



GUJARAT ENERGY TRANSMISSION CORPORATION LTD.

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TECHNICAL SPECIFICATION
FOR
SUPPLY & ERECTION WORK
OF
220 KV TRANSMISSION LINES

GETCO/E/TS SEL054/R3 Dt. Nov. 2017

SEAL AND SIGNATURE
OF BIDDER

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SECTION-I
TECHNICAL SPECIFICATIONS

1. General Information and Scope

1.1 Scope

1.1.1 The turn key work of procurement, erection & commissioning of 220kV transmission lines are included in the scope of the Bidder.

1.1.2 Check survey of the route given by GETCO and preparation of profiles.

1.2 Procurement of raw materials like steel, zinc etc. required for fabrication and galvanizing, Inspection of raw steel and Fabrication , Galvanizing, inspection at manufacturer's works and supply of all types of 220 KV D/C Transmission tower materials suitable for "ACSR Zebra " conductor as per the GETCO's approved design/ drawing including approved quality bolt nuts (5.6 class), pack washers, spring washer & accessories, phase plate, number plate, circuit identification plate, anti climbing devices etc. This also includes the extension portion above six meter extension as per line requirement, design and supply including foundation design thereof with no extra cost to GETCO.

1.3 Procurement and supply of earthing material for pipe type and counter poise type earthing as per the GETCO's approved drawing/s including all materials.

1.4 Procurement and supply of danger plate, number plate, circuit identification plate and phase plate as per the GETCO's approved drawings including all material and obstruction lights (wherever applicable) for aviation requirements (as required)

1.5 Procurement and supply of Earth wire 7/3.15mm or OPGW, hardware & accessories for conductor and earth wire or OPGW, Silicon rubber insulator/Anti-Fog Disc Insulators/ Plain Disc Insulators suitable for 220 KV (suspension & Tension type), TMT bars and cement of 43 grades as per IS-8112 of brand approved by GETCO for casting foundations for various type of towers as per drawings.

1.6 Taking delivery of all materials to be procured /manufactured by the successful Bidder, to check the material before transportation from sub vendor's to own works and to keep them in safe custody at store at site.

1.7 Transportation of all materials to erection site and transit insurance of material to be supplied / transported.

1.8 Excavation for different types of foundations of various towers as per GETCO approved drawing and back filling with normal soil, erection of tower, tack welding of bolt-nuts including supply and application of zinc rich paint preferably Berger /shalimar and 2 coat of enamel paints Berger/Asian for bottom most two panel (up to 10 Meter) including special tower.

- 1.9 Insulator hoisting, stringing of conductor and earth wire including laying, jointing, jumpering and tree cutting of entire section for safe clearance including clearance towards right of way.
- 1.10 Guarantee of all above items, materials and activities. Other items not specifically mentioned in this Specification and are required for the successful erection and commissioning of the transmission line, unless specifically excluded in the Specification.
- 1.11 The successful Bidder shall make his own arrangement for procurement of required bolt nuts, accessories attachments like D shackles, U bolts, anchor bolts, step bolts etc from approved vendor of GETCO well in advance and supply as per scheduled completion period along with the inspection at sub vendor's premises.
- 1.12 ACSR Zebra conductor will be supplied by the Corporation to the successful bidder. The maximum ceiling for wastages permitted is as under.
- a) 0.5%-For jumpering & sag
 - b) 0.5%-For credit as scrap of cut piece length from 10 Meters up to 30 Meters.
 - c) 0.5%-For credit in pieces as good conductor length from 30 Meters up to 100 Meters.
- All the wastages are accountable except for Conductor as mentioned above. The account of permissible wastages shall be maintained at site in the registers as prescribed by the Engineer in charge.
- The contractor will not be required to credit the empty wooden drums in case of Conductor is supplied by Corporation. However, steel drums are on returnable basis.
- 1.13 The successful Bidder has to carry out the design work for structure for non available extension above 6 Mtr. to suit the approved tower design of GETCO including the design of their foundations and design of special Towers (River crossing), raised chimney with no extra cost to GETCO.

2. Procurement of equipment, tools-tackles & materials:

- 2.1 All the materials, tools, equipments required in sufficient quantity, shall be procured/ arranged by the successful Bidder before the work is taken up on hand and shall not link the delivery/completion period with non procurement/arrangement made by him for these items.
- 2.2 In case of non-availability of required steel sections for manufacturing of tower, Bidder at his own cost shall procure and utilize next higher section to complete the work. However, use of such higher section is to be got approved by the GETCO and, no extra payment will be made beyond guaranteed BOM weight for use of higher section.

3 Drawings & Bills of Materials:

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- 3.1 The GETCO shall provide one set of drawings and Bills of Material for various types of 220 KV D/C towers suitable for "ACSR Zebra" conductor upto 6 Mtr. extension to be utilized for this line to the successful Bidder on award of contract.
- 3.2 The GETCO shall provide one set of detailed drawing to the successful Bidder for various material like insulator, hard wares / accessories, danger board & number plates to be procured by the Bidder.
- 3.3 The GETCO will provide drawings for foundation upto 6 Mtr. extension of towers and earthing to be carried out for various types of towers to the successful Bidder.
- 3.4 The GETCO will provide one set of structure drawings, Bills of Material and foundation drawings for various types of available extensions above 6 Mtr. of 220 KV D/C towers suitable for "ACSR Zebra" conductor to be utilized for this line to the successful Bidder on award of contract. However, design for non available extensions of structure and foundations shall be in scope of bidder with no extra cost to GETCO.
- 3.5 Design /drawing for any other item to be executed including foundation, tower, non available extension above 6 Mtr., additional member for special tower cross arm, special Tower (river crossing), raised chimney base plate assembly if any shall be prepared by the Bidder and submitted to the GETCO for approval at no extra cost to the GETCO.

4. Inspection:

- 4.1 The inspection of materials shall be carried out as per the relevant Indian Standards at the Manufacturer's works according to all acceptance tests.
- 4.2 The testing charges for inspection shall be borne by the Bidder.
- 4.3 If the testing facilities are not available at the manufacturer's works than same shall be carried out at third party laboratory at no extra cost to the GETCO.
- 4.4 The Bidder shall replace the materials if not found as per the specific requirements at no extra cost to the GETCO, including testing charges if any.
- 4.5 The Bidder shall intimate the date for inspection well in advance i.e. at least 15 days before to enable GETCO to depute his representative for inspection.
- 4.6 Although the materials have to be supplied as per IS and or as per the tender specifications, the GETCO reserves right to take sample of any material from the lot received at site and get the same tested according to IS at third party laboratory. The materials should pass the tests and if the material fails, the entire lot will be rejected and Bidder should make immediate arrangement for replacement with fresh materials and after getting them duly inspected. Rejected /defective material if found during inspection shall be destroyed in presence of GETCO representative.

