

	DAKSHIN GUJARAT VIJ COMPANY LIMITED CINU40102GJ2003SGC042909 Regd. & Corporate office: "Urja Sadan", Nana Varachha Road, Surat-395006	
	RAJPIPLA DIVISION OFFICE (O & M) OLD POWER HOUSE, RAJPIPLA-393145, PHONE NO. (O) : 02640-222152 E-mail : eeraj.dgvcl@gebmail.com	

DAKSHIN GUJARAT VIJ COMPANY LIMITED
Rajpipla (O&M) Division

Tender Notice No: E-85/2026-27

Name of Work	Tender for the UG Cable work for Wire Free City and other scheme work of Rajpipla-1 SDN (also in any other sdn of Rajpipla Dn if required) for under Rajpipla Division.
Time Limit	: 24 months
Estimate Cost	: 4500000.00
Earned Money Deposit	: 45000.00

Stamp of Contractor

Signature of Contractor

	DAKSHIN GUJARAT VIJ COMPANY LIMITED CINU40102GJ2003SGC042909 Regd. & Corporate office: "Urja Sadan", Nana Varachha Road, Surat-395006	
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અગત્યની સુચના: દરેક કોન્ટ્રાક્ટર/સપ્લાયર એ નીચે મુજબની વિગતો કોઈ પણ પ્રકારની ભૂલ વગર કેપિટલ લેટર્સમાં લખીને ટેન્ડર ડોક્યુમેન્ટના પહેલા પેજ ઉપર અચૂક લગાવવી તથા જે ડોક્યુમેન્ટ ટેન્ડર સાથે અપલોડ કર્યા હોય તેની આગળ ટીક (✓) અચૂક કરવું.

1	Tender Notice No.	: E-85
2	Name of Work	Tender for the UG Cable work for Wire Free City and other scheme work of Rajpipla-1 SDN (also in any other sdn of Rajpipla Dn if required) for under Rajpipla Division.
3	Last Date & Time of Issue/download of Tender	13-07-2026 (upto 18:00 Hrs)
4	Last date & time of online submission of tender	13-07-2026 (upto 18:00 Hrs)
5	Last Date & Time of payment of EMD of Tender (if DD/PO/BG)	13-07-2026 (upto 18:00 Hrs)
6	Date & Time of Opening of Tender (if possible)	14-07-2026 (upto 15:30 Hrs)
7	Actual Date of Opening of Tender	: _____ (for office use only)
8	Estimated Cost Rs	: Rs:-4500000.00
9	EMD	: Rs:-45000.00
10	Tender Fee Transaction/UTR number Date	: Rs:-2360.00 _____ __/__/2026
11	EMD Transaction/UTR number Date	: Rs:-45000.00 _____ __/__/2026
12	If other payment mode Receipt Number Date	: _____ __/__/2026

દરેક કોન્ટ્રાક્ટર/સપ્લાયરએ જો નીચે જણાવેલ ડોક્યુમેન્ટસ ટેન્ડર સાથે જોડેલ/અપલોડ હોય તો []Yes []No માં ફરજિયાત ટીક (✓) કરવું.

UPLOADED/Submitted (Yes/No)			(FOR OFFICE USE ONLY)
13	Registration of Firm	[]Yes []No	Remarks:
14	Partnership Deed attached/MOA	[]Yes []No []N.A.	Remarks:
15	Power of attorney	[]Yes []No []N.A.	Remarks:
16	Electrical Contractor license number : _____	[]Yes []No	Remarks:
17	Solvency Certificate @ 20% of Tender Amount	[]Yes []No	Remarks:
18	Experience Certificate (WCC/ Authorized certificate)	[]Yes []No	Remarks:
19	Workman Compensation (Insurance document)	[]Yes []No	Remarks:
20	Dully signed tender submitted/Uploaded with Schedule-B	[]Yes []No	Remarks:
21	GST Registration No. : _____	[]Yes []No	Remarks:
22	Pan Card No. : _____	[]Yes []No	Remarks:
23	PF No: : _____	[]Yes []No	Remarks:
24	Labour license Number : _____	[]Yes []No	Remarks:

It is certified by the contractor that.....

Stamp of Contractor
Signature of Contractor

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1. Should this tender be accepted I / We hereby agree to abide by and fulfill all the terms and conditions of the "Tender Contract for works" as applicable and in default thereof forfeit and pay to the Board the sum of money due.
2. The full value of the "Earnest Money Deposit" paid here with should be absolutely forfeited to the Board should I / We do not deposit the full amount of specified security deposit.
3. The competent authority can be delete any item in schedule 'B' of the tender.
4. I have filled in the rates after visiting the site of work personally.

Certified Documents to be Attached by Contractor:-

All below mention documents must be uploaded in below mention series (1 to 9) one PDF Form

- 1) Copy of PAN Card
- 2) Copy of Goods Service Tax Registration (GST)
- 3) Copy of Electrical Contractor Certificate
- 4) Copy of Labour License
- 5) Copy of PF Registration Certificate
- 6) Solvency Certificate of minimum estimate value of 20%
- 7) UG Cable Erection Work Experience and Work satisfactory certificate from concern Division Office (As per attached Form No.3(A))
- 8) CA certificate
- 9) Work compensation Registration (Insurance)

Write contact details of contractor for communication purpose:

- (1) Mobile Number of Contractor : _____
- (2) Email address of Contractor : _____

Date: _____

SIGNATURE OF CONTRACTOR

**EXECUTIVE ENGINEER (O&M)
RAJPIPLA DIVISION OFFICE, RAJPIPLA**

Stamp of Contractor

Signature of Contractor

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SPECIAL NOTE:

1. Payment of Tender Fee and Earnest Money Deposit (EMD) can be accepted by RTGS/NEFT
 -Name of Bank: - Bank of Baroda
-Account Number:-02230200000663
-IFSC Code: - BARB0RAJPIP (fifth digit is Zero)
 -Account Name: - Dakshin Gujarat Vij Co Ltd.
 -Branch: - Rajpipla
2. The detailed specifications are for general guidance and should be followed, if there is any variation between as described in the schedule and the detailed specification former should be adhered to over the letter in respect of the variation only, otherwise the later should be adhere to.
3. **Tender Fee and EMD must paid only online RTGS/NEFT and cash, DD not allowed.**
4. The Security Deposit will be 5% of the Contract Value.
5. **Each page of the specifications schedule and the booklet tender and contract for works shall be signed by the contractor in taken of its acceptance and same signed copy must be uploaded in online.**
6. **Tender should be submit by online only**
7. Bidder has to upload scanned copies of original (Notarized / Self attested copies of original-as specified in tender documents) documents with bid and no physical documents to be called from bidder.
8. In case of short submission of documents with bid and / or clarification if any required from the bidder, the required detail / documents may not be asked from bidder in physical or mail & it will be treated as disqualified.
9. **It shall be sole responsibility of the bidder that the uploaded scanned (Documents must be must scanned portrait in proper Scanner in PDF form in A4 SIZE and documents must be proper visible.) documents remain visible and should not be password protected.**
10. **Tender work order may be awarded more than one qualified bidder.**

The time limit allowed is **24 Months** from the date of issue of the tender to commence the Work.

SUPDT.A/C.(EXP)

EXECUTIVE ENGINEER (O&M)
RAJPIPLA DIVISION OFFICE, RAJPIPLA

SIGNATURE OF CONTRACTOR

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SPECIAL CONDITION

Name of Work	Tender for the UG Cable work for Wire Free City and other scheme work of Rajpipla-1 SDN (also in any other sdn of Rajpipla Dn if required) for under Rajpipla Division.
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Name of Contractor:-

1. Should this tender be accepted I / We hereby agree to abide by and fulfill all the terms and conditions of the "Tender Contract for works" as applicable and in default thereof forfeit and pay to the Board the sum of money due.
2. The full value of the "Earnest Money Deposit" paid here with should be absolutely forfeited to the Board should I / We do not deposit the full amount of specified security deposit.
3. Every contractor shall except the registered contractor on the approved list of the Board unless exempted by the Superintending Engineer / Account Officer jointly Of the concerned circle produce along with his tender solvency certificate from Mamlatdar of the Taluka within which he resides or Banker's certificate of his Financial stability. If he fails to produce such certificate such tenders are liable to be rejected.
4. The contractor has to work in any sub division of the Bharuch Circle as and when required as per instruction of the competent authority.
5. No any order pending for execution at any subdivision office of more than one year.
6. It is directed to add a clause in all tender / inquiry for works and purchases for demanding GST registration number. Unregistered Contractors / Suppliers / Fabricators should not be allowed for the bid.
7. The contractor has to submit Workmen Insurance Certificate along with tender documents.
8. The contractor has to submit Work completion Certificate along with work-order of concern division office.
9. **Safety:-Before starting any work by the labour of the contractor, it will be the responsibility of the contractor to obtain line clear from the concerned officer/ employee.**
10. **The Company is not liable for any injury or damage to contractor's workman or his equipment respectively during execution of this contract and the Company will not pay any compensation for any reasons whatsoever. The contractor is also responsible for any damage to private property i.e. standing crops in farms or Gram Panchayat property etc.**
11. **No any work should be carrying out without supervisor of the company for safety point of view. Contractors should observe all the safety rules during execution of work.**

Stamp of Contractor

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12. The contractor will have to see that labours working on the site should utilize all safety equipment like helmet, safety belt, hand gloves, safety shoes and tool-tackle. If any labour found without safety equipment at site during execution of work, it is fully responsibility of contractor for any accident occurred.
13. The contractor shall not demand or accept any help from the intending consumers in line erection works or in transportation of materials.
14. Whenever there is an excess work carried out by a contractor beyond the technically sanctioned amount against the work order given, the approval for the excess quantity of work done should be obtained from the competent authority as per Company rules.
15. As per Circular no: DGVCL/O&M/EE. Tech.2/DE-5/Geo Urja/22/22308 Dtd: 31.12.2022 For Geo inventory mapping which must be submitted by concern SDO at the time of Submission of contractor's bill.

