

OFFICE OF THE CHIEF GENERAL MANAGER (PP&D),
BIJULEE BHAWAN, GUWAHATI-781 001



TENDER DOCUMENT FOR

NIT NO: - Short Tender Notice No. AEGCL/MD/AIIB/Route Survey_Master Plan
/2022/BID/E

NAME OF THE WORK: - Preparation of Master Plan for 132kV CHABUA GIS and
Route Survey for associated Transmission Line under
AEGCL - E

Price: - ₹ 500/-



ASSAM ELECTRICITY GRID CORPORATION LIMITED

Regd. Office: 1stFloor.Bijulee Bhawan. PALTANBAZAR; GUWAHATI - 781001

CIN: U40101AS2003SGC007238

PHONE: 0361-2739520 FAX NO.0361-2739513

Web: www.aegcl.co.in Email: cgm.ppd@aegcl.co.in

INDEX

<u>Chapter</u>			<u>Page No</u>
Chapter-I	Short Tender Notice	3
Chapter-II	Scope of Work	4
Chapter-III	Instruction for bidders and General Conditions	5
Chapter-IV	Bidder's Details	8
Chapter-V	Schedule of work	9



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Short Tender Notice

No. AEGCL/MD/AIIB/Route Survey_Master Plan /2022/BID/E

dtd:- 18 . 11.2022

Chief General Manager (PP&D), AEGCL invites short sealed quotations in prescribed format from experienced contractor(s)/firm(s) having experience in survey works for execution of the following works of AEGCL.

Invitee: The Chief General Manager (PP&D), AEGCL

Name of Work: Preparation of Master Plan for 132kV CHABUA GIS and Route Survey for associated Transmission Line under AEGCL – E

Scheme: AIIB Phase-II Funding

Duration of Completion: Submission shall be within 30 days from date of issue of the work order.

Tender Fee (Non Refundable): INR 500/- (Rupees Five Hundred) only.

Earnest Money Deposit (EMD): INR 10,000/- (Rupees Ten Thousand) only.

Address: The Chief General Manager (PP&D), AEGCL, 1st Floor, Bijulee Bhawan, Ghy-781001

Issue of Tender Paper/Tender Start Date: On all working days from 18 . 11. 2022

Receipt of Tender Paper /Tender end Date: Till 12: 00 hrs of 25 . 11. 2022

Tender opening Date: 14:00 hrs of 25 . 11. 2022

In case the date of receiving of tenders happen to be holiday the next working day will be treated as receiving/ opening date of tender at the same time and place.

The undersigned reserves the right to reject the tender (partly or in whole) without assigning any reason thereof and does not bind himself to accept the lowest tender.

Sd/-

Chief General Manager (PP&D)
Assam Electricity Grid Corporation Ltd.



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Chapter-II

Scope of Work

The brief description of scope covered under this Bidding Document is furnished below:

- a) Preparation of detailed Master Plan required to initiate the process of construction of the 132/33kV CHABUA GIS.
- b) Route Survey for associated line LILO of Tinsukia (AEGCL-Existing) - Dibrugarh (AEGCL-Existing) S/C Line (approx. 8 km)
- c) The different tasks need to be carried out in the scope of work are as laid out in the attached – schedule of work in Chapter V.