5.0 Despatch of Materials:

- 5.1 All the materials shall be dispatched only after inspection and dispatch clearance from the Chief Engineer (Project), Corporate Office, GETCO-Vadodara
- 5.2 Delivery of materials after satisfactory inspection and clearance shall have to be taken by the Bidder and to be stored in his store at site within the vicinity of transmission line till its utilization on the line.
- 5.3 Intimation/proof of receipt i.e. TRC and S.R Note of Tower materials, Insulator , Earth wire, OPGW, Hardware and Accessories for conductor and earth wire or OPGW at Bidder's store will be issued by the concern Executive Engineer (Const) GETCO, from time to time. The defective materials should be replaced by the Bidder without charging any extra cost to the GETCO.
- 5.4 Successful Bidder shall obtain permission from concern Construction Division Office before making Arrangement for stacking of material at site (Yards/Stores) as and when required. The cost and handling of storage shall be to the Bidder's account.

6.0 Wastages:

- 6.1 The tower material, earth wire or OPGW, Silicone rubber insulators, Antifog Disc Insulators, Plain Disc Insulators, hardware for conductor and earth wire, cement, RCC etc are to be procured by the successful Bidder and shall make his own arrangement for storage to avoid breakage, losses and wastage of material, cement, etc.
- 6.2 The maximum ceiling for wastages permitted are as under:

Sr. No.	Item	% wastages permitted (Maximum)
i)	Earth wire.	½% (for sag, jumper & sister wire.)
ii)	OPGW	NIL

- 6.3 No wastage is allowed for any material except the percentage limit mentioned for Earth wire here in above in Clause No. 6.2 and for Conductor in Clause No. 1.12

7.0 Quantities:

- 7.1. The quantities mentioned in the schedule attached herewith are tentative and to be procured/executed by the successful Bidder at the same rates accepted by the GETCO in the A/T and all the terms and conditions of an order. However, payment shall be made only for the quantities utilized / actual executed to complete the work. In case of any deviation resulting in any increase in quantity, prior approval of corporate office, GETCO will be required.
- 7.2 Templates for each type of tower including extension and special tower should be supplied by the Bidder with bolt-nuts etc. at no extra cost to the GETCO.

Sufficient quantity of templates shall be provided by the Bidder to complete foundation work

8. General:

- 8.1. The Bidder shall not use any drawing/designs or part thereof of all/any structure /line material covered under the Contract for the purpose other than the contract awarded.
- 8.2 In an event of any material used for transmission line found broken or damaged or received short during transit or failed during the erection/ testing at site before commissioning of line, the Bidder shall replace the same free of cost. However, GETCO will arrange recoveries of amount equivalent to cost of such damaged / broken / short supplied materials before actual replacement is given.

9.0 Audit Inspection:

From the lots inspected by the GETCO, the Inspector of Audit Inspection Wing may pick up samples from the lots supplied at consignee stores of the GETCO at random for quality check only. The samples picked up will be tested for acceptance test / type test or as decided by GETCO at Government approved laboratory in presence of representatives of supplier & GETCO as per relevant IS/BIS/ GETCO specifications. The test results will be binding on the supplier and GETCO. In general no re-sampling is allowed. If the material fails in any of the acceptance tests carried out on particular lot, the full lot will be considered as rejected, and if replacement is not possible due to consumption of the material in that case for whole of the rejected lot, GETCO will deduct maximum up to 30% (Thirty) of the total End Cost Price. If the same are not utilized / consumed, GETCO may ask for replacement at sole discretion of the GETCO or may accept with maximum deduction up to 30% (Thirty) of the total End Cost Price and this will be binding to the supplier.

In case if the material do not confirm to specifications or fails at Government approved laboratory during testing and if subsequent testing are to be carried out (which will solely at GETCO's discretion), then all Testing fees, expenses of the inspector and other expenses incurred by the GETCO will be on Bidder's account. The decision in this regard for acceptance by the GETCO shall be final and this will be binding to successful Bidder.

SECTION-I
GENERAL INFORMATION & SYSTEM DATA

CLIMATIC CONDITIONS

i)	Location	: In the State of Gujarat .	
ii)	Maximum Ambient Air Temperature. □ C.	:	50
iii)	Minimum Ambient Air Temperature. □ C.	:	0
iv)	Average daily ambient Air Temperature □ C.	:	35
v)	Maximum relative humidity. - %	:	95
vi)	Average rainfall per annum.(mm)	:	1150
vii)	Maximum altitude above mean sea level – Mtrs	:	1000
viii)	Ceraunic level i.e. Average number of Thunder storm – Days/annum	:	15
ix)	Maximum wind pressure.(kg/Sq. meters)	:	200
ix)	Seismic level i.e. Earthquake Acceleration		
	a) Horizontal Seismic Co-efficient (acceleration) – g (Zone – 5)	:	0.08
	b) Vertical Seismic Co-efficient (acceleration) – g (Zone – 5)	:	0.84

SYSTEM PARTICULARS

a) System Voltage (KV rms)	220
b) Max. Voltage (KV rms)	245
c) Lightning impulse withstand voltage (dry & wet) (KVP)	1050
d) Power Frequency withstand voltage (wet) (KV rms)	460
e) Short circuit level (KA)	40
f) Switching Surge withstand voltage (wet) KVP	NA
g) Frequency – Hz	
a) Normal	50
b) Maximum	51
III) Minimum	47
h) Number of Circuits	02
i) Normal Span – m	350
j) Wind Span – m	385
k) Weight Span – m	
a) Maximum	525
b) Minimum	-100
l) Factor Of Safety (At Every Day Temp. & No Wind)	04

TOWER DETAILS

TOWER TYPE	NORMAL CONDITION		BROKEN WIRE CONDITION	
	MAX. (m)	MIN. (m)	MAX. (m)	MIN. (m)
A	525	175	315	100
B	525	0	315	-200
C	525	0	315	-200
D	525	0	315	-300

DETAILS OF LINE MATERIALS

A. Conductor and Earth wire for 220 KV Single Conductor line

Sl. No.	Description	Unit	Earth wire	Conductor
1.	Name/Type		Galvanised steel	ACSR Zebra
2.	Size	mm	7/3.15	54/3.18Aluminium +7/3.18 steel

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3.	Configuration		One continuously To run horizontally On the top of the Towers & conductors	
6.	Overall diameter	mm	09.45	28.62
7.	Unit mass	Kg/Km.	426	1621
8.	Min. UTS	KN	58.4	130.30
9.	Ruling Design Span Meters		350	350
10.	Area of cross-section	mm ²	545.5	484.50 mm ²
11.	Maximum working Tension at:			
	i) 32 Deg. C with full wind	Kg	1285	3950 kg
	ii) 0 Deg. C with 2/3 rd full wind		1315	4360 kg
12.	Maximum sag under maximum Temperature and no wind condition.		07.300 Mtr. at 53 deg.C	08.910 Mtr. at 67 deg. C.
13.	Modules of eleasticity		1.933x10 ⁶	7.036x10 ⁶ Kg Mm ²
14.	Co-efficient of linear		11.5x10 ⁻⁶ /Deg.C.	19.3x10 ⁻⁶ / Deg.C.