SIGNATURE OF CONTRACTOR

EXECUTIVE ENGINEER (O&M)
RAJPIPLA DIVISION OFFICE, RAJPIPLA

Terms & Condition

Stamp of Contractor

Signature of Contractor

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➤ **GENERAL**

1. The work entrusted as per the contract should be soundly constructed in accordance with the best practice and should present a neat appearance when completed. All the works have to be carried out according to the drawing and specification and as per the instruction of Engineer - in – charge. There should not be any danger or injury to material of other's property during transportation or erection.
2. Before commencing erection of lines, the contractor will be provided with the pole schedule and lay out map which will give the type of support, number of Guy, earthing etc at every one of the locations marked in the lay out map. The pole Guy and earthing location will be showed by the Engineer – in – charge other drawing referred to in pole schedule will be available for reference with the company's staff at site or at the Division or tree branches which come in the way of the line will be arranged by the company.
3. Marshy or water logged locations must be avoided as far as possible. If it becomes inevitable to locate poles at such points special precautions about foundation will have to be taken and work carried out as instructions of the Engineer – in – charge.
4. The spans shall be as specified in the pole schedule and the minimum spacing between Power conductors and neutral shall be as shown in approved drawings.

➤ **SUPPLY OF MATERIAL**

1. All the material are to be supplied by contractor as per DGVCL specification.

➤ **EARTHING**

1. The earthing devices shall be of the pipe type as indicate in the pole schedule. The work of earthing must be carried out as per drawings and at the places selected by the field Engineer, earthing coil, coke or charcoal powder and salt will have to be procure by the contractor erection of earthing should be carried out under the supervisions of the representative of the Engineer – in – charge. No amount will be paid if the works is not done accordance with these instructions.

➤ **GENERAL CONDITIONS OF THE CONTRACT**

1. All single pole structures, special structures and fitting of cross arms earthing etc. should be carried out according to standing standard drawings available for reference in the division office.
2. Quantities: - The quantities mentioned in the accompanying schedule are only approximately. Actual quantities may increase according to the local condition. The company reserves the right of revising or deleting any of the quantities to be erected during the execution of the contract and the final quantities actually erected by contractor will be calculated and paid for at the rates given in the contract schedule of rates.
(a) Whenever there is an excess work carried out by a contract beyond the technically sanction amount against the order the approval for the excess quantity of work done should be obtained from the competent authority as per company's rule.
3. DGVCL company's does not bind itself to accept the lowest or any tender
(a) Closing down and recommencement of work at all stage must be intimated by the contractor to Engineer –in- charge or vice versa in writing with reasons if any failing which their claims for extension or time limit will not be entertained.

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4. The work will have to be carried out as per program laid out by the company and the contractor should employ proper and competent supervisor who should thoroughly supervise the execution of work by being present on the work site throughout.
5. No tools will be supplied except jointing dies by the company and the contractor should make his own arrangements to get adequate quantities of all other tools in order to complete the job within the prescribed period jointing dies will be supplied free of cost.
6. The contractor shall be responsible for breakage loss or theft of material during transit or erection to him from stores till the work is handed over to and taken over by the company.
7. The erection work should be commenced within seven days from the date specified in the order to commenced work issue by the Executive Engineer and should be complete within the prescribe period for each work.
8. Minimum period of guarantee if during 12 calendar months from date of handing over charge after completion of the work the erected lines are found defective in any way the same should be rectified by the contractor.
9. All the general conditions of the contract to the company will be applicable to this tender An agreement is to be signed in the prescribe form.
10. R.A. Bills will be prepared once a month looking to the progress of the work and payment will be made as under
 - (a) Running bill may be paid on the works carrying out after measurement are recorded up to 80% and on submission of material account by the contractor.
 - (b) Final bill for contractor will be paid after completion of work and recording measurement and after submission of materials account by the contractor.
11. No material of the company should be left on the lines without supervisions.
12. For starting of aluminum or ACSR conductor aluminum or wooden pulley must be used for supporting the conductor on poles.
13. All conductor earth wire and stay set must be tight.
14. Stay rod bit must be in as per instruction.
15. All the poles must be in plumb.
16. Fabrication fitting on pole must be tight.
17. Generally following span should be kept on HT line
 - I. 28 ft for 150ft
 - II. 36 ft for 180ft
18. All road crossing must be provided with binding arrangement and minimum 22 ft clearance must be kept between conductor and road level.
19. While executing the stringing work, the contractor will have to use proper device for rotating the conductor drum required for unwinding the conductor.
20. Contractor must get the requisition three days before the requirement of the materials on site from Engineer in charge.
21. The payment through R. A. bill shall be made only to extent of 80% of the total value of the work done. The amount so withheld will be released on furnishing by the contractor the material account statement of the relative R.A. bill.

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22. The contractor shall on completion of the work prepare and render the final detailed material account of the materials received by him from the company's stores within one month from the date of completions of the work if however the contractor does not render the material account a register AD notice will be issued to him if within ten days from the date of issue of such notice there is not reply from the contractor the material account will be finalized and recoveries made as per the company's account which shall have to be accepted by the contractor disputes if any raised later shall not be entertained.
23. The contractor is bound to complete the work within specified period for each work given by the Executive Engineer.
24. The contract will remain in force for the period of **24 months**. Contracture will have to work according to name of work or according to the instructions of DGVCL authorities and DGVCL norms.
25. Priority of the work would be decided by the Ex. Engineer and contractor shall carry out the work within the stipulated period for the order issued by the Ex. Engineer.
26. The contractor must have adequate resources and gang of unskilled and skilled person to undertake the work at different places.
27. The contractor will be given separate order for each work on the basis of the rate contractor order. The date of commencement and date of completion of work will be stipulated in the order which the contractor has to agree otherwise the penalty will be liable for late completion of works as company's standard conditions.
28. The soil may be hard or normal the tendered should fill in the rates after seeing the site.
29. The contractor shall be responsible for returning the residual material after completion of the contract and if fails to return the balance material supplied to him by the company, the cost of the residual material will be recovered from the contractor at the market rate or stock issue rate whichever is higher at the time of finalization of material account plus 15%.

SIGNATURE OF CONTRACTOR

EXECUTIVE ENGINEER (O&M)
RAJPIPLA DIVISION OFFICE, RAJPIPLA

Stamp of Contractor

Signature of Contractor

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WORK WISE DETAILS OF WORK COMPLETED OR IN PROGRESS BY CONTRACTOR

FORM NO.3(A)					
Name and Address of client/Contractor					
Name of Work Execute					
Order No. & Date					
Date of Work Commencement					
Due Date of Work Completion					
Actual Date of Work Completion					
Value Of Order					
Actual Work Amount					
Actual Work Done (Description Of Work)					
Under Whom Work Executed					
Execution of Work					
Quality of Work					
COMMENT ON THE CAPABILITIES OF THE CONTRACTOR					
A.Technical Proficiency					
B.Technical Soundness					
C.Mobilization of adequate T&P					
D.Mobilization of Manpower					
E.General Behaviour					
Note:					
1 All the column should be filled properly					
2.This certificate issued to contractor for Experience point of view for					
workin for DGVCL					
EXECUTIVE ENGINEER (O&M) RAJPIPLA DIVISION OFFICE, RAJPIPLA					

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UG CABLE WORK TECHNICAL SPECIFICATIONS INDEX

- 1.0 11/22 kV XLPE Cable Jointing Kit & laying of cables
- 2.0 Earthing
- 3.0 Cable Trench
- 4.0 HDPE Pipes
- 5.0 List of Approved Makes of Equipments and Accessories
- 6.0 Drawings
- 7.0 Erection of Pole, Structure, Transformer, Guys.

Stamp of Contractor

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TECHNICAL SPECIFICATION FOR 11/22 KV XLPE POWER CABLE TERMINATION KIT

SECTION -I

1.11 Termination:

The 11/22 kV cable termination/joints shall be done by skilled and experienced jointers duly approved by the Engineer in charge. Termination including supply of jointing kit is included in the contractor's scope unless specified otherwise.

Termination kits shall be suitable for termination of the cables to indoor switchgear or to weather proof cable end box of an outdoor mounted transformer an outdoor type for termination at poles. The terminating kits shall preferably be as of the following types.

Heat shrink type of approved make of DGVCL as mentioned in approved make list in section 5.0(Technical specification) using factory molded silicone rubber insulators. For outdoor installations weather shields, shielding ends and any other accessories required should form part of the kit.