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Chapter-III

Instruction for Bidders and General Terms and Conditions

1. Sealed bids in prescribed format are to be submitted with Name of the Work, Tender Reference No./Short Tender Ref No. and Name of the bidder mentioned on the sealed envelopes containing the bids.
2. The tender shall be submitted in two separate parts, each in separate sealed covers superscribed as follows.
Part I – Technical & Commercial bid.Part II – Price bid.
3. Tender should be written either in ink or typed. No tender filled in otherwise shall be considered.
4. Every tender must be accompanied with Earnest Money amounting to INR 10,000/- in the form of A/C payee Demand draft/ Bankers Cheque pledged in favour of the Assam Electricity Grid Corporation Limited, Bijulee Bhawan, Paltanbazar, Guwahati-1, and Payable at Guwahati. Tenders without EMD / EMD of lesser amount shall be rejected outright.
5. The cost of the tender documents is Rs. 500.00 (Rupees five hundred) only in the form of Banker's Check /Demand Draft draft in favour of Assam Electricity Grid Corporation Limited, Guwahati-781001 and to be submitted along with the tender in 'Part I – Technical & Commercial bid'.
6. The rates against item(s) as detailed in the Schedule of Work (Chapter-V) are to be quoted as per the given schedules and shall be submitted along with the bid in "Part II – Price bid."
7. Every tender should quote rate of all items clearly both in figure and word. Taxes should be indicated separately in given columns.
8. The tenders should reach/ be submitted in the office of the Managing Director, AEGCL, Bijulee Bhawan, Paltanbazar, Guwahati-781001 on or before 12-00 hours on 25.11.2022
9. The Part-I (Technical & Commercial bid) of the tender will be **opened at 14:00 hours on 25.11.2022** in the office of the Managing Director, AEGCL, Bijulee Bhawan, Paltanbazar, Guwahati-781001, in presence of the authorised representatives who desire to be present.
10. The Part-II (Price bid) of the bidders whose bids are shortlisted in the "Technical Evaluation" of Part-I (Technical & Commercial bid) shall be opened separately.
11. Tenders shall preferably be submitted in person or by registered post with AD. Tenders received late due to delay in postal/courier service/ late due to any other reason shall not be considered. The tenders received after due date and time shall be returned unopened by post.
 - (a) Telegraphic tenders / tenders sent by means of FAX shall not be considered
 - (b) If for any unforeseen reasons the date of opening of bid turns into a holiday, the tenders shall be opened on the next working day at the specified time
12. The tender shall be accompanied with the registration certificate / GST/ Income tax certificate etc. of the contractor/ firm etc. participating as the bidder.
13. The contractor must have registration with the concerned department of Government of Assam/Govt. of India.
14. The Contractor/Firm should produce work experience/completion certificate in the name of the Contractor/Firm of at least 1(one) complete work relevant to the tendered work, done within last 10 years.
15. All pages of the submitted bid by an intending bidder must contact seal and signature of the bidder.
16. The Chief General Manager, (PP&D), AEGCL Circle reserves the right to reject any or all the tenders without assigning any reason thereof and further reserves the right to split up the supply order/ work order in favour of more than one contractor.



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17. The works vide the work order issued to the successful bidder must not be sublet.
18. No labour below 18 years should be engaged and contractor should have labour licence from competent authority.
19. The tender shall have to be submitted in the prescribed form only.
20. The tender shall be completed in all respect. Incomplete tender will not be considered and will be rejected.
21. The contractor will be responsible for safety of his materials.
22. Cost for construction of temporary building for storage of materials etc. house for contractor and staff should bear by the contractor. No rent will be paid by the AEGCL.
23. **ELIGIBILITY CRITERIA:**
 - (i) **EXPERIENCE**

Reputed and financially sound engineering firms/contractors having experience of successfully executing similar nature of work during the last 10 years. (Submitted with supporting documents).