B (I) Details of Insulator (Silicone Rubber Insulator)

1)	Size of discs		NA	
2)	Number of discs		Single unit	Double unit
	i) Suspension string		1 string	2x1 string
	ii) Tension string		1 string	2x1 string
3)	Description of string	Electro mechanical strength in KN	Length without hanger in mm	Approx. Weight in Kg.
	a) Single Suspension	90 KN	2030	14.0
	b) Double Suspension	90 KN	2030	28(14x2)
	c) Single Tension	120 KN	2175	15.0
	d) Double Tension	120 KN	2175	30(15x2)

B (II) Details of Insulator (Anti-Fog Disc Insulator)

PART- II
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Sr. No.	Details	120KN	90KN
1	Type	Ball & Socket	Ball & Socket
2	Height – mm	145	145
3	Diameter – mm	280 or 305	255 or 280
4	Creepage – mm (Minimum) 5.0 Total 6.0 Protected	430 260	430 260
5	Ball Diameter – mm	20	16
6	Colour	Brown	Brown
7	Surface	Glazed	Glazed
8	Materials 13.0 Socket Cap 14.0 Ball Pin 15.0 Security Clip 16.0 Zinc Sleeve 17.0 Insulator	Malleable Cast Iron / SGI Hot Dip Galvanised High Tensile Forged Steel (Hardened & Temp- ered) Hot Dip Galvanised Phosphor Bronze Or Stainless Steel 99.95% Pure Zinc Porcelain	
9	Shape Of Security Clip	R/W	
10	Dimensions Of Zinc Sleeve – mm 9 Thickness 10 Exposed Length from Cement Surface i Minimum j Maximum 11 Total Length (Min.)	3 5 13 20	
11	Minimum Failing Load – Kg.	12500	9180
12	Minimum Electro Mechanical Load – Kg.	12500	9180
13	Visible Discharge Test Voltage – KV (Min.)	9	9
14	Dry Impulse Flash Over Voltage – KV (Min. +ve Peak Wave – 1.2/50 Microsec.)	162	162
15	- DO – But For –ve Wave	176	176
16	Dry Impulse Withstand Voltage – KV (Min. +ve Peak Wave – 1.2/50 Microsec.)	162	162

17	- DO – But For –ve Wave	175	175
18	Power Frequency Flash Over Voltage – KV (RMS – Min.) 1 Dry 2 Wet	100 60	100 60
19	Power Frequency Withstand Voltage – KV (RMS – Min.) 3 Dry 4 Wet	85 55	85 50
20	Power Frequency Puncture Voltage – KV (RMS – Min.)	140	140
21	Eccentricity of the disc (i) Axial run out (ii) Radial run out	Max.11.2mm Max.8.4mm	

B (III) Details of Insulator (Plain Disc Insulator)

Sr. No.	Details	90KN	120KN
1	Type	Ball & Socket	Ball & Socket
2	Height – mm	145	145
3	Diameter – mm	255	255
4	Minimum Creepage Distance – mm	320	320
5	Ball Diameter – mm	16	20
6	Colour	Brown	Brown
7	Surface	Glazed	Glazed
8	Materials 10 Socket Cap 11 Ball Pin 12 Security Clip 13 Insulator	Malleabel cast iron/SGI H.D.G. High-tension forged steel (Hardened & tempered H.D.G.) Phospher Bronze Or Stainless Steel Porcelain	Malleabel cast iron/SGI H.D.G. High tension forged steel (Hardened & tempered H.D.G.) Phospher Bronze Or Stainless Steel Porcelain
9	Shape Of Security Clip	R/W	R
10	Minimum Failing Load – Kg.	9180	12500
11	Minimum Electro Mechanical Load – Kg.	9180	12500

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12	Min. Visible Discharge Voltage – KV (RMS.)	9	18
13	Dry Impulse Flash Over Voltage – KV (Min. +ve Peak Wave – 1.2/50 Microsec.)	115	115
14	- DO – But For –ve Wave	120	120
15	Dry Impulse Withstand Voltage – KV (Min. +ve Peak Wave – 1.2/50 Microsec.)	110	110
16	- DO – But For –ve Wave	110	110
17	Power Frequency Flash Over Voltage – KV (RMS – Min.) viii) Dry ix) Wet	75 45	75 45
18	Power Frequency Withstand Voltage – KV (RMS – Min.) x) Dry xi) Wet	70 40	70 40
19	Power Frequency Puncture Voltage – KV (RMS – Min.)	120	120
20	Maximum RIV at 1 MHz and 10 KV AC (rms) voltage of single disc-Microvolts	50	50

C Insulator hardware:

- (i) Slipping Strength : ACSR ZEBRA
- (a) Suspension Clamps : 15% of ultimate strength of conductor i.e.1997.4Kg.
- (b) Tension Clamps : 95% of ultimate strength of conductors i.e. 12650.2Kg.

- (i) Minimum Failing Load : ACSR ZEBRA
- (ii) Suspension Fittings : 50%of ultimate strength of Conductor i.e. 6658Kg.
- (a) Tension Fittings : 100% of U.T.S. of conductor i.e. 13316Kg.

- (i) Type
- (a) Suspension Clamps : Forged Steel Hanger free center type without bolt only
- (b) Tension Clamp : compression type

- (i) Material : Aluminium/ steel
- (ii) Ele. Resis. At 20⁰ C equal length : 75% of measured resistance of of conductor

- (iii) Ferrous Parts : Hot dip galvanized
- (iv) No. Of insulators to be used : 14 for Suspension
15 for Tension

SECTION-II
EXECUTION OF WORK

1. SCOPE:

- 1.1 The erection works covered under this section consist of
- a. Check survey with preparation of profile, GETCO will provide the details of the line alignment as per survey carried out for taking reference to proceed further for the work of check survey.
 - b. Delivery of tower material including Bolt-Nuts accessories, Base plate assembly, earth wire, and hardware accessories, insulators etc. and transportation to erection site and keeping in safe custody.
 - c. Insurance of material during storage-cum-erection.
 - d. Distribution of materials at erection site,
 - e. Excavation, stub-setting, pile foundation, concreting, back-filling etc. complete work of foundation including dewatering, shoring & shuttering, cutting of stubs, fabrication and supply of chimney material and form boxes etc.
 - f. Tower erection including fixing of attachments, accessories, base plate assembly and tack-welding including supply and application of primer and 2 coats of zinc rich paints for bottom most two panel (up to 10 Meter)
 - g. Stringing of ACSR Zebra conductor and One ground wire up to sub-station gantries at both ends with the help of tensioner and puller machine or manual.
 - h. Guarantee of all the activities carried out from (a) to (g).
 - i. Other items not specifically mentioned in this Specification and are required for the successful erection and commissioning of the transmission line, unless specifically excluded in the Specification.
- 1.2 The successful Bidder shall carry out all addition / alteration required for completion of line and up to commissioning the same at rates quoted in the offer for respective item. However, no items are to be executed for which prices not covered in price schedule.
- 1.3 All works shall be carried out in accordance with the revised and latest provisions under Indian Electricity Act and Rules made there under.