Straight through jointing kits shall be suitable for underground installation with uncontrolled backfill and possibility of flooding by water. The jointing kit shall be preferably of PUSH ON/Heat shrink type of approved make of DGVCL as mentioned in approved make list in section 5.0(Technical specification)

Fixing of end termination & straight through joints.

1.
 - (i) Contractor should clarify the make of cable end termination and straight through joint. The heat & shrink type end termination & straight through joints shall be utilized for the job.
 - (ii) Dual wall molded type should be available in straight through joint.
 - (iii) After completing work of cable laying end termination straight through joints, following test shall be carried out jointly by engineer in charge of DGVCL and contractor.
 - (iv) Insulation resistance test before & after with 5 KV insulation tester. (A) Hypo test
 - (v) Contractor has to furnish Guaranteed Technical Parameters (GTP) type test certificate of various tests conducted at any Govt./ NABL approved laboratory for the joints they intend to supply for this job. The test certificate should not be prior to 5 years from the date of tender. The contractor shall have to submit the same with technical bid and failure in which technical bid will be disqualified & the price bid of that party will not be opened.
 - (vi) One competent skilled supervisor shall have to co-ordinate the site authority and he has to do all communication with engineer in charge of DGVCL.
 - (vii) It is essential to have suppliers certificate of training for cable jointing of cable jointer.
 - (viii) Joints have to ensure safety while making joints so that other nearby cables will not be damaged.
 - (ix) **Before using Termination Kit & Jointing Kit should be got verified at SUB-DIV level. The bidder has to get verification certificate from D.E. (O&M) for the works to be carried out in their jurisdiction.**
 - (x) **Bidder shall offer guarantee for all part of Termination Kit & Jointing Kit for a period of 2 Years from the date of charging the Termination Kit. In the event of failure of Kit due to manufacturing defect during guarantee period, bidder shall have to replace it at no extra cost within 24 hrs on intimation.**
 - (xi) **The bidder shall get each end termination kits & straight through joint kit verified before utilization of the same from the concern D.E. of s/dn office matching with original invoice submitted & sample approved by concern sub-division level and M.O.M. of verification to that effect shall be submitted while submitting the bills.**
- 2 The Bidder shall have to supply cable end joint / straight joint kit as per IS 13573-1992 with latest amendment No. 2, 1998 IEEE 48-1990 and shall be Class -1, ESI-09-13 performance specification for high voltage cable accessories.
- 3 The work of laying of cable along the road / road crossing to be carried out by Horizontal Drilling Machine / Auger boring machine enclosed in HDPE Pipe only.

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CLASS OF TERMINATION:

The XLPE 11/22 KV Link Line shall be class 1 termination as per appropriate ISI code nos. i.e. IEEE-48-1990.

APPLICABLE STANDARDS:

IS 13573-1992 with latest amendment – Latest amendment No. 2, 1998. IEEE 48-1990. The termination shall be Class 1. ESI-09-13 performance specification for high voltage cable accessories. The cable accessories being supplied in the form of kit which has different components to be assembled at site.

MATERIALS:

The term 11 KV / 22 kV XLPE Cable refers to extruded or Molded Polymeric. Polymeric material which are cross linked by gamma radiation to develop elastic memory and supplied in an expanded or otherwise deformed size and shape. Bidders should submit the proof that the tubes are cross linked by gamma radiations. However chemically cross linked, crotch seal and lug seals are permitted.

For straight joints, the insulation over the ferrules should be reinsulated by dual wall tubing. This should have an inner insulating layer vulcanized to an outer semi-conducting layer. This is required to ensure reconnection of cable insulation screen of the core from one end of the joint to the other. The dual wall tubing ensures that there is no entrapment of air pockets between the insulating and semi-conducting layers.

FOR JOINTS:

11 kV / 22 kV XLPE underground flexible polymeric tubing, preferably black colored pre coated with adhesive shall be provided for sealing the exposed metallic sheaths and sheath/earth connections.

PROVISION OF ADDITIONAL CREEPAGE INDOOR / OUTDOOR TERMINATIONS:

Single piece, 11/22 KV XLPE underground cable, weather sheds having non-tracking, erosion and weather resistant properties shall be supplied with the kits for application over non-tracking tubing. The quantity of sheds to be supplied shall depend on voltage grade and indoor/outdoor application and shall be indicated along with offer. Each shed shall give an additional creepage length of at least 100mm.

INSULATION AND SCREEN REINSTATEMENT FOR JOINTS:

The reinstatement of insulation shall be by means of heat shrinkable, flexible, polymeric tubing made from a discharge resistant polymer, preferably colored red. The tubing after complete recovery shall have a minimum wall thickness to ensure provisions of adequate insulation in step.

EARTH & SCREEN CONTINUITY FOR TERMINATION & JOINTS:

Screen continuity by using tinned copper mesh and earth continuity by using tinned copper braids of appropriate size shall be provided for transfer of screen/earth in straight through joints. In termination, tinned copper braids of appropriate size or equivalent current carrying capacity of cable conductor along with copper lugs of appropriate size shall be provided for continuity of screen to armour to the earth.

LUGS & FERRULES:

The requisite number and type of aluminum/ copper lugs/ferrules shall be provided for termination/joints. The Lugs and ferrules for XLPE cables shall be crimping type suitable for compacted circular conductor having two nos. of holes.

TECHNICAL SPECIFICATION

FOR Laying, testing & Commissioning of 11 KV underground cable (Cable to be supplied by DGVCL and jointing kits to be supplied by the Contractor) in Rajpipla Division, Bharuch Circles under jurisdiction of DGVCL.

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2.0 Earthing

1.0 INSTALLATION SPECIFICATION FOR EARTHING: GENERAL:

All the non-current metal parts of electrical installation (RMU, MSP/FSP, Cables terminals) shall be earthed properly. All metal conduits, trucking, cable sheaths, switchgear, distribution fuse boards, lighting fittings & fixtures and all other parts made of metal shall be bonded together and connected by means of specified earthing system. All earthing will be conformed to Indian Standard Specifications **IS: 3043 – 1987**. The bidder shall measure the resistivity of various places in the proposed sub stations and design suitable earthing system and get it approved from DGVCL.

EARTHING CONDUCTORS:

All earthing conductors shall be of high conductivity G.I./Aluminum/copper and shall be protected against mechanical injury or corrosion.

CONNECTION OF EARTHING CONDUCTORS:

- (i) Main earthing conductors shall be taken from the earth connections at the main switchboards to an earth electrode with which the connection is to be made. Sub-main earthing conductors shall run from the main switchboard to the sub-distribution boards. Final distribution boards earthing conductors shall run from sub-distribution boards.
- (ii) Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor or its distribution boards or to an earth leakage circuit breaker. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switchboards at which they originate or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of the equipment shall be earthed by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord. Switches, accessories, lighting fitting etc. which are rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered as a part of earthing conductor for earthing purposes, even though the run of metallic conduit is earthed.
- (iii) All metal clad switches and other equipment carrying single phase current shall be connected to earth by a single connection. All metal clad switches, carrying medium voltages and high voltage shall be connected with earth by two separate and distinct connections. The earthing conductors inside the building, wherever exposed, shall be properly protected from mechanical injury by running the same in GI pipe of adequate size.
- (iv) Earthing conductors, outside the building, shall be laid as per IS motioned above below the finished ground level.

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PROTECTION FROM CORROSION:

Connections between copper and galvanized equipment shall be made on vertical face and protected with paint and grease. Galvanized fixing clamps shall be used for fixing earth conductors. When there is evidence that the soil is aggressive to copper, buried earthing conductors shall be protected by suitable serving and sheathing.

PIPE ELECTRODE EARTHING:

Earthing electrode shall consist of a GI pipe (class B of approved make), not less than 80 mm dia. and 3 meters long. GI pipe electrode shall be cut tapered at the bottom and provided with holes of 12 mm dia. drilled at 75 mm interval upto 2.5 meters length from bottom. The electrode shall be buried vertically in the ground as far as practicable below permanent moisture level, but in any case not less than 3 mtr. below ground level. The electrode shall be in one piece and no joints shall be allowed in the electrode. Wherever possible, earth electrodes shall be located close to water tap, water drain or a down take pipe. Earth electrode shall not be located in proximity to a metal fence. It shall be kept clear of the building foundations and in no case; it shall be nearer than 2 meters from the outer face of the wall.

The pipe earth electrode shall be kept vertically and surrounded with 300mm alternate thick layer of charcoal dust and salt mixture upto a height of 2.5 meters from the bottom. At the top of the electrode a G.I. threaded cap shall be provided for watering the earth. The main earth conductors shall be connected to the electrode just below the G.I. cap, with proper terminal lugs and check nuts. The G.I. cap over the GI pipe and earth connection shall be housed in a masonry chamber, approximately 300 mm length x 300 mm wide and 350 mm deep. The masonry chamber shall be provided with a cement concrete inspection cover resting over a C.C. frame, embedded in masonry. The pipe type earthing drawing for 11/22 kv cable laying work is attached.