Documentary Evidence of Experience in works of a similar nature and volume for each such work in the last ten years, and/or details of works presently under way or contractually committed and their respective clients.
 - (ii) **CAPABILITY**
 - (a) Each bid shall be accompanied by a statement by the bidder declaring that he/she/it is a bona-fide engineering contractor and has in possession adequate equipment, qualified personnel to fill positions required for execution of the work.
 - (b) The Bidder will supply information of the key personnel, design & engineering staff, support staff, field staff etc. proposed for the work along with details of their experience in similar nature of work.
 - (c) The Bidder should also substantiate availability (either owned or leased) of the tools, tackles, spare parts etc. for carrying out the works.
24. **Supervising Authority:** The work shall be carried out under supervision of the concerned AGM as specified in Work Order.
25. **Approving Authority:** The CGM (PP&D), AEGCL shall give final approval to the submitted report. After approval, the contractor shall submit the report(s) to this office as follows:
Hard copies: 6 nos. of approved hard copies Soft copies: 6 nos. in USB drives.
All data is to be submitted in AutoCAD format, PDF as well as hard copies (Coloured) as referred above.
26. **Execution of Work:** The execution of work shall be done in the presence of AEGCL officials/representatives. The successful bidder before beginning of the work shall intimate AEGCL regarding their readiness to initiate the work.
27. **Liquidated Damage:** The date of completion of work shall be deemed as the essence of the work order and shall not be completed no later than the time specified in the contract. In case of failure, AEGCL shall be entitled to recover an amount at the rate of 0.5% of the contract price per week subject to maximum of 10% of the work order value as liquidated damage of AEGCL. However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the work.
28. **Performance Guarantee:** A DD/BG for an amount equivalent to 10% (ten percent) of the total value of the work will shall have to be submitted as performance security within 3 days from date of issue of the W.O. and the said BG/DD shall be valid for a period of upto 3(three) months from the date of issue of W.O. After successful completion of the work and on completion of the period, the BG/DD shall be released on written request from the bidder.
29. Income tax shall be deducted at source. GST as per the GST norms shall be paid to the contractor.



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30. The contractor should produce experience of such work executed earlier with supporting documents.
31. **Joint Venture is allowed. In case the bidder is a JV, notarized JV agreement alongwith Power of Attorney has to be submitted.**
32. **BIDDER SHOULD EXAMINE & UNDERSTAND**
All prospective bidders are required to thoroughly study and carefully examine all the terms and conditions, instructions, requirements & specifications pertaining to the work and visit the field of work to fully satisfy and acquaint themselves about the nature and location of work, the configuration of the ground, the surface conditions, quality and quantity of materials required and the type of equipment and facilities needed preliminary to and during the execution of the work and local conditions which may affect the work or cost thereof. Failure to do so will be at the bidder's risk.
33. Any condition not included herewith will be applicable as per the "GENERAL CONDITIONS OF SUPPLY AND ERECTION-2009" OF AEGCL.



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Chapter –IV

BIDDER DETAILS

Tender Notice No. AEGCL/MD/AIIB/Route Survey_Master Plan /2019/BID/E dtd: – 11 - 2022

Name of work: **Preparation of Master Plan for 132kV CHABUA GIS and Route Survey for associated Transmission Line under AEGCL - E**

Name of Bidder:-

Address: -

Bidder's Contact Official/Representative

Contact No:

Email Id:

Contact No:

PREVIOUS EXPERIENCE (As per Clause 15, Chapter-III):

(Make a list of your works of similar nature executed/completed by you along with supporting documents and enclose sheets if necessary).

DECLARATION (As per Clause 15, Chapter-III):

Manpower & Equipment(s) List (As per Clause 15, Chapter-III):

Seal and Signature of the Bidder.



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Chapter –V

SCHEDULE OF WORK

(To be filled up and submitted separately as part of the 2nd Envelope i.e Part-II – Price BID)

From

.....
.....
.....

To

The Chief General Manager (PP&D),
AEGCL,
1st Floor, Bijulee Bhawan, Ghy-781001

Sub: - Submission of Tender for the Work – “NAME OF THE WORK”.

Ref: Your Tender Notice NO AEGCL/MD/AIIB/Route Survey_Master Plan /2022/BID/E dtd:- -11-2022

Sir,

Having thoroughly examined all terms and conditions of the NIT and having clearly understood the scope and specifications of the work to be executed as incorporated in the tender specification, I/We.....am/are submitting my/our rates for the work as follows;