- 1.4. All the erection tools required during construction of lines shall be arranged by the Bidder at his own cost. The Bidder shall only be responsible for any damage to and / or loss of his erection tools.
- 1.5 Quantities given in the Schedule of erection in price Bid are to be executed by the Bidder at the rates accepted by the GETCO in the A/T. In case of any deviation in tower quantity / type of tower / length of line, excavation / concreting resulting into an increase in which event the field officer shall obtain prior approval of the Corporate Office and excess quantity shall be paid only at the accepted rate of the A / T.
- 1.6 The erection work beyond contractual ceiling amount shall be done only after approval from the GETCO.
- 1.7 In case of pile foundation, if the bidder does not have necessary experience, some other qualified agency may be engaged by the bidder for design and casting of pile foundation. However, the overall responsibility shall be of the Bidder and shall be responsible for all the necessary co-ordination with the pile foundation contractor including stub-setting.(As per IS 2911-1980)

2.0 SURVEY

- 2.1. The Bidder has to make check survey and preparation of the profiles as per the details of route alignment already carried out by GETCO. The complete route alignment along with the other details as given below will be furnished to the successful bidders for further execution of the work. If any minor modification in alignment of the route, during check survey or while scrutiny of check survey is required, the same shall be carried out by the Bidder at no extra cost to the GETCO.

- i) Survey report
- ii) Brief Summary of the Project
- iii) BOQ for type wise Towers with extensions
- iv) BOQ for tower type wise foundation
- v) Details of angle points with latitude and longitude
- vi) List of the major crossings
- vii) Details of trial pits along the route
- viii) Complete route alignment fixed on the toposheet

3.0 ACCESS TO LOCATIONS:

- 3.1 It will be the Bidders sole responsibility to take the materials up to the location. Any path way, temporary road, temporary bridge required will have to be provided by the Bidder at his own cost. If, for any reasons the above is not feasible, the Bidder at his own cost shall have to arrange transportation by head loads.
- 3.2 The Bidder will be deemed to be very well familiar with the route of the transmission line before submitting an offer. Notwithstanding the difficulties of

terrain, location approaches, way leave and other obstructions the price quoted for all the items of erection shall not undergo any change at any stage or granted by the GETCO for any special rates/consideration.

4.0 EXCAVATION:

- 4.1 The excavation will be limited to the volumes as per approved excavation drawings even though the Bidder may excavate more for the sake of his own convenience or for any reasons. If the excavated dimension/s is/are more than the dimension/s shown in the approved drawing, the additional excavated volume should be filled in with 1:3:6 mixture concrete at Bidders cost in respect of materials, labours etc.
- 4.2 In case of rock soil, the extra excavated rock portion on all sides shall be filled with 1:1.5:3 mix concrete at his own cost in respect of materials, labours etc.
- 4.3 The rates indicated in schedule for excavation work in each soil shall be applicable to all the locations as per actual condition of the soil strata irrespective of classification of type of foundation.
- 4.4 The rates for excavation indicated in schedule shall also be applicable for benching work, if required.

5.0 SHORING, SHUTTERING AND DEWATERING :

The Bidder has to arrange for shoring, shuttering and dewatering work during activities of excavation, stub setting and concreting. These shall be done at his own cost.

6.0 STUB SETTING:

- 6.1 The rates for stub setting are inclusive of cutting of stubs (if any), setting of stubs, leveling at correct level, dismantling of template after concrete, back-filling work etc.
- 6.2. Above rates shall be on per MT basis for normal, extensions up to 25 meters and special/river crossing towers.
- 6.3. The weights payable for stub-setting item shall comprise of the weight of stub and its respective stub setting template as per approved bill of material.

7.0 CONCRETE:

- 7.1. The rates indicated in schedule for concrete work shall be applicable to all the locations irrespective of soil strata and type of foundation adopted. The Bidder shall have to procure cement from the open market according to line requirement and keep sufficient quantities to avoid delay in work. Same quantity of cement is to be utilized from his own stock. Account of cement utilized at each location duly certified by concerned GETCO supervisor and engineer in charge of work, is required to be maintained and submitted with each R.A Bill. No wastage is

permitted as same is to be procured by the Bidder of brand approved by the GETCO at his own cost from the authorized dealer.

7.2 Use of Cement :

The rates in Schedule-‘B’ are inclusive of cement cost. Bidder has to purchase fresh 43 grade cement confirming to IS 8112 and brand approved by GETCO. Bidder has to construct pucca godown at site of work so that cement bags can be properly preserved to avoid damage due to any kind of water and moisture. Bidder has to bring sufficient quantities of cement bags and at no time less than 200 (Two hundred) bags to maintain progress of work. The work should not suffer for want of cement. It is full responsibility of Bidder to bring sufficient cement at site at right time. Cement should give the required strength of cement concrete. Bidder has to submit material account for consumption of cement used with every bill. In case of non submission of the same, bill will not be passed. Bidder has to submit the copy of cement purchased bill along with each RA Bill/Final Bill.

Nothing will be paid extra for over consumption. Bidder is fully responsible for safety of cement at site. If GETCO authorized representative desires to check cement stock at site, Bidder has to allow him at any time. Bidder has to maintain day to day cement consumption/balance account at site. As far as possible, Bidder has to maintain supply of cement of only one brand & grade through out the work and on account of closer/shortage of approved brand, cement of other brand in accordance of condition no. (1) will be allowed by Engineer-In-Charge. Minimum cement consumption considered for nominal mix cement concrete will be as follows:-

- a. 1:1.5:3 - 8.12 Bags per CMT
- b. 1:2:4 - 6.5 Bags per CMT
- c. 1:3:6 - 4.5 Bags per CMT
- d. 1:4:8 - 3.5 Bags per CMT

In respect of pile foundation, GETCO reserves the right to adopt design mix and same will be indicated in BOQ of bidding document.

Bidder has to use minimum cement as above. Bidder should not use less than the prescribed quantities of cement.

Bidder will be allowed to carry out work only after physical verification of cement available at site .