COIL TYPE EARTHING:

In this method G.I. wire No.8 SWG is used in coil form instead of G.I. pipe. The pit for earthing may be only 1800mm deep and 600mm section. The G.I. earth wire is wound in the form of a coil of 50mm dia. and 450mm length (approx 115 turns) and placed at the bottom end of earth wire embedded in the P.S.C. pole. The surrounding space around the coil upto 350mm dia. is filled up by 300mm alternate layers of salt and coke/charcoal upto 1500mm from the bottom. The top and surrounding remaining space of the pit is filled up with loose earth.

EARTH RESISTANCE:

The earth resistivity result of the soil where the earthing stations are located shall be submitted to the engineer-in-charge before the earthing work starts. If the earth resistance is too high and multiple electrode earthing does not give adequate low resistance to earth, the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions as required.

RESISTANCE TO EARTH:

The resistance of each earth system shall not exceed 2 ohm in the case of M.V. system and 1.0 ohm in the case of E.H.V. system.

The separate earthing shall be provided for incoming and outgoing cable.

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3.0 Cable Trench

CABLE TRENCH:

TECHNICAL SPECIFICATION FOR 11/22 KV XLPE UNDERGROUND CABLE.

This specification lays down the material properties. Performance requirement of 11/22 KV XLPE Cable termination and jointing system for use on electrical systems operating at voltage 11/22KV (i.e. voltage at which the cable termination kit is meant for).

3.2 Route

Before the cable laying work is undertaken, the route of the cable shall be decided by the Engineer-in-Charge considering the following.

- (i) While the shortest practicable route should be preferred, the cable route shall generally follow fixed developments such as roads, foot paths etc. with proper offsets so that future maintenance, identification etc. are rendered easy. Cross country run merely to shorten the route length shall not be adopted.
- (ii) Cable route shall be planned away from drains and near the property, especially in the case of LV/MV cables, subject to any special local requirements that may have to be necessarily complied with.
- (iii) As far as possible, the alignment of the cable route shall be decided after taking into consideration the present and likely future requirements of other services including cables enroute, possibility of widening of roads/lanes etc.
- (iv) Corrosive soils, ground surrounding sewage effluent etc. shall be avoided for the routes.

(v) Route of cables of different voltages.

- (a) Whenever cables are laid along well demarcated or established roads, the LV/MV cables shall be laid farther from the kerb line than HV cables.
- (b) Cables of different voltages, and also power and control cables shall be kept in different trenches with adequate separation. Where available space is restricted such that this requirement cannot be met, LV/MV cables shall be laid above HV cables.
- (c) Where cables cross one another, the cable of higher voltage shall be laid at a lower level than the cable of lower voltage.

3.3 Proximity to communication cables

Power and communication cables shall as far as possible cross each other at right angles. The horizontal and vertical clearances between them shall not be less than 60cm.

3.4 Railway crossing

Cables under railway tracks shall be laid in spun reinforced concrete, or cast iron or steel pipes at such depths as may be specified by the railway authorities, but not less than 1m, measured from the bottom of the sleepers to the top of the pipe. Inside railway station limits, pipes shall be laid upto the point of the railway station limits, pipes shall be laid upto a minimum distance of 3m from the centre of the nearest track on either side.

3.5 Way Leave

Way leave for the cable route shall be obtained as necessary, from the appropriate authorities, such as, Municipal authorities, Department of telecommunication, Gas Works, Railways, Civil Aviation authorities, Owners of properties etc. In case of private property, Section 12/51 of the Indian Electricity Act shall be complied with.

3.6 Methods of laying

The cables shall be laid direct in ground, pipe, closed or open ducts, cable trays or on surface of wall etc. The method(s) of laying required shall be specified in the tender schedule of work.

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3.7 Laying direct in ground

3.7.1 General

This method shall be adopted where the cable route is through open ground, along roads/lanes, etc. and where no frequent excavations are likely to be encountered and where re-excavation is easily possible without affecting other services.

i. EXCAVATION OF TRENCH

The Contractor shall have to dig the trench for 1200 mm depth and 400 mm width (for single cable) & 600 mm width (for double cable) as per instruction of Engineer-in-charge. For 600 mm width, trench length will be considered as one & half (1½) times the length for 400 mm width and payment shall be made accordingly. as per DGVCL Drawing. Cable trench must be excavate manually (without machine) as there is many utility. Bidder is responsible to excavate cable trench for any type of soil and any type of Pakka Road as per Scheduled-B specification.

ii. Laying of cable in trench

LAYING OF XLPE CABLE IN TRENCH AND REFILLING OF TRENCH:

In cable trench each sand layer shall be prepared for 100 mm thick & 11 kV / 22 kV XLPE Cable of size up to 185/240 mm². to be laid on sand layer covering the cable with 150 mm Inner diameter x 25 mm thick, 200 mm outer dia. and 1.0 meter long RCC half round muffs (to be supplied by contractor) and refilling the same, as per Instruction of Engineer-in-charge.

1.6 Erection Specifications for Cable lying:

1.6.1 Scope

Scope includes installation, testing and commissioning of the cable system.

1.6.2 Standards:

The work shall be carried out by the best workmen with confirmation with this specification, codes of practice of Indian Standards Institution, approved drawings and instructions of Engineer in charge or authorized representative. In case of any conflict between the standards, the instructions of Engineer in charge shall be binding.

1.6.3 Cable laying:

1.6.3.1 Cables as far as possible shall be laid in complete, uncut lengths from one termination to the other.

1.6.3.2 Cables shall be properly arranged in the cable tray such that criss crossing is avoided and final take off to the switchgear is facilitated. Contractors are responsible for arrangement of cables in cable trench.

1.6.3.3 Temporary ends if any shall be protected against dirt and moisture and prevents damage

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to the insulation. Proper PVC or rubber insulating tape shall be used. Use of friction type or fabric tape is not permitted. Lead sheathed cables shall be plumbed with lead alloy.

- 1.6.3.4 Cables shall be handled carefully during installation to prevent damage to the cables. Protective pipes shall be used as and when required as directed.
- 1.6.3.5 Insulation resistance test of all the cables shall be taken in presence of Engineer in charge. Defective cables shall be immediately replaced before laying of cables of other groups.
- 1.6.3.6 Suitable GI/HDPE/RCC hume pipes for protection as directed shall be provided as required. Cable ends shall be carefully drawn through such pipes to prevent damage to the cable. Radius at bending shall not be less than the recommended bending radius of the cables specified by the manufacturer.
Standard gauge of pipe filling shall be used for sizing the pipe.

After installation and testing of cables, conduit ends shall be plugged with a suitable weather proof plastic compound/ putty for sealing purpose as directed. No extra payments shall be allowed for the laying.
- 1.6.3.7 Prior approvals for cutting holes for laying cable in existing structures and foundations shall be obtained from the Engineer in charge.
- 1.6.3.8 At road/railway/canal crossing where cable enters pipe sleeves adequate bed of sand shall be given so that the cable do not slack and get damaged by pipe ends.
- 1.6.3.9 Drum number shall be recorded for each cable in cable schedule. Cables shall be routed so that they are not subjected to heat from adjacent hot piping and vessels.
- 1.6.3.10 Appropriate support shall be provided to prevent sagging of cable as per cable trench drawing.
- 1.6.3.11 Supporting angles for cables shall be suitably clamped/tied by means of nylon cords.
- 1.6.3.12 The identification marker shall be placed on each cable at every 2 Mtrs intervals and at every cable joint locations, of adequate size fabricated from 3 mm thick, 25 mm wide aluminum strip. The marker shall be tied by nylon string with cable. The marker shall be embossed by letter as stated below as applicable.

DGVCL- 22/11 KV – Name of feeder, Depth of cable
–mtr

ERECTING XLPE CABLE ON D.P. STRUCTURE

The XLPE cable shall be erected on DP structure in such a manner that cable should be 8 meters above ground level in 110mm O.D. and 6.11 kg/Cm², Class-4, Green color with thickness of 8.5 mm conforms to the specification for HDPE pipes as per IS 4984 - 1987 (3rd revision) (110mm dia, 3000 mm in length) and HDPE should be erected 300 mm below

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ground level and 2700 mm above ground level.

I. The XLPE cable should be clamped on DP structure with proper polymer clits. The material shall be supplied by contractor.

EARTHING OF CABLES ON D P STRUCTURE

Pipe type earthing should be provided & fixed from 80 mm dia class-B GI pipe with pit to be filled with salt & coke and construction of chamber as per drawing attached and cable. All materials including joining of cable with earth pit pipe by providing 25mm width G.I. strip will be supplied by bidder.

The drawing is attached.

(ii) Testing before laying

All the time of issue of cables for laying, the cables shall be tested for continuity and insulation resistance

(iii) The cable drum shall be properly mounted on jacks, or on a cable wheel at a suitable location, making sure that the spindle, jack etc. are strong enough to carry the weight of the drum without failure, and that the spindle is horizontal in the bearings so as to prevent the drum creeping to one side while rotating.

(iv) The cable shall be pulled over on rollers in the trench steadily and uniformly without jerks and strain. The entire cable length shall as far as possible be laid off in one stretch

(v) After the cable has been so uncoiled, it shall be lifted slightly over the rollers beginning from one end by helpers standing about 10m apart and drawn straight. The cable shall then be lifted off the rollers and laid in a reasonably straight line.