1. NAME OF WORK: Preparation of Master Plan

SI No.	Details	Unit	Qty.	Unit Rate	GST	Amount
1	Construction of two (2) nos. of permanent RCC benchmark pillars at suitable locations - all future references shall be obtained from them. Size of the pillar should be minimum 300mm X 300 mm HFL & FGL markings should be shown in the benchmark pillar.	Job	1			
2	Survey of the entire land area in 5 m X 5 m grid marking with RL using total station and submit on AutoCAD, scaled drawing and marking by peg on the field. **	Job	1			
3	Marking the switchyard, control room, incoming and outgoing feeders, etc on auto CAD scaled drawing and marking by peg on the field. **	Job	1			
4	Planning and marking of staff quarters , guest house, internal roads, drainage system, storm water management etc. on AUTOCAD drawing **	Job	1			
5	Planning and marking on AutoCAD drawings about street lighting , boundary wall, security fencing illumination etc **	Job	1			



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SI No.	Details	Unit	Qty.	Unit Rate	GST	Amount
6	Planning , estimation and marking on AutoCAD drawings about boundary wall and gate with details of entire colony **	Job	1			
7	GA Drawing for Water supply arrangement, rain water harvesting system and provision for bore hole / overhead tank.	Job	1			
8	Preparing a Proper Substation Layout Drawing to scale along with SLD clearly specifying the schemes on AutoCAD.	Job	1			

** HFL & FGL: Should be marked in the master plan(s).

2. NAME OF WORK: **Route Survey for associated Line**

SI.No	Description of Work / Item(s)	Qty	Units	Unit Rate	GST	Amount
1	Preliminary/walkover survey from identification of three alternate route and finalization of most economical and optimum Route and digitalization of the route map showing Topographical and other features and indicating the final selected route alignment, soil resistivity measurement, Three enumeration and submission of reports as per format enclosed and as mentioned in the technical specification.	8	Kms			
2	Detailed survey using GPS, total work station, digital theodolite/ALTM including profiling, tower spotting and optimization of locations using computer aided techniques as well as other activities in the scope of work.	8	Kms			

Signature of the Bidder.

3. TECHNICAL SPECIFICATIONS FOR REFERENCE OF THE BIDDERS

3.1.0 TECHNICAL SPECIFICATIONS FOR SURVEY FOR REFERENCE OF THE BIDDERS:

3.1.1 PRELIMINARY/WALKOVER SURVEY

- 3.1.1.1 Identification of three alternative route alignments & selection of optimized route alignment. This shall be done using low resolution satellite imageries of NRSA, Google images and Survey of India maps. The output shall be in the form of digitized route alignment drawing with latest topographical and other details/features up to 8 kms on either sides of selected route alignment (both in hard and soft copies).
- 3.1.1.2 Digital terrain modelling along the selected route using contour data from topographical maps. Digitization can be done manually and automatically using software. For this purpose ArcGIS Editor, Arc View, ERDAS, AutoCAD, R2V etc. are to be used.
- 3.1.1.3 **For selection of routes, the statutory clearances as per Relevant Standards should be complied with and clearly mentioned in the reports.**
- 3.1.1.4 Walk-over Survey of the route alignment (finalized in consultation with the AEGCL).
- 3.1.1.5 The following areas, however, are to be avoided as far as possible while selecting the routes of the line:
- a) Tough inaccessible areas where approach is difficult
 - b) Towns and villages, leaving sufficient margin for their growth.
 - c) Areas subject to floods, gushing nalas during rainy seasons, tanks, ponds, lakes, etc. and natural hazards.
 - d) Wooded areas with high trees or fruit bearing trees involving payment of heavy compensations for cutting of the trees.
Swamps and shallow lands subject to flood, marshy areas, low lying lands, river beds and earth slip zones, etc. involving risk to stability to foundations.
 - e) High hillocks / hilly areas / sand dunes and areas involving abrupt changes in levels and requiring too many long spans.
 - f) Series of irrigation wells.
 - g) Shooting areas and other protected areas such as army / defence installations/ ammunition depots , areas of archaeological importance, forest areas and wild life sanctuary.
 - h) Areas which involve risk to human life, damage to public & private properties, religious places, cremation grounds, quarry sites and underground mines, gardens, orchards and plantations.
 - i) Areas which will create problems of right of way and way leaves.
 - j) Buildings / Storage areas for explosives or inflammable materials, bulk oil storage tanks, oil or gas pipelines, etc.
- 3.1.1.6 Preliminary survey is to transfer the route to the ground with such deviations as may be necessary as per field constraints. Instruments like Survey chains, tapes, theodolite, total station etc are to be used.
- 3.1.1.7 Preliminary survey involves :
- i. Fixing of angle points of the towers
 - ii. Identification of crossings of all electrical lines & details of the lines.
 - iii. Finalizing of crossing points of Railway Tracks & details of such points.
 - iv. Finalizing of crossing points of major rivers & details of such points
 - v. Finalizing of crossing points of roads, national highways & details of such points
 - vi. General classifications of soils, land including forest area (if any).
 - vii. Measurement of route length etc
 - viii. Pegging of locations.
 - ix. Following points may be noted in this regard:



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- a. Measurements of the angles of deviation at all angle / section points are made. Resurvey of parts of the line route is done wherever it is possible to reduce the number of angle points and / or the magnitude of the angles of deviation.
- b. The length of the line route is measured with the use of survey chains or with the theodolite. When using survey chains for measuring the length of the line route, the chain should be kept horizontal in uneven or undulating land so that horizontal distances are measured and not the distances along the contours of the land.
- c. The number of consecutive spans between two angle / section points shall not exceed 15 (fifteen) in plain terrain and 10 (ten) spans in hilly terrain.
- d. The length of any section of the line, i.e., between two angle / section points, shall not exceed 5 km in plain terrain and 3 km in hilly terrain. In case longer sections are available, then cut points / section points shall be provided by using "B" type tower.
- e. If the terrain & line route permit, attempts can be made so that the section lengths are, as far as possible, in multiples of the basic span of the towers for the relevant voltage class.
- f. The Preliminary survey report shall be prepared and submitted by the surveyor to the AEGCL.
- g. After approval is given, the surveyor shall go ahead with the detailed survey.

3.1.1.8 Requirement of Transmission Line Routing

- i. The alignment of the transmission line shall be most economical from the point of view of construction and maintenance.
- ii. During routing of transmission line, the points in Clause 3.5.1.6 should be kept in mind.
- iii. Routing of transmission line through protected/reserved forest area should be avoided. In case it is not possible to avoid the forests or areas having large trees completely, then keeping in view of the overall economy, the route should be aligned in such a way that cutting of trees is minimum.
- iv. The route should have minimum crossings of Major river, Railway lines, National/State highways, overhead EHV power line and communication lines.
- v. The number of angle points shall be kept to a minimum.
- vi. The distance between the terminal points specified shall be kept shortest possible, consistent with the terrain that is encountered.
- vii. Marshy and low lying areas, river beds and earth slip zones shall be avoided to minimize risk to the foundations.
- viii. It would be preferable to utilize level ground for the alignment.
- ix. Alignment will be kept at a suitable distance from power lines to avoid induction problems on the lower voltage lines.
- x. Crossing of communication line shall be minimized and it shall be preferably at right angle. Proximity and parallelism with telecom lines shall be eliminated to avoid danger of induction to them.
- xi. Areas subjected to flooding such as Nalah shall be avoided
- xii. Restricted areas such as civil and military airfield shall be avoided. Care shall also be taken to avoid aircraft landing approaches.
- xiii. All alignment should be easily accessible both in dry and rainy seasons to enable maintenance throughout the year.
- xiv. Certain areas such as quarry sites, tea, tobacco and saffron fields and rice plantations, gardens & nurseries which will present the AEGCL problems in acquisition of right of way and way leave clearance during construction and maintenance, should be avoided as far as possible.