- 7.3 The GETCO reserves the right to test the quality of steel and cement procured by the Bidder at any Government recognized laboratory and the test results shall be binding to the Bidder. If the test results are not found satisfactory the entire lot supplied and work executed has to be replaced / re-executed by the Bidder at no extra cost to the GETCO.
- 7.4 Back filling of the excavated soil is to be arranged by the successful bidder. For back filling if borrowed earth is required, the same should be arranged of suitable quality and quantity irrespective of site condition at no extra cost to the GETCO.
- 7.5 The sand shall be the best quality containing hard siliceous materials, clean and of sharp angular grit type and free from earth or organic matter or salts and to

the satisfaction of the Engineer in-charge. The sand shall be washed before use. No saltiest or brackish water shall be used for concreting.

- 7.6 The mixture of concrete to be used shall be such as to produce a sound, compact and water-proof concrete. The mixture shall not be weaker than the ratio to be prepared. The concrete for chimney shall be prepared with 20 mm stone metal and the concrete for pyramid/step/pad shall be prepared with 20 mm or 40 mm stone metal. The mixture shall be prepared using mixing machine only. It should also be free from grit and dirt. The concrete shall be mixed as stiff as required for placing the concrete in the form of moulds with ease and degree to which concrete resists segregation will permit. Hence, the quantity of water used should not be too much.
- 7.7 Proper form boxes or moulds adequately braced to retain proper shape while concreting should be used for chimney, pyramid and slab portions & vibrator machine shall be used at the time of concreting. Form boxes should be water tight so as not to allow cement cream to come out leaving only sand and gully to form honey combs in concrete. Form boxes should be cleaned and oiled before using for concreting.
- 7.8 All sub-merged locations must be kept completely dewatered both during the placing of concrete and for 24 hours after completion. There should be no disturbance of concrete by water during this period.
- 7.9 Form boxes should not be removed before 24 hours, after concreting. Concrete surfaces where required should be set right with rich cement and mortar after removal of the forms.
- 7.10 The Chief Engineer (Projects) or Engineer appointed by him at his sole discretion may uncover any cast foundation to find out the workmanship of foundation. Bidder shall render necessary assistance during such fact finding operation and shall comply the report of the investigating officer.
- 7.11 The Bidder will be responsible for constructing the foundations in accordance with the design of each type of foundation supplied by the GETCO.
- 7.12 The payment of excavation will be limited to the volumes as per approved excavation drawings even though the Bidder may excavate more for the sake of his own convenience or for any reasons. If the excavated dimension/s is/are more than the dimension/s shown In the approved drawing, the additional excavated volume should be filled in with 1:3:6 mixture concrete at Bidders cost in respect of materials, labours etc.
- 7.13 In case of rock soil, the extra excavated rock portion on all sides shall be filled with 1:1.5:3 mix concrete at his own cost in respect of materials, labours etc.
- 7.14 The rates for excavation indicated in schedule shall also be applicable for benching work, if required.:
- 7.15 The tor / plain steel bars required for RCC type foundation shall be procured by the successful Bidder in advance to avoid delay in the work.

- 7.16 No wastage is permitted for reinforcement steel, as the same is to be procured by the Bidder at his own cost. Overlapping of reinforcement steel will be permitted in line with provisions of IS:456. However separate approval of modality shall be got approved from GETCO engineering department. However, no payment shall be made for extra consumed reinforcement due to overlapping adoption.
- 7.17 GETCO reserves right to test the quality of steel and cement procured by the Bidder at any Govt. recognized Laboratory and intended to be used for the tower foundation works. The test results shall be binding to the Bidder and GETCO.

8.0 **[A] Classification of Soil.**

- a) Normal Dry Soil:
The soil readily removable with ordinary spades and shovels viz. Murram, hard murram etc. and to be used for location in normal dry cohesive or non cohesive soils. If the black cotton soil is encountered up to 500 mm below ground level, normal dry soil foundation shall have to be adopted. (The normal dry soil foundation designs shall be inclusive of this stipulation)
- b) Sandy dry soil:
To be used for locations where cohesion less pure sand or negligible cohesive sand mixed with soil are met in dry condition
- c) Sandy wet soil:
To be used in location where water table is met from top
- d) Fully submerged black cotton Soil.
To be used at locations where soil is clay type, not necessarily black in color, which shrinks when dry and swells when wet, resulting in differential movement extending to a max., depth of 3.5 meter below ground level. For designing foundation for this location the soil is to be considered submerged in nature. If the black cotton soil is encountered only up to 500 mm from ground level, normal dry soil foundation shall be adopted. (This foundation design shall be inclusive of this stipulation).
- e) Soft Rock:
To be used at locations where decomposed or fissured rock, hard gravel, kankar, lime stone, laterite or any other soil of similar nature is met. Undercut type foundation is to be used for soft rock locations.
- f) Hard Rock
To be used at locations where chiseling, drilling, and blasting is required.
- g) Fully submerged soil:
To be used at locations where sub soil water table is met at less than 1.50 meter below ground level and up to complete depth of foundation.
- h) Partially submerged soil:
To be used at the locations where the submerged soil water table is met at 1.5m or more than 1.5 m below the ground level, the top portion of the strata being normal dry soil.

Soil strata for adopting various types of foundations:

8.0 [B] GEOTECHNICAL INVESTIGATIONS & PARAMETERS:

The geotechnical investigation shall be carried out by Bidder, with no extra cost to GETCO, for assessing bearing capacity and settlement characteristic of soil determining shrinkage and swelling properties, suitable type, size of foundation and foundation levels for 66/132/220/400KV Transmission tower at following locations due to special conditions/situations. The scope of work under this contract shall include but not limited to following.

1. For Marshy soil/Fully submerged black cotton soil conditions.
2. For filled up soil.
3. For river crossing/creek area crossing/pond crossing.
4. Special Requirement as per approved profile.

Geo technical investigation shall be carried out through GETCO approved laboratory/agencies only and depth of bore hole shall be 15 meter/30 meter/40 meter depending on site requirement/line profile as approved by GETCO.

The boreholes shall be backfilled by the Bidder after completion of investigation work. The entire work shall be carried out as per relevant Indian Standard Specification. Every undisturbed Sample (UDS) and disturbed sample (DS) collected from the boreholes shall include but not limited to the following series of tests only.