(vi) Testing before covering

The cables shall be tested for continuity of cores and insulation resistance and the cable length shall be measured, before closing the trench.

(vii) Extra loop cable

(a) At the time of original installation, approximately 3m of surplus cable shall be left on each terminal end of the cable and on each side of the underground joints. The surplus cable shall be left in the form of a loop. Where there are long runs of cables such loose cable may be left at suitable intervals as specified by the Engineer-in-Charge.

(b) Where it may not be practically possible to provide separation between cables when forming loops of a number of cables as in the case of cables emanating from a substation, measurement shall be made only to the extent of actual volume of excavation, sand filling etc. and paid for accordingly.

(ix) Mechanical protection over the covering

(a) Mechanical protection to cables shall be laid over the covering as below to provide warning to future excavators of the presence of the cable and also to protect the cable against accidental mechanical damage by pick-axe blows etc.

(b) covering the cable with 150 mm inner dia, 25 mm thick 1.0 meter long RCC half round muffs & refilling same as per instruction of EIC. (Necessary material to be supplied by bidder)

3.9. Back filling

(i) The trenches shall be then back-filled with excavated earth, free from stones or other sharp ended debris and shall be rammed and watered, if necessary in successive layers

(iii) The temporary re-statements of roadways should be inspected at regular intervals, particularly during wet weather and settlements should be made good by further filling as may be required.

(iv) After the subsidence has ceased, trenches cut through roadways or other paved areas shall be restored to the same density and materials as the surrounding area and –re-paved in accordance with the relevant building

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specifications to the satisfaction of the Engineer-in-Charge.

(v) Where road beams or lawns have been cut out of necessity, or kerb stones displaced, the same shall be repaired and made good, except for turfing /asphalting, to the satisfaction of the Engineer-in-Charge and all the surplus earth or rock shall be removed to places as specified **3.10**

CHARGING OF CABLE:

It is mandatory for the bidder to test the Main and Spare cable for continuous 72 Hrs at maximum loading condition.

3.11 JOINTING

3.11.1 Joints pits

(i) Joint pits shall be of sufficient dimensions as to allow easy and comfortable working. The sides of the pit shall be well protected from loose earth falling into it. It shall also be covered by a tarpaulin to prevent dust and other foreign matter being blown on the exposed joints and jointing materials.

(ii) Sufficient ventilation shall be provided during jointing operation in order to disperse fumes given out by fluxing.

3.11.2 Safety precaution

(i) A caution board indicating "CAUTION – CABLE JOINTING WORK IN PROGRESS" shall be displayed to warn the public and traffic where necessary.

(ii) Before jointing is commenced, all safety precautions like isolation, discharging, earthing, display of caution board on the controlling switchgear etc. shall be taken to ensure that the cable would not be inadvertently charged from live supply. Metallic armour and external metallic bonding shall be connected to earth. Where "Permit to work" system is in vogue, safety procedures prescribed shall be complied with.

3.11.3 Jointing materials

(i) Jointing materials and accessories like conductor ferrules, solder, flux, insulating and protective **tapes**, filling compound, jointing boxes, heat shrinking joint kit etc. of right quality and correct sizes, conforming to relevant Indian Standards, wherever they exist, shall be used.

(ii) The design of the joint box and the composition of the filling compound shall be such as to provide an effective sealing against entry of moisture in addition to affording proper electrical characteristic to joints.

(iii) The heat shrinkable straight joint of approved make is to be used. The storage as well as jointing instructions of the manufacturer of such materials shall be strictly followed.

3.11.4 Jointer

Jointing work shall be carried out by a licensed/ experienced (where there is no licensing system for jointers) cable jointer.

3.11.5 Cable work with joints

(i) About 3m long surplus cable shall be left on each side of joints.

(ii) Insulation resistance of cables to be jointed shall be tested.. Unless the insulation resistance values are satisfactory, jointing shall not be done.

(iii) Cores of the cables must be properly identified before jointing.

(iv) Where cable is to be jointed with the existing cable, the sequence should be so arranged as to avoid crossing of cores while jointing.

(v) Whenever the aluminium conductor is exposed to outside atmosphere, a highly tenacious oxide film is formed which makes the soldering of aluminium conductor difficult. This oxide film should be removed by using appropriate type of flux.

(vi) The clamps for the armour shall be clean and tight.

3.9.6 Jointing procedure

While it would be necessary to follow strictly the instructions for jointing furnished by the manufacturers of cables and joint kits.

3.12 TESTING

3.12.1 Testing before laying

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All cables, before laying, shall be tested with a 2500/5000V megger for 11 KV/22 KV cables .. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance from conductors to earth / armour and between conductors.

3.12.2 Testing after laying

(ii) The cable is to be tested for one minute with 2500/5000 V megger for 11KV/22 KV cables.

4.0 HDPE PIPE

Bidder has to submit the type test reports/certificates of HDPE pipes from NABL approved laboratory or CIPET and same should be of size: 110mm O.D. and 6.11 KG/Cm² (0.6 Mpa), Class - 4, Green color with thickness of 8.5 mm confirms to the specification for HDPE pipes as per IS 4984 - 1987 (3rd revision) for laying of 11/22KV XLPE cable of size up to 185/240 mm² size on the erected DP structure for the mechanical protection of cable by inserting the cable inside HDPE pipe. The HDPE pipe shall be erected in such a way that 300mm shall be below the ground level and the rest 2700 mm shall be supported on the DP Structure Fixing with polymer clits.

The sample of HDPE pipe shall be get approved at concern (sub-division level prior to commence supply of HDPE pipe. The testing certificate & type test certificate of HDPE pipe shall be submitted at the time of passing of bills.

The lot wise inspection of sample randomly selected from the lot of HDPE pipe is to be carried out at NABL approved testing LAB/CIPET prior to supply of HDPE pipe and then work for HDPE vertical laying/HDD work is to be executed.

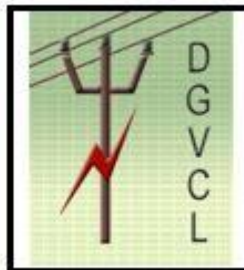
HDPE Pipe of 110mm O.D. and 6.11 kg/Cm² (0.6 Mpa), Class - 4, Green color with thickness of 8.5 mm confirms to the specification for HDPE pipes as per IS 4984 - 1987 (3rd revision) for laying of underground 11/22KV XLPE cable

5.0 LIST OF APPROVED MAKES OF EQUIPMENTS AND ACCESSORIES

Sr. No.	Particulars	Makes /Suppliers
1	Termination & Jointing Kit	Raychem, Bensons, Densons , M-seal (3M), and equivalent to ISI Mark
2	G.I. Pipes	Tisco, Sail, Damodar, Zenith & Shirdurg and equivalent to ISI Mark

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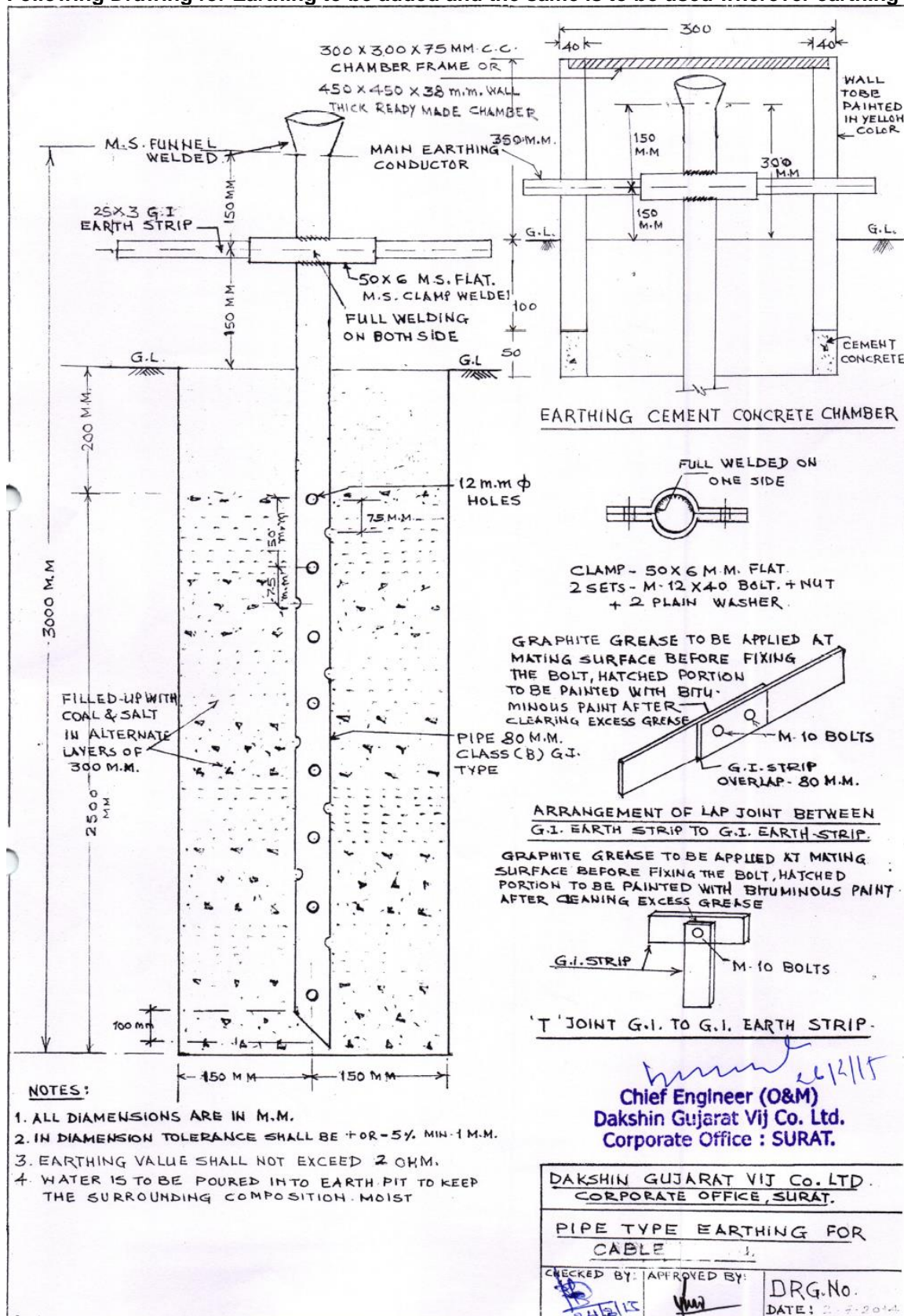
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- Following Drawing for Earthing to be added and the same is to be used wherever earthing is needed