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- xv. Angle points should be selected such that shifting of the point within 100 m radius shall be possible at the time of construction of the line.
- xvi. The line routing should avoid large habitations, densely populated areas, Forest, Animal/Bird sanctuary, reserve coal belt areas, oil pipe line / underground inflammable pipe lines etc. to the extent possible.
- xvii. The areas requiring special foundations and those prone to flooding should be avoided as far as possible.
- xviii. In case of Tower Types, foundations, modern techniques like Monopoles, Multi-Circuit Towers, Narrow Based Towers, etc. shall be explored.

3.1.1.9 For examination of the alternatives & identification of the most appropriate route, besides making use of information/data/details available/extracted through Survey of India Topographical maps and computer-aided processing of NRSA's satellite imagery.

3.1.1.10 The contractor shall submit his preliminary observations & suggestions along with various information/data /details collected and also processed satellite imagery data, scanned topographical map data marked with the alternative routes etc. The final evaluation of the alternative routes shall be conducted by the contractor in consultation with AEGCL's representatives and optimal route alignment shall be proposed by the contractor. Site visit and field verification shall be conducted by the contractor for the proposed route alignment.

3.1.1.11 Final digitized route alignment drawing with latest topographical and other details/features including all rivers, railway lines, canals, roads etc. upto 8 kms on both sides of selected route alignment shall be submitted by the contractor for AEGCL's approval along with report containing other information/details as mentioned above.

3.1.1.12 The co-ordinates of all the angle points as well as other important crossings, landmarks etc. shall be recorded using GPS instrument.

3.2.0 DETAILED SURVEY

3.2.1 The detailed survey shall be carried out using GPS, total stations, digital theodolites etc. along the approved route alignment. As an alternative, the contractor may also use ALTM (Airborne Laser Terrain Modeling) techniques of equal or better accuracy for the detailed survey and plotting on topo sheet to fix up angle point.

3.2.2 Soil resistivity, along the route alignment shall be measured in dry weather by four electrode method keeping inter – electrode spacing of 50 mtrs. For calculating soil resistivity formula $2\pi ar$ (where $a=50$ m and r =megger reading in ohms) shall be adopted. In case of soil characteristics changes within 2 to 3 km, values shall have to be measured at intermediate locations also. Megger reading and soil characteristics should also be indicated in the soil resistivity results.

3.2.3 Route Marking:

The route of the transmission line shall be recorded using GPS of positional accuracy less than 3m. The co-ordinates of all the angle points as well as other important crossings, landmarks etc. shall be recorded using GPS for easy relocating. At the starting point of the commencement of route survey the co-ordinates shall be recorded. The co-ordinates of the location of the survey instrument shall also be recorded. Further, the co-ordinates at prominent position at intervals of not more than 750 meter along the transmission line to be surveyed upto the next angle point shall also be recorded. Wherever the line alignment crosses the EHT line, Railway line, P&T line or roads, the contractor shall record co-ordinates on the points of crossing. Wherever line route alignment passes over permanent land marks such as rock, boulders,



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culverts etc. suitable white paint marks with directional and AEGCL markings shall be made and coordinates recorded. Surveyor should provide concrete block of size 1000x150x150 mm buried to a depth of atleast 750 mm with AEGCL's name embossing on the concrete block at all angle point locations and important crossings etc.

3.2.4 Profiling

3.2.4.1 The complete profiling along the route shall be carried out using surveying equipments viz. total stations, GPS, digital theodolite, long range scanners etc. Reference levels at every 20 meters along the route are to be recorded. R/Ls at other undulations along the route as well as in the route plan and other enroute details viz. crossings, building & structures, trees & other infrastructure etc shall also be recorded. Areas along the route, which in the view of the contractor, are not suitable for tower spotting, shall also be marked.

3.2.4.2 The complete profiling details shall be digitized and the data shall be prepared & stored in the format compatible to computer – aided tower spotting software.

3.2.4.3 A printed / plotted output of the digitized profiling shall be submitted by the contractor to AEGCL's site-in-charge for review before taking up computer- aided tower spotting.