- Tests: Applicable to
- Natural moisture content: UDS
- Atterberg limit: UDS & DS
- Sieve analysis: UDS & DS
- Unit weight: UDS
- Specific gravity determination: UDS & DS
- Unconfined compression test: UDS
- Unconsolidated undrained triaxial strength: UDS
- Consolidation test: UDS

9.0 Curing and back-filling :

- 9.1 After 24 hours of pouring, the concrete should be cured by keeping it continuously wet for 14 days. After 48 hours of pouring, the pit may be backfilled with excavated selected earth (which is free from grass, dung, wooden waste, postures and fodder woods, shrubs, thorn etc.) sprinkled with necessary amount of water and well compressed and consolidated in layers not exceeding 150 mm. If the excavated soil consists of large boulders/stone, the same shall be broken to maximum size 80 mm and mixed with soil to be back filled. At the locations where borrowed earth is required for back filling, this shall be done by the Bidder at his own cost, irrespective of transportation from any land. Thereafter, the exposed top end fill shall be kept wet for the remainder of above prescribed curing period. The uncovered portion of concrete chimney above the back filled earth shall be kept wet by providing empty gunny bags fully wrapped around the

concrete chimney for curing and ensure that the bags are kept wet by frequent pouring of water on them.

- 9.2 Extra ordinary care shall be taken during back filling. The Bidder and GETCO Engineer at site shall ensure that the back filling is done in the manner referred above so that back-filled earth become homogeneous with surrounding parent soil with the passage of time. The record for the same with day/date of curing, back filling etc be maintained in the register and duly signed by the Bidder and GETCO representative. The quantities of excavated earth obtained from a particular location shall be generally utilized in back filling work in protection of tower footing of same location unless it is unsuitable for such purpose. In the later case, the back filling shall be done with borrowed earth of suitable quality irrespective of land and the consolidation of earth shall also be done free of cost.
- 9.3 The rates of stub setting are including the work of back filling of excavated pit. The large stones / boulders shall be broken to maximum 80 mm size before used for back-filling at no extra cost to the GETCO.

10.0 PROTECTION OF TOWER FOOTING :

Quantities of various protection works like stone revetment, concrete revetment, brick masonry and random stone masonry to the foundations are to be executed by the successful Bidder if indicated in the schedule and payment for such quantity shall be as per unit rates accepted.

11.0 TOWER ERECTION AND GROUNDING:

(a) ERECTION OF TOWERS:

- 11.1 The super-structure of towers should be erected on foundations after 14 days of concreting. However, the method adopted for erection of tower is left to the discretion of the Bidder subject to the condition that he takes responsibility for any damage to materials. No tower member should get strained or bent during erection. The towers must be truly vertical after erection and no straining would be allowed to bring it in alignment. Maximum tolerance in verticality that will be permitted is ONE mm per 360mm of tower height. The bolt head shall be on outside faces and nuts and washers on inside faces of the tower. All bolts & nuts shall be made fully tight and finally the bolt threads shall be centre punched to avoid nuts getting loose. Punching of bolts shall be made by chamfering the threads with centre punch at least at three places equally spaced on contact surface of bolts and nuts.
- 11.2 Complete tower erection shall include erection of all accessories like danger board, number plate, phase plate, C.I. Plate, Anti-climbing devices and fittings including attachments like step bolts, ladders, platforms, 'U' bolts, shackles, hangers, strain plates etc.
- 11.3 Suitable tower extension shall be erected to get desired ground clearance whenever required, as determined at the time of survey and profiles.

- 11.4 To avoid pilferage of bolts and nuts and tower members, the bolts of the two bottoms most panels (say up to 10 meters) shall be tack welded at three places on the nuts diametrically. The zinc rich paint shall be procured by the Bidder at his own cost and shall be applied immediately following the tack welding.
- 11.5 The Bidder shall measure the tower footing resistance of each tower after it has been erected and before stringing of the earth wire during dry weather. Each tower shall be earthed; the tower footing resistance shall not exceed 10 ohms. Pipe type and counter poise type earthing which ever required shall be done in accordance with the latest edition and revision of IS : 3043 (code of practice for earthing).The Bidder shall measure the footing resistance of each location and prepare the record for submission and approval of Engineer-in-Charge for deciding the type of grounding to be provided.
- 11.6 **Pipe Type Earthing :**
- At locations where footing resistance does not exceed 10 Ohms., the pipe type earthing as per appended drawing shall be provided. The Bidder will have to supply all the materials required for grounding like pipe, flat, bolt-nuts, salt, fine broken coke/charcoal etc. The earthing is to be done by making a bore hole for insertion of pipe away from the tower leg excavation line as per attached drawings.
- 11.7 **Counterpoise Earthing :**
- At locations, where footing resistance exceeds 10 Ohms, counterpoise earthing as per appended drawing shall be provided to bring down the tower footing resistance below 10 Ohms. The Bidder will have to supply all the materials required for grounding like lugs, G.I. wire, bolts, nuts etc. The counterpoise earthing shall be buried 1000 mm below ground level.
- 11.8 The method for providing earthing shall be at the desecration of the Bidder.
- 11.9 The rates for erection of structure of tower and extension up to 25 meters and special / river crossing tower on special foundation/pile foundation carried out by Bidder shall be on per MT basis. These rates shall be valid irrespective of location, nature and specification.
- 11.10 The payment for superstructure / extension / special or river crossing tower shall be made only after erection of complete tower as per structural drawing.
- 11.11 The rates for fixing of anti-climbing devices, danger board, number plate, phase plate, circuit identification plate shall be inclusive of all materials and labour.
- 11.12 The rates for providing earthing to the tower either pipe or counter poise type inclusive of supply of complete earthing set, coke, charcoal, salt etc. including required bolt nuts as per approved drawing all materials and labour.

- 11.13 The Bidder shall arrange for all the equipments for tack-welding purpose. The rates shall be inclusive of supply and application of zinc rich paint on it.
- 11.14 The Bidder shall arrange required equipments for measurement of soil and tower footing resistance of each location, the tower footing resistance shall be less than 10 Ohms and submit the joint measurement record of same jointly signed by Bidder and Engineer in charge of line with final bill. The payment shall be released only after receipt of final soil resistance details on providing earthing at each location.

12.0 INSULATOR HOISTING:

- 12.1 Suspension silicone rubber insulator/ Anti-Fog Disc Insulator/Plain Disc Insulator shall be used on all tangent type towers and tension silicone rubber insulator/ Anti-Fog Disc Insulator/Plain Disc Insulator on all small, medium, large angle and dead end type tension towers.

13.0 STRINGING :-

The stringing work should be carried with the help of tensioner and puller machine or Manual.

- 13.1 The rates for any type of stringing work, out of followings are indicated in Schedule.
- i) Stringing of one ground wire or OPGW,
 - ii) Stringing of single / double circuit line.
 - iii) Hot-line stringing of conductor
 - iv) LILO arrangement
- 13.2 The rates for stringing of conductors and ground wire or OPGW for special crossings like river shall be on per KM basis only and shall be paid according to actual work done. In case special towers are suspension type, the special shall mean major river crossing section considering the span from one anchor tower to the other end anchor tower. If the special towers are tension type, the special crossing shall mean span from special tower to special tower of other end.
- 13.3 The stringing work should be planned in such a manner in consultation with the Engineer in charge of the work that minimum shut down of power line crossings are required. Revenue loss due to any undue shut down i.e. after the shut down is arranged and required to be extended on account of Bidder shall be recoverable from the Bidder.
- 13.4 Before commencing of stringing work, Bidder must obtain approval of sag tension charts (these shall have to be supplied by the Bidder) showing final sag and tension for various temperature and spans. The stringing chart shall be prepared according to appended format only.