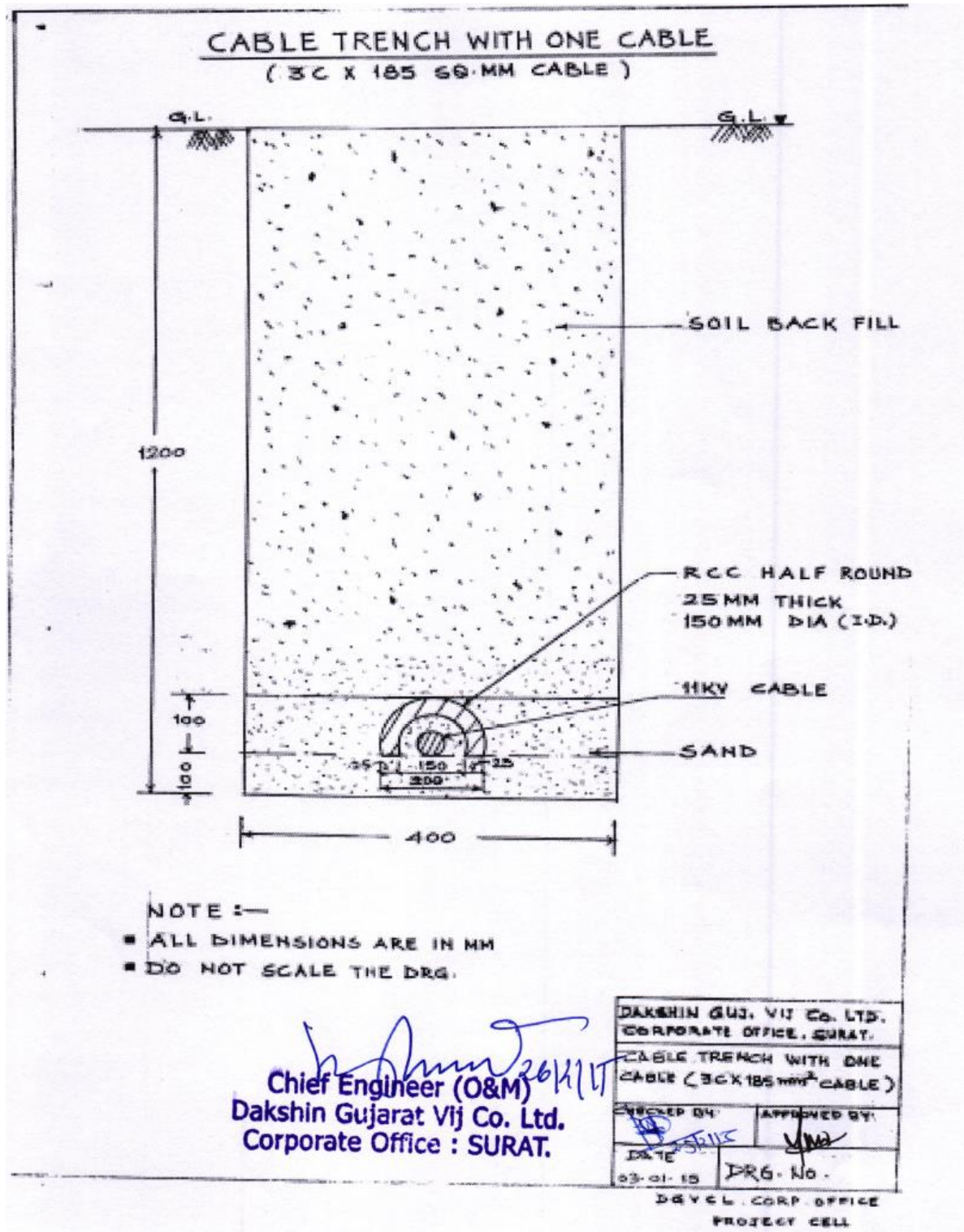


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11/22 KV Cable Trench for Single Cable laying drawing

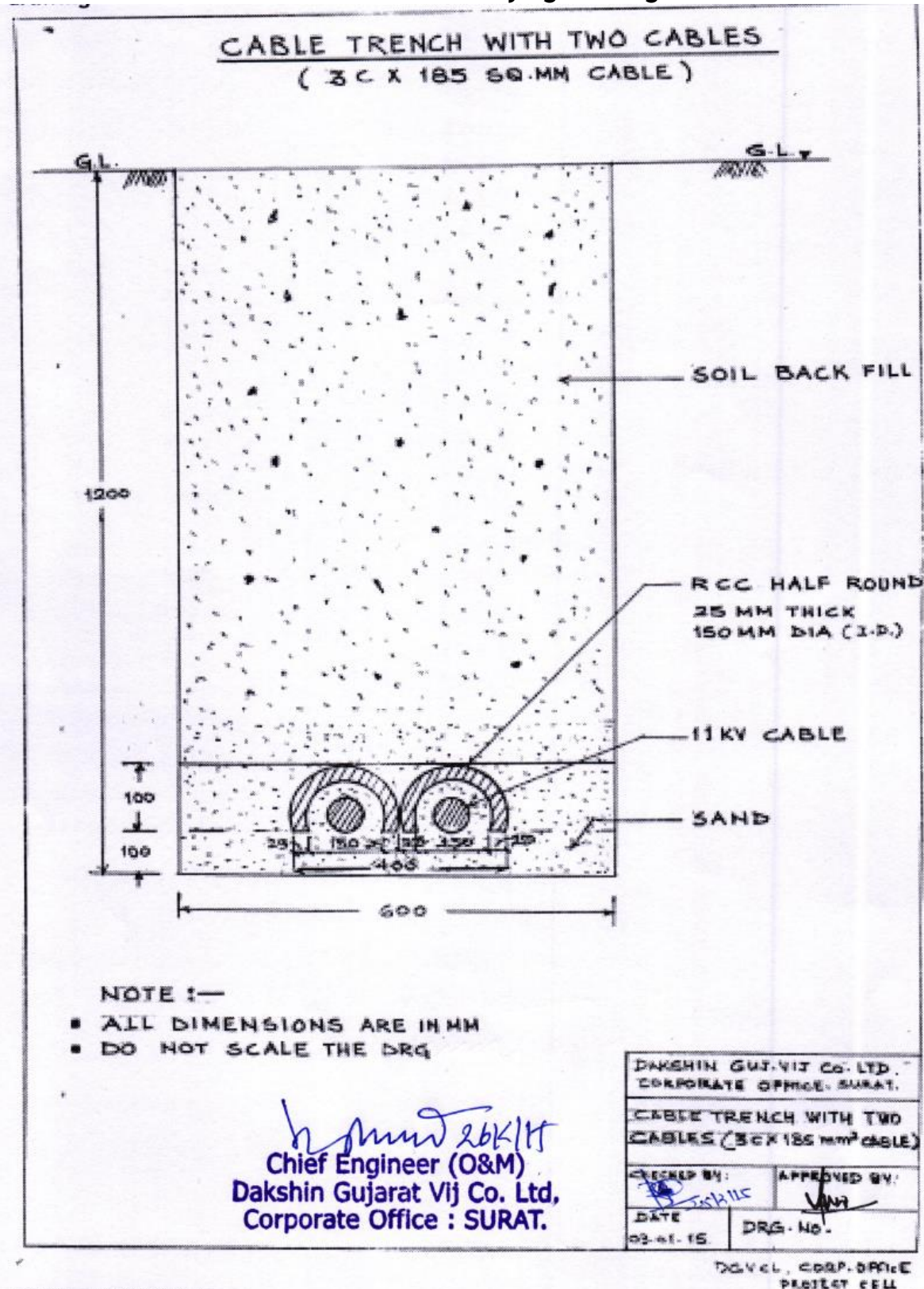


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11/22 KV Cable Trench for Double Cable laying drawing