3.2.5 Optimization of tower location / tower spotting :

3.2.5.1 Optimization of tower locations shall be done by the Contractor using computer-aided tower spotting software (PLS CADD). In order to verify the results of computer aided tower spotting, the contractor shall supply the AEGCL, one soft copy of tower spotting & optimization report.

3.2.5.2 The sag-tension characteristics of the conductor as well as tower spotting data, sag template curves, if any required for tower spotting shall be prepared by the contractor on acrylic sheet indicating cold curve, hot curve, ground clearance curve and support footing curve.

3.2.5.3 Tower Spotting: While profiling & spotting the towers, the following shall to be borne in mind :

(a) Span: The number of consecutive spans between the section points shall not exceed **15 spans or 5 km in plain terrain and 10 spans or 3 km in hilly terrain** for 220KV line. A section point shall comprise of tension point with minimum angle of deviation type towers as applicable.

(b) Extension / Truncation: An individual span shall be as near to the normal design span as possible. 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 / leg extension. In case of locations where the ground clearance is available, truncated towers may be spotted. The provision kept in the design of towers with respect to body/leg extensions, truncations shall be intimated to the contractor by the AEGCL during execution stage.

(c) 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 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.

(d) Road/NH Crossing: At all important road crossings, the tower shall be fitted with double suspension or tension insulator strings depending on the type of tower but the ground clearance at the roads under maximum temperature and in still air shall be such that even with conductor broken an adjacent span, ground clearance of the conductor from the road surfaces will not be less than 9



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Mtr for 220KV & 132KV line. At all national highways tension towers shall be utilised and crossing span shall not be more than 250 meters.

- (e) Railway Crossings: All the railway crossings coming enroute the transmission line shall be identified by the contractor. 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 large angle 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 centre 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 15.40 Mtr for 220KV line. And 14.6 Mtr for 132KV line.
 - vi) The crossing span will be limited to 80% of Normal Span or 250 meters whichever is less.
- (f) River Crossings: In case of major river crossings, towers shall be of suspension type and the anchor towers on either side of the main river crossing shall be large angle Y/ D 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). Minimum ground clearance above the highest flood level river and lowest point of conductor shall be 3 Mtr. for 220KV line.
- (g) Power line crossings: Where this line is to cross over another line of the same voltage or lower voltage, R / 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 / Indian Electricity Act, 2003 as amended upto date. In order to reduce the height of the crossings towers it may be advantageous to remove the groundwire of the line to be crossed (if this is possible, and permitted by the AEGCL of the line to be crossed). For power line crossings of voltage level of 132 KV and above, an angle towers shall be provided on either side of tangent R / A type tower which can be temporary dead end condition with proper guying.
- (h) Telecommunication Line Crossings: The angle of crossing shall be as near to 90 degree 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.
- (i) Details en route: All topographical details, permanent features, such as trees, buildings etc. 17.5Mtr (Total 35Mtr) for 220KV line on either side of the alignment and 8Mtr (Total 16Mtr.) for 132KV Line on either side of the alignment shall be detailed on the profile plan.

3.2.5.4 Clearance from Ground, Building, Trees etc.

- (a) Clearance from ground, buildings, trees and telephone lines shall be provided in conformity with the Indian Electricity Rules, 1956 / Indian Electricity Act, 2003 as amended upto date.



