TENDER DOCUMENT FOR 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

AMMENDMENT-1

(JUNE 2010)

(Only the affected sections and drawings are attached. Rest of the Tender Document remains unaltered)

SECTION-I

NOTICE INVITING TENDER

To

M/s ……
……
……

Dear Sir,

Sub: TENDER FOR “Construction of 33kV Ring Main System including 33/0.433kV substations at NIT, Rourkela campus, Orissa”.

1) Sealed item rate tenders are invited in the prescribed form from bonafied contractors for execution of electrical, civil, structural, data acquisition system (DAS), internal electrification, external electrification and external services and development works for the proposed “Construction of 33kV Ring Main System including 33/0.433kV substations at NIT, Rourkela campus, Orissa” as per following details.

a.	NAME OF THE WORK	:	“Construction of 33kV Ring Main System including 33/0.433kV substations at NIT, Rourkela campus, Orissa”.
b.	ESTIMATED COST OF THE WORK	:	Rs……
c.	EARNEST MONEY DEPOSIT	:	Rs. 2 lakhs.
d.	PERIOD OF COMPLETION	:	Eight (8) Calendar Months
e.	VALIDITY OF TENDER	:	90 Days
f.	DATE OF ISSUE OF TENDER	:	From ……. Upto…….. during office hours
g.	PRE BID MEETING WITH CONTRACTOR	:	……..at 10.30 A.M.
h.	LAST DATE OF SUBMISSION	:	…….. upto 3 P.M.
i.	DATE & TIME OF OPENING OF THE TENDER	:	…….. at 3.30P.M.

2) Clarifications, if any, regarding this tender should get clarified from the Consultant. A prebid conference shall be arranged on …… in the office of Director, National Institute of Technology, Rourkela- 769008 (Orissa) to discuss the relevant points/clarification if any, "So that tenderers are well acquainted" with the details of the Tender.

3) Tender documents including all Bill of Quantities can be had from the office of REGISTRAR, NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA- 769008 (ORISSA).

4) The submission of bids by the Tenderer and opening of the same by REGISTRAR, NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA-769008 (ORISSA) will be done as per procedure enumerated below:

Envelope No.1. To contain Earnest Money in the form of Demand Draft/Pay Order favouring Nationalized Bank payable at Rourkela and Prequalification documents.

EARNEST MONEY DEPOSIT	:	As per clause 1.c above.
Prequalification documents	:	As per clause 6.0 of Section-II : Instructions for submission of tender. The documents shall be submitted in three (3) sets

Envelope No.2 To contain Unpriced Techno-commercial bid in sealed envelope.

(Unpriced Bid) : To contain technical part comprising of Unpriced and signed Schedule of Quantities, drawings, documents and catalogues as indicated in different sections of the Technical Specification (Section-VI) and Commercial terms and conditions.

The Techno-commercial bid shall be submitted in three (3) sets.

Envelope No.3 To contain priced Proposal Particular Sheets in sealed envelope.

(Price Bid) : To contain the Tender with Schedule of rate duly filled in, signed and stamped on all pages. Discounts, if any, should be properly mentioned e.g. 0.531% (ZERO POINT FIVE THREE ONE PERCENT).

The Priced part shall be submitted in three (3) sets.

All the above Envelopes shall be super scribed with:

Envelope No.----

Name of the Work : ……

Due Date of Submission : ……

And to be addressed to the concerned authority as mentioned in the NIT.

NOTE: Tenderer's are advised not to make any alteration/modification in the tender documents, items of work or in any respect whatsoever. Violation of this requirement will make the Tender Liable for rejection.

Envelope No.1. Will be opened first on the due date of opening. Upon finding satisfactory compliance of this requirement, Envelope No. 2 & 3 will be opened on the same date.

5) Tenders are to be submitted in one sealed envelope cover enclosing therein the Envelope No.1, 2 and Envelope No.3.