13.5 The Bidder shall be responsible and will take care of proper handling of Conductor drums. Sufficient numbers of aluminum snatch blocks shall be used for paying out the ACSR Conductor. Necessary precautions shall be taken to avoid conductor rubbing on the ground by providing adequate ground roller, rollers on supports. Additional rollers shall also be provided to cross thorny hedges, footing and other obstructions to avoid scratching of conductor. The conductor and ground wire shall be made to sag correctly as per stringing charts, before they are finally transferred to the hardwares for conductors and to clamps for ground wire. No joint should be made at less than 30 metres from the tower end and no joint shall be permitted in Railway, River, road and other important crossings spans. There shall not be more than one joint in a span of each conductor. The sag shall be adjusted to suit the sag indicated against actual temperature for an individual span. The thermometer shall be provided at the conductor point during the stringing work. Dynamometers shall be used in tensioning the conductors. All conductors shall be stressed to their maximum working load at the time of stringing, as per approved stringing charts.

13.6 The minimum clearance between the lowest point of conductor and ground shall not be less than required. All compression joints should be carefully made and a record of initial and final lengths of the joints jointly signed by Bidder's and GETCO representatives shall be maintained. Check for sag should also be made at intervals when conductors are drawn up. Over stressing, causing damage to towers, should be avoided. Care should be exercised not to over tension the conductor. An extra sag of 150 mm be allowed at all the important tension locations like Railway/River Crossings.

For stringing of bundle conductor on line, the Bidder shall use only tension stringing equipment. The earth wire may be strung by conventional method and tension stringing equipments may not be used. The Bidder shall ensure that the stringing gadgets are not anchored to the tower footing.

Each phase conductor shall consist of one conductor of size 54/3.18 mm. Al.+7/3.18 mm. steel - ACSR ZEBRA. the ground wire shall be 7/3.15mm galvanized steel wire.

To avoid contact with the ground or any object above ground level the conductor shall be pulled by the controlled tension methods using neoprene lined double pulled wheel type tension stringing equipments. The equipments shall be capable continuous of maintaining continuous tension of not less than of 5000 kg. which shall be such that the conductor is maintained about 20% grater than the sags specified in the correspondence stringing sag tables.

13.7 After being pulled the conductor/ground wire shall not be allowed to hang in the stringing sheaves for more than 72 hours, before being pulled to the specified sag. During the time the conductor / ground wire is on the stringing sheaves before sagging-in, it shall be ensured that the conductor / ground wire is not damaged due to wind, vibration, vehicles or other causes. Scaffolding should be used to cross the important roads and Railway Crossing for minimum interruption to traffic.

- 13.8 The conductor shall be pulled up to desired sag and left in serial stringing sheaves for at least one hour after which the sag shall be rechecked and adjusted, if necessary, before clipping in and transferring the conductors from the serial stringing sheaves to the suspension clamps.
- 13.9 Conductor shall be clamped within 24 hours of sagging. The sag will be checked in the larger spans of the section in case of sections up to eight spans and in one intermediate larger span also for section with more than eight spans.
- 13.10 The stringing sheaves, when suspended on the transmission structure for sagging, shall be so adjusted that the conductor will be on the sheaves at the same height as the suspension clamp to which it is to be secured.
- 13.11 The stringing of the ground wire or OPGW shall be done in accordance with the stringing charts approved by the GETCO. The ground wire of galvanized steel shall be strung to run continuously over the conductors. The ground wire shall be pulled, sagged and clamped-in from tension tower to tension tower before the phase conductors are pulled in that section.
- 13.12 All the line conductors shall be terminated at sub-station structures whose details shall be furnished by the GETCO at the appropriate time. The contractor shall fix strain insulators on the sub-station structures.
- 13.13 Armour rods and vibration dampers shall be fitted at each suspension tower before final clamping of conductor with Insulator strings. Vibration damper shall be fitted at each tension tower after final clamping of conductor with insulator strings. Vibration dampers are to be fixed using aluminum tape with each clamping bolt and in correct vertical position in relation to conductor. Compression type joints are to be used for jointing of conductors. Each part connected with joints shall be perfectly cleaned by wire brush and properly greased before final compression. All the joints of conductors and earth wire shall be made with the best workmanship and shall be perfectly straight and having maximum possible strength.
- 13.14 Proper guys shall be provided to counter balance the paying out tension of conductor/ground wire at the tension locations, to avoid damage to towers and/or accident.
- 13.15 Stringing work shall mean, the activities of fixing of insulator and insulator hardwares, paying, jointing, tensioning, clamping with armour-rod, providing dampers, repairing of conductors (if any) and fixing the conductor at tension hardwares etc.
- 14.0 FIELD QUALITY PLAN**
- 14.1 Bidder shall invariably submit the FQP along with Technical Bid for erection of line including all the activities such as excavation, concreting, erection, stringing etc. with detailed check list to be referred.

SECTION- III
TECHNICAL DETAILS FOR ERECTION &
COMMISSIONING OF TRANSMISSION LINE

1.0 SURVEY

survey & check survey :-

The Bidder has to carry out check survey, profile using modern technique as per the complete BOQ given in this section. If any minor modification in alignment of route, during check survey or while scrutiny of check survey is required, the same shall be carried out by the Bidder at no extra cost to the GETCO.

2. RIGHT OF WAY, WAY LEAVE, TREE CUTTING AND OTHER OBSTRUCTIONS

The successful bidder shall follow the RoW guideline issued by Govt. of Gujarat through Trarav No. GET-11-2015-Gol-199-K dated 14.08.2017 (copy attached) for Right of Way / Way Leave Clearance / Tree-crop Damages etc. during construction of transmission line.