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- (b) The contractor shall count, mark and put proper numbers with suitable quality of paint at his own cost on the trees that are to be cut by the AEGCL at the time of actual execution of the work as detailed below. Contractor may please note that AEGCL shall not pay any compensation for any loss or damage to the properties or for tree cutting due to contractor's work.
 - (c) To evaluate and tabulate the trees and bushes coming within 17.5 Mtr. for 220KV line and 8 Mtr. for 132KV line on either side of the central line alignment the trees will be numbered and marked with quality paint serially from angle point 1 (1) onwards and the corresponding number will be painted on the stem of trees at a height of 1 meter from ground level.
 - (d) The trees list should contain the following :
 - i. Girth (circumstances) measured at a height of 1 meter from ground level.
 - ii. Approximate height of the tree with an accuracy of +2 meters.
 - iii. Name of the type of the species / trees.
 - iv. The bushy and under growth encountered in the 35 Mtr. Belt for 220KV line and 16Mtr for 66KV line should also be evaluated with its type, height, girth and area in square meters, clearly indicating the growth in the tree / bush statement.
 - v. The contractor shall also intimate the AEGCL, his assessment about the likely amount of tree & crop compensation etc required to be paid by the AEGCL during execution stage. This assessment shall be done considering prevailing practices / guidelines, local regulations and other enquiries from local authorities.
- 3.2.5.5 The profile sheets showing the locations of the towers together with preliminary schedules of quantities indicating tower types, wind & weight spans, angle of deviation, crossing & other details etc shall be submitted by the contractor for review & approval by AEGCL's site in charge.
- 3.2.5.6 Types of tower shall be A, B, C, D as per IS 5613 and other relevant standard for transmission lines.
- 3.2.5.7 Conductor to be used for 220 KV and 132 KV lines shall be AAA Zebra and panther conductor respectively.
- 3.2.5.8 Tower Schedule submitted shall be as per format specified in Annexure 6.
- 3.2.5.9 Detailed survey of tower locations:
 - (a) The detailed survey shall be conducted to locate the tower locations on ground conforming to the profile and tower schedule.
 - (b) The co-ordinates of all the tower locations shall also be recorded using GPS of positional accuracy less than 3m for easy relocating. The positions of all tower locations shall be marked in the final digitized route alignment drawing with relative distances from any permanent bench mark in the area.
 - (c) The contractor shall also collect required data at each tower location in respect of soil strata, ground water level, history of water table in adjacent areas / surface water and classify the suitable type of foundation at each tower location based on the data collected at each location and detailed soil investigations carried out at selected locations etc.
 - (d) The levels up or down of each pit centre with respect to centre of tower location shall be recorded at intervals of 2m using total stations / GPS / digital theodolite and digitized contour plans shall be made. Based on the digitized elevation plans, the quantities of benching & protection work vis-à-vis possible unequal leg extensions shall be optimized using suitable computer aided techniques / softwares.
- 3.2.5.10 The changes desired by the AEGCL in the preliminary tower schedule or as may be required based on detailed survey of tower locations & contouring by the contractor, shall be carried out by the contractor and the final tower schedule shall be submitted for approval of AEGCL. The tower schedule shall show



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position of all type of towers, span length, type of foundation for each tower, benching & revetment requirement, unequal leg extensions, deviation at all angles, crossings & other details etc.

3.3.0 TECHNICAL SPECIFICATIONS FOR MASTER PLAN:

Drawings and Documents in conformity with the following:

3.3.1 Construction of two (2) nos. of permanent RCC benchmark pillars at suitable locations - all future references shall be obtained from them. Size of the pillar should be minimum 300mm X 300 mm.HFL & FGL markings should be shown in the benchmark pillar, for each substation.

3.3.2 For each substation. survey of the entire land area of the GSS in 5 m X 5 m grid marking with RL using total station and submit on AutoCAD, scaled drawing and marking by peg on the field. **

3.3.3 Marking the switchyard including Cable trench, control room, incoming and outgoing feeders, etc. on auto CAD scaled drawing and marking by peg on the field. **

3.3.4 Planning and marking of staff quarters, guest house, internal roads, drainage system, storm water management etc. on AUTOCAD drawing **

3.3.5 Planning and marking on AutoCAD drawings about street lighting, boundary wall with security post, security fencing illumination etc. **

3.3.6 Planning, estimation and marking on AutoCAD drawings about boundary wall and gate with details of entire colony **

3.3.7 Preparing a Proper Substation Layout Drawing to scale along with SLD clearly specifying the schemes on AutoCAD.

3.3.8 GA Drawing for Water supply arrangement, rain water harvesting system and provision for bore hole / overhead tank.

**HFL & FGL: Should be marked in the master plan(s).