6) The tenderer must use only the tender forms issued for the purpose to fill in the rates.

7) 'Rates' should be quoted both in figures and words and 'total price' can be filled up in figures in columns specified. All erasures and alterations made while filling up the forms must be attested by initial of the Tenderer. Overwriting is not permitted both in words and figures column. Failure to comply with either of these conditions will render the tender invalid and it will be the discretion of DIRECTOR, NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA-769008 (ORISSA) to accept or reject the tender. No request of any change in rate or conditions after opening of the tender will be entertained.

8) In the case of figures, the word 'Rs' should be written before the figures of rupees and the word 'P' written after the decimal figures e.g Rs.3.25 P. In the case of words, the word Rupee should similarly precede and the words "Paise only" should be written at the end, closely following each the percentage rate. The word "only" should not be written in the next line unless the rate quoted is in whole Rupees closely followed by the word "only": The amount should invariably be upto two decimal places.

9) Errors in the bill of quantities shall be dealt with in the following manner.

a. In the event of any discrepancy between the rates quoted in words and the rates in figures the former shall prevail.

b. In the event of an error occurring in the 'total price' column of the bills of quantities as a result of the wrong multiplication of the unit rate and the quantity, the unit rate shall be regarded as firm and multiplication shall be amended on the basis of the rates.

c. All the errors in totaling in the 'total price' column and in carrying forward the totals shall be corrected.

10) Each of the tender documents should be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General and Special Conditions of Contract, Specifications etc., as laid down. Any tender with any of the documents not so signed will be subjected to rejection.

11) The tender submitted on behalf of a firm shall be signed by all partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter the proposed contract. Otherwise the tender may be rejected by DIRECTOR, NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA-769008 (ORISSA).

12) No consideration will be given to a tender received after the time stipulated above and no extension will be allowed for submission of the tender. The Director shall have the right to reject any tender not conforming to prescribed procedure (or all tenders) without assigning any reason.

13) The time allowed for completion of works is eight (8) Calendars months (including monsoon period) for construction and the date of commencement of the work is reckoned from the fourteenth day from the date of Letter of Intent. Time shall be considered the essence of contract.

14) Water and electricity required for the completion of the construction shall be provided by the institute. However contractor to will have to make arrangement of pipe line for water and electric poles wires cable etc. for electricity.

15) Every tender shall be accompanied by earnest money of Rs 2 lakhs by way of Demand Draft/Pay order favouring NATIONAL INSTITUTE OF TECHNOLOGY AT ROURKELA- 769008 (ORISSA). Tender submitting without earnest money shall be summarily rejected.

16) The Earnest Money will be retained in the case of the successful tenderer as part of the security for due fulfillment of the Contract. No interest shall be paid on this deposit. Failure to enter into the contract agreement within the stipulated time of 30 days from the date of letter of Intent shall entail the forfeiture of the Earnest Money Deposit. The Earnest Money of unsuccessful tenderers will be released after issue of work order, without any interest.

17) The tenderer shall submit his tender after carefully examining the whole of the tender document and the terms and conditions of contract, the drawings and specifications, the schedule of quantities etc., and also after examining the site and conditions prevailing in and around site.

18) The notice inviting tenders, the conditions of tender and the duly completed form of tender etc., will form part of the Agreement to be executed by the successful tenderer with the owner.

19) The Owner does not bind himself to accept the lowest or any tender and reserve to themselves the right of accepting the whole or any part of the tender and tenderer is bound to perform the same at the rates quoted. The owner will not be bound to accept the lowest tender and reserves the right to accept or reject any or all the tender without assigning any reasons whatsoever.

20) Tenders shall remain valid for a period of 90 days from the date of opening of the tender which period may be extended by mutual agreement and the tenderer shall not cancel or withdraw the tender during the initial validity period of 90 days.

21) The successful tenderer shall be bound to implement the Contract and mobilize and sign specified agreement within 21 days from the date of Letter of Intent.