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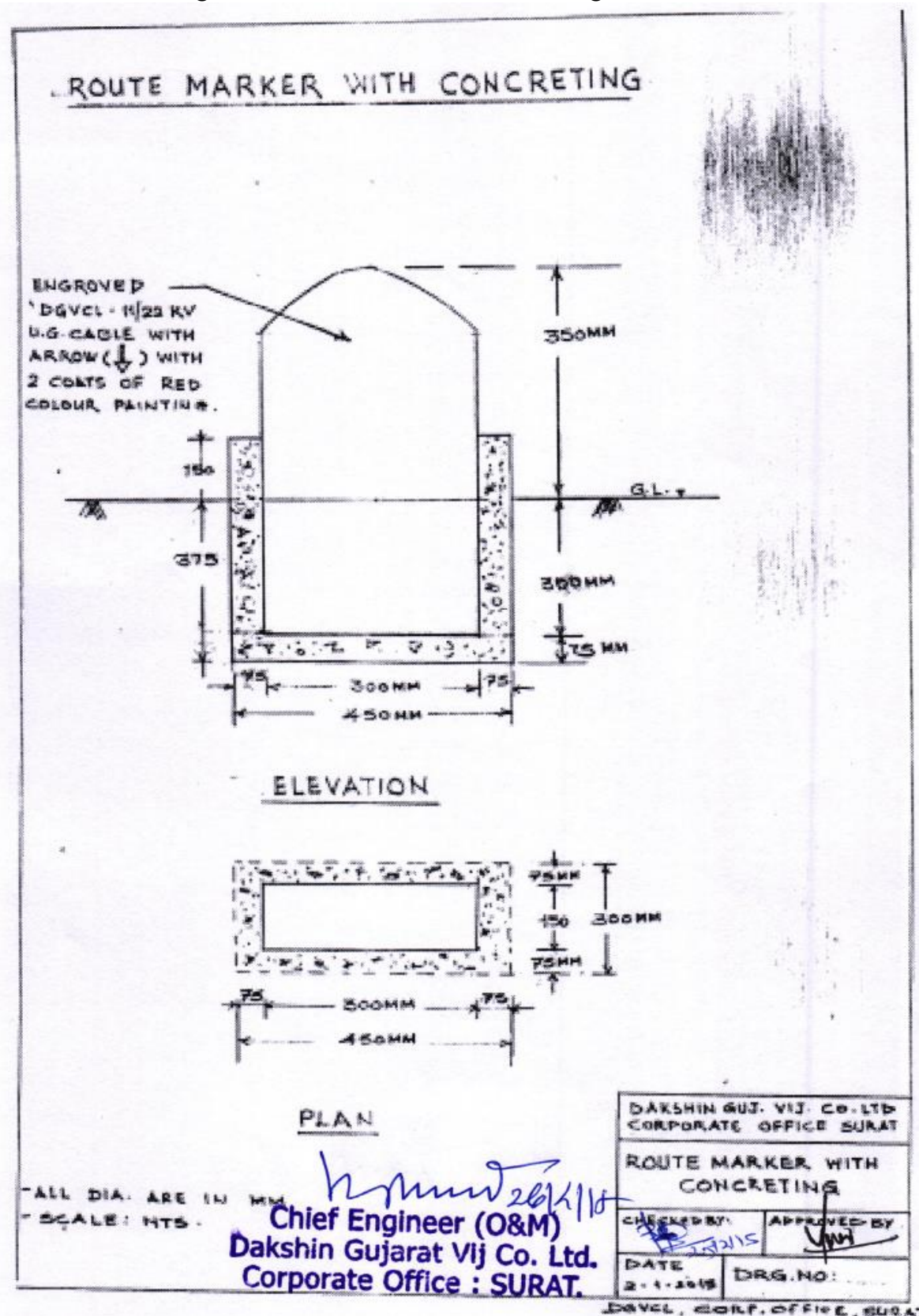
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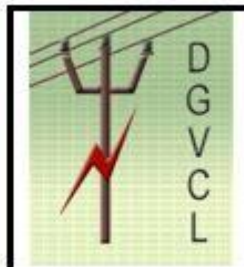


Drawing for Route maker with concreting .



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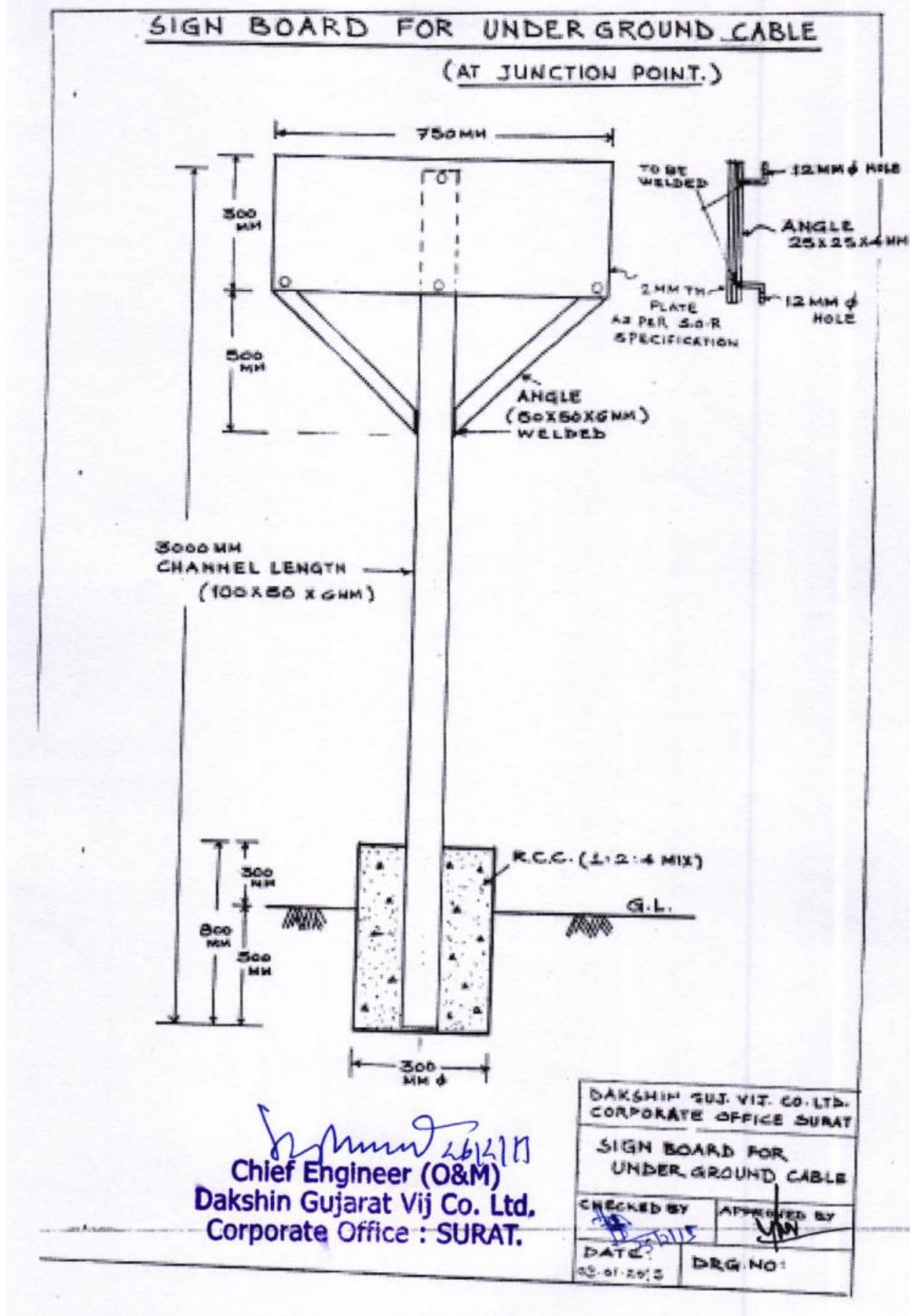
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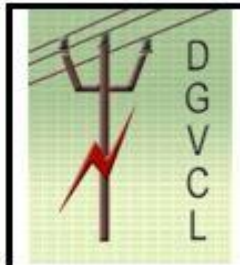


- Sign Board (Caution board)