- 2.1 All statutory clearances and permissions from various statutory bodies/Govt. authorities like Forest Department, Railway, Aviation Authority, Maritime Board, National Highway Authority, etc. wherever required GETCO will co-ordinate, along the entire route of the Transmission line, however the complete responsibility lies with the contractor for submission of the required details, follow up with statutory bodies e.t.c. for obtaining the approval.
- 2.2 For necessary forest clearance, the Corporation will do the processing and the payment to the central government/state government for compensation of forest clearance will be paid by the Corporation as necessary. For permission from other Govt. authorities like railway, National highway authority etc. the payment shall be made by the Corporation.
- 2.3 For clearances, permissions etc. from various authorities, the Bidder shall not remain contented by simply informing the Corporation, but shall have to arrange for personal follow up to overcome the difficulties in the interest of progress of the work.
- 2.4. The Bidder shall instruct his labours and staff to use minimum area while executing the work where there are standing crops. No persons of the Bidder should pick up any items from the standing crops or fruit. The Bidder should take all possible steps to avoid or minimize damages to the standing crops. On completion of the work, bidder shall make the surrounding soil to its original condition.
- 2.5. For clearance of way leave permission/obstruction etc., as per GoG Tharav No. GET-11-2015-Gol-199-K dated 14.08.2017 (copy attached) the Bidder is solely responsible including any payments required to be made thereof including that for crop /tree compensation.

The bidder shall be responsible for mapping the route and location of towers with Survey No. of land on Tikka Map and name of the land owner from Revenue records (7/12). Based on these data, Notice shall be issued by GETCO to respective land owners for tower erection works as per the Circular No. GETCO/CE(P)/LO/Circular/2882 dated 21.07.2011. (Copy attached).

- 2.6 Removing of trees, tree cutting and crop/ tree compensation thereof shall be organized and paid by the Bidder as per GoG Tharav No. GET-11-2015-Gol-199-K dated 14.08.2017 (copy attached). The cost of cutting the trees shall also be borne by the Bidder. Corporation's field officer shall render necessary helps for fixing the compensation through concerned Department or other local revenue authority like Talati-Mantri, Sarpanch / Mamlatdar. **Such Payments are to be given immediately after foundation, tower erection and stringing stages and recorded in the 'Panch Nama'**. The amount to be paid shall also be informed to the GETCO's field officer not below the rank of Executive Engineer in charge of work, however bidder should not claim for the delay in work on account of the above. **The record register of location wise payment shall be maintained.**
- 2.7 It is the Bidder's responsibility to take appropriate action for way leave etc. as indicated above well in advance **so that objections from the land owners could be addressed well in time. In the event of any objection from land owners, work shall be carried out by taking an order from District Magistrate location wise. This order of District Magistrate shall also cover provision of police protection and SRP. Circular No. GETCO/MD/CE(P)/LO/Circular/22 dated 09.07.2013 of Managing Director, GETCO is to be strictly followed. As per this, State Police or SRP protection for any activity of transmission line is to be sought only after permission from District Magistrate in all such cases wherever and whenever objection is raised by land owner for laying of transmission line in their land.**

3.0 TESTING AND COMMISSIONING:

- 3.1 The Bidder after completion of erection work will ensure that all works connected with line have been completed. These works shall be done correctly as per Indian Electricity Rules and Procedures. Any extra cost involved due to incompleteness of work or bad workmanship found out subsequently shall be set right forthwith by the Bidder at his own cost.
- 3.2 After the erection is complete in all respects, the line should be thoroughly patrolled and checked for continuity and clearances. The line should be meggered to check its insulation level. A written confirmation should be given to the Engineer-in-Charge that, the men, materials, tools and earthings (if any) are removed and the line is safe for charging. On charging the line, if it does not stand and trips, the Bidder should arrange to patrol the line and find out the causes of the tripping and rectify the defect at no extra cost to the GETCO.

4.0 HANDING OVER OF LINE DOCUMENTS:

4.1 On completion of all erection activities, the Bidder has to furnish following information along with technical details to concerned Engineer-in-Charge of the work in triplicate duly bound:-

- 1) Approved surveyed route with permanent marks, (To be obtained from the GETCO)
- 2) Approved copy of profiles with tower schedule, (To be obtained from the GETCO except for portion where any change is approved)
- 3) Location wise soil strata details of each pit excavated, type of foundation executed, volumes of excavation & concrete and RCC steel weights,
- 4) Details of revetment, retaining walls, etc., work done for protection of tower footing and their approved drawing copies,
- 5) Approved copies of excavation plan and foundation drawings, (To be obtained from the GETCO)
- 6) Approved copies of structural drawings of stubs, templates, towers, extensions, etc., (To be obtained from the GETCO)
- 7) Approved copies of stringing charts,
- 8) Value of tower footing resistance jointly measured before & after providing earthing and type of earthing executed, duly signed by Engineer Incharge of line.
- 9) Details of spans and phase where mid span joint, repair sleeve are provided,
- 10) Location wise type and numbers of insulators, insulator hardwares, earth wire hardware, conductor accessories, provided, etc.
- 11) Separate detail of each crossing like road, river, railway, power line, etc and details of clearance as per Indian Electricity Rules.

5.0 GENERAL:

5.1 The Bidder shall ensure that at the end of each sub-activity the surplus material is immediately removed from the work-site to avoid loss and injury to the public.

5.2 The Bidder has to make reconciliation of material account and to settle final bill including signature in all relevant papers required for passing of final bill within three months from the date of charging / commissioning of line.

5.3 A lump sum amount of 6 % of the order value OR Rs.1.0 lac whichever is less, will be with held from the running bills of stringing work, which will be released only after handing over of these documents to the satisfaction of concerned Superintending. Engineer (Trans).

Note: The weights of non available tower extensions above 6 Mtr. are taken tentative. The successful Bidder has to design the non available extension above 6 Mtr. and should be got approved by GETCO with no extra cost. The payment of the extension above 6 Mtr. will be paid as per the BOM approved by GETCO.

SECTION-III

**INDEX FOR FILES CONTAINING DRAWINGS AND
SPECIFICATIONS**

Sr. No.	Description
1.	Tower Material Specification
2.	Earth & stay wire
3.	Insulators
4.	ACSR Zebra H/W & ACCS
5.	220kV Single suspension H/W for ACSR Zebra 1 of 1 Model
6.	220kV Double suspension H/W for ACSR Zebra 1 of 1 Model
7.	220kV Single tension H/W ACSR Zebra 1 of 1 Model
8.	220kV Double tension H/W ACSR Zebra 1 of 1 Model
9.	Preformed Armour rod suitable for ACSR conductor – Model
10.	Vibration damper- 4R for ACSR conductor - Model
11.	Tubular Repair Sleeve
12.	Tubular Compression Joint
13.	Earth wire accessories 7/3.15
14.	Tension Clamp Suitable for 7 3.15 MM Earth Wire
15.	Suspension Clamp for Earth Wire
16.	Mid span Compression Joint for Earth Wire
17.	Cross by Clips for Earth Wire
18.	Tinned Copper Earth Bond
19.	Tower Earthing drawing 1 of 3 Model
20.	Tower Earthing drawing 2 of 3 Model
21.	Tower Earthing drawing 3 of 3 Model
23.	Supply & Erection

NOTE: The entire part-II (Technical Specifications) should be down loaded and submitted with Technical Bid duly signed by the Bidder and stamped with round company stamp on every page.