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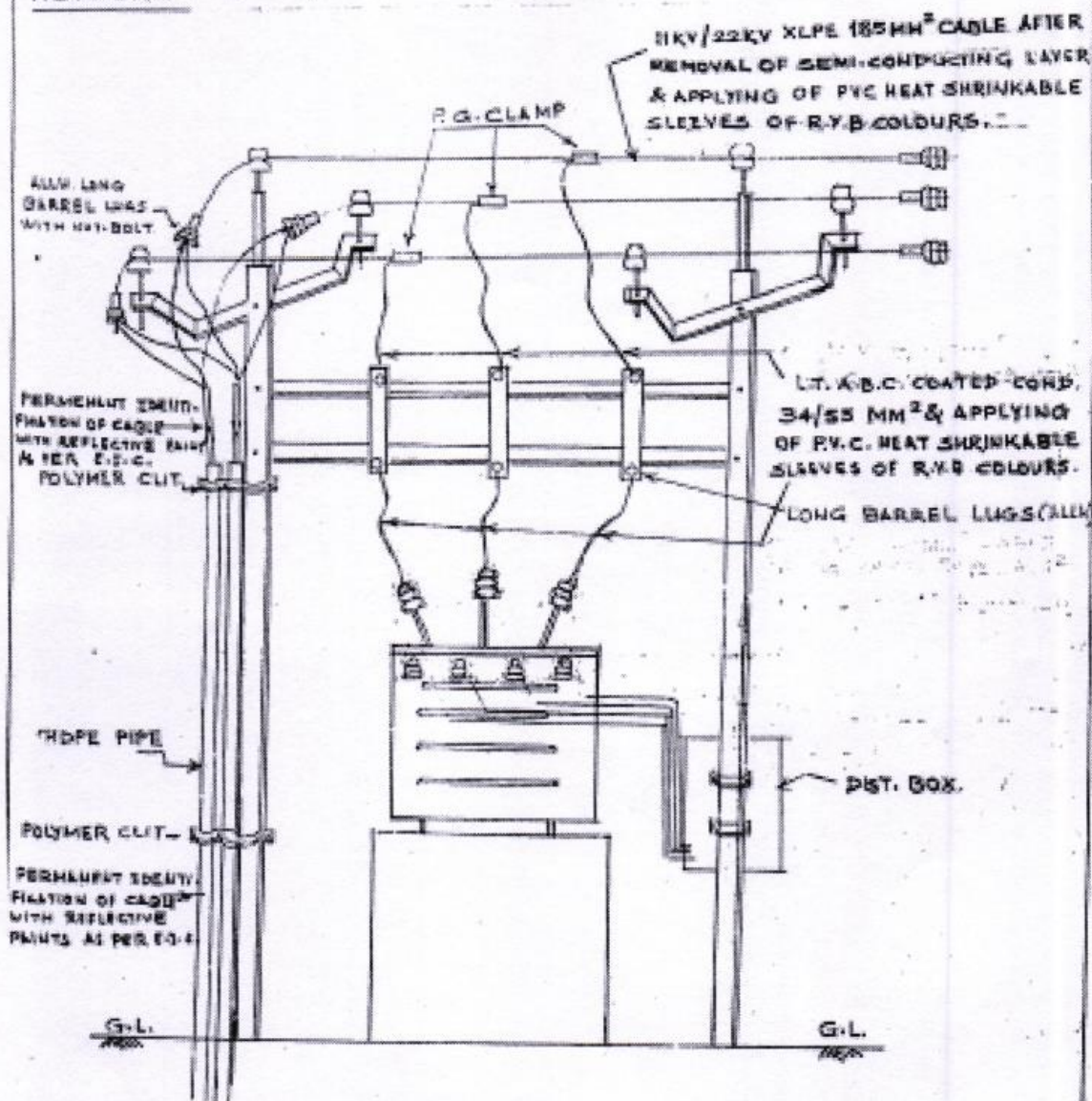
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- D.O.D.P Bus bar arrangement drawing.

11/22KV BUS BAR ARRANGEMENT ON D.P. FOR UNDER GROUND CABLE NETWORK



W. P. M. 26/11/15
Chief Engineer (O&M)
Dakshin Gujarat Vij Co. Ltd.
Corporate Office : SURAT.

DAKSHIN GUJARAT VIJ Co. LTD. CORPORATE OFFICE, SURAT	
11/22KV BUS BAR ARRANGEMENT ON D.P. FOR U/G. CABLE NETWORK	
RECEIVED : <i>[Signature]</i> DATE : 02-01-15 CRBY :	APPROVED : <i>[Signature]</i> DRG. No. CORP. OFF. PROT. CELL /

Stamp of Contractor

Signature of Contractor

	DAKSHIN GUJARAT VIJ COMPANY LIMITED CINU40102GJ2003SGC042909 Regd. & Corporate office: "Urja Sadan", Nana Varachha Road, Surat-395006	
	RAJPIPLA DIVISION OFFICE (O & M) OLD POWER HOUSE, RAJPIPLA-393145, PHONE NO. (O) : 02640-222152 E-mail : eeraj.dgvcl@gebmil.com	

7.0 Erection of Pole, Structure,Transformer, Guys.

Erection of Poles, structure, Transformer, Guys :-

(1) The Locations of the two P.S.C. poles of the D.P. structure are marked according to the center –to-center distance between the two poles and the mid-point in line with the incoming H.T.line. The poles are to be erected with the slant side perpendicular to the incoming line.

(2) Poles have to be embedded under ground to a height equal to one –sixth the length of the poles .The P.S.C poles normally used for D.P. structure are 8 meters long. Hence, the pits have to be excavated to 1:50 meters, including the R.C.C. padding or base plate used under the bottom of the pole.

(3) Excavation in normal soil is done by pick-axes, crow bars and shovels and sometimes by earth augers. Excavation in rocky soil or in rock beds may need blasting of rock by small charges of gun powder etc. the pits for the poles are excavated in the direction of the line which will facilitate erection of the poles, besides giving lateral stability.

(4) In order to ensure exact center –to center distance between the two poles, it is advisable to fix up top channels as well as transformer base channels between the two poles, before lifting the poles for erection .this will also ensure easy fixing of other channels, angles afterwards

(5) After the proper orientation, alignment and verticality of the poles/ structure are ensured as above, the back-filling of the pits can be undertaken. For this, the coarse aggregate up to 37/40 mm. size and sand are mixed in the ratio 2:1 first in the dry state outside the pits and then water added to convert the mixture into a lamp. This is then dumped into the pits, so that the pits are filled up by homogeneous mass and air pockets are then avoided by ramming. This is done in the case of P.S.C and R.C.C. poles. However, when rails or steel girders are used as poles, they have to be concreted by cement concrete of 1:3:6 ratio ,and then mufing is also provided for 300 mm. height above ground level and with 300mm. diameter.

(6) When the structure erection is completed in all respects, the erection of the transformer on the structure should be taken up .For this a chain pulley block of adequate size is raised by means of a rope and fixed on top channel of the D.P. structure. Suitable slings with D-shackles are then suspended from this chain pulley block. The lower ends of the slings are then suspended from this chain pulley block. The lower ends of the slings are firmly fixed to the hooks of the transformer. The transformer is then lifted by pulling the chain of the pulley block gradually, steadily and without any jerks. The transformer body is also pulled sideways by ropes, so that transformer is lifted remaining away from the bottom channels, etc. and does not brush against any part of the structure.

(7) Special care should be taken that while lifeting, the transformer bushings, breather, oil drain valve etc. are protected properly.

(8) After placing the transformer centrally on its base on the structures the transformer belting angles should be fixed on both the sides and secured in place properly .The transformer body be fixed by means of bolts and nuts on its supporting channels.

(9) Distribution Box and Cables:-

- (1) All The fitting inside the distribution Box, e.g. fuses ,links, studs etc. should be properly tightened
- (2) The Distribution box should be fixed at proper height ,the bottom most part being one meter up from the ground level so as to enable ease in operation of the main switch and replacement of fuses.
- (3) Correct size of L.T. Cables as shown in the table earlier should be used .no strands of cable should be cut while fixing in lugs or transformer.
- (4) Connections of cable ends should be done properly with the help of crimping tools, with shaping and forging dies of suitable sizes specified for particular crimping tool.
- (5) Cable entries into the box should be protected by means of wooden or polyethylene bushes, which should be gummed up with the distribution box by fevicol.

10 .Erection of Guys:-

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- (1) Two guys are to be provided in the direction opposite to the incoming line, and two guys on sides one guy on each side of the two poles of the structure.
- (2) The guy wire should be fixed using a guy insulator, which will be at least 3 meter high from the ground level.
- (3) G.I. Thimbles must be used at the end of the guy wire before fixing with the eye bolt or the guy rod.
- (4) Guys should be away from the line conductors I.E they must have sufficient clearance from the according to the system voltage.
- (5) Guys should be tied somewhat loose in the initial stag which will be tightened properly when stringing is done.
- (6) Guys should be properly earthed at the top.
- (7) The guy –rod should be pleased in the guy pit in a position such that the angle of inclination of the guy with the vertical is 30 to 45 .The rod should come out about 0.3 m above ground .
- (8) Concrete blocks with center holes are now used, instead of loose concreting of the stay ,at the bottom of the pit. This ensures speedy work and possibility of misuse of cement is removed .the stay rod passes through the centre hole of the block .back –filling and ramming must be well done thereafter.
- (9) The free end of the guy wire is passed through the eye of the anchor rod. Bent back parallel to the main of the guy and bound after inserting the G.I. thimble.
- (10)The turn buckle should be mounted at the pole end of the stay and the guy wire so fixed that the turn buckle is half way in the working position, thus giving the maximum movement for tightening or loosening.

(11) Painting:

- (1) All the steel materials used on the D.P. structure viz. cross arm channels, angles, clamps ,nuts etc. will have a primary coat of red lead paint and there after first coat of aluminum paint mixed with "Azure" blue paint before erection.
- (2) After complete erection of the equipments on the structure, a final coat of aluminum paint is applied for protection against rusting.

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