22) Tenderers must include in their rates, sales tax (both CST & LST), VAT, excise duty, octroi, sales tax on works contract and any other tax & duty or other levy by the central and state government or any other tax & duty or other levy or to be levied in future by the central government or state government or local authority if applicable. No claim in respect of sales tax, excise duty, octroi, turn-over tax, sales tax on works contract or other tax, duty or levy etc., shall be accepted by the owner, if found later on to be additionally payable. Deductions in respect of sales tax or turnover levied as per government notification and /or guidelines shall be made from the contractor's interim and final bills, and deposited with the relevant authority by the owner on his behalf. Any shortfall in deposit thereof shall be made up by the contractor, before submitting his final bill.

23) This contract shall be an item rate contract. The Contractor shall be paid for actual quantity of work done, as measured at site including any deviation plus or minus. The rate of any non-schedule items of work shall be derived as per conditions of this contract.

24) The tender drawings exhibited/enclosed are preliminary drawings intended for the guidance of the contractor only. They may be subject to revision and alteration without vitiating any of the terms of the contract and the contractor shall be bound to execute the works as shown on the final drawings without claiming any extra payment.

25) No correspondence will be entrained in respect of this tender other than any clarifications strictly pertaining to this tender.

26) All the correspondence and documents shall be in English only.

27) The tender price quoted by a tenderer shall be kept strictly confidential and shall not be divulged to any other party even approximately before the time limit for delivery of tender. The only exception be for obtaining an insurance quotation, you may give your insurance company or agent any essential information they ask for, so long as it is done in strict confidence. No information about other's tender price should be obtained and no arrangement with anyone else should be made whether or not be submit the tender.

28) For electrical, sanitary, water supply and drainage works, tenderers must possess respective licenses from the competent authority valid in Rourkela (Orissa), wherever applicable.

29) Contractor should sign at the end of every page prior to submitting the tender.

Director,

National Institute of Technology

Rourkela- 769008 (Orissa)

SECTION-II

INSTRUCTIONS FOR SUBMISSION OF TENDER

INSTRUCTIONS FOR SUBMISSION OF TENDERS

NOTE: Tenderers are requested to note that non-compliance of the following instructions is liable to render their tenders unacceptable.

1. Address at which the tender is to be submitted :

   REGISTRAR,
   NATIONAL INSTITUTE OF TECHNOLOGY,
   ROURKELA-769008 (Orissa).

2. a. Prebid conference date ……

   b. Last date for receipt of tender ……

   c. Date of opening of tender ……

3. The different Schedules should be filled as follows:

   a. The "Rate" Column wherever applicable to be legibly filled in ink in both figures and words.

   b. The "Total price" Column will be legibly filled in ink in figures. The total summated cost at the end of the BOQ table shall be indicated both in figures and words.

   c. All corrections to be initialed.

   d. No over writing is allowed.

   e. The figure of percentage of rate shall be legibly filled in ink in both figure and words.

4. Bank Guarantee or cheques shall not be accepted for the Earnest Money Deposit. "The Earnest Money Deposit should be in strict compliance of requirement as specified in the tender documents.

5. The tender shall be signed and dated at all places provided therein. Also all pages, drawings and corrections/alternations shall be initialed. The tender submitted on behalf of a firm shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract.

6. **PREQUALIFICATION REQUIREMENT:**

Part-2 and 3 of the tenders shall be opened if the bidder meets the following criteria:

a) Must have done similar nature of work.
b) Must have worked with Govt. of India/Orissa or a Public Undertaking.
c) Must have executed a single work of Rs. 3 crore or at least two similar works of Rs. 2 crore each in last 3 years.
d) Must be an active contractor for last 3 years.
e) Must have own capability of developing drawings/design for electrical and civil/structural.

7. **CONDITIONAL OFFER:** Any tenderer who proposes alterations to any of the conditions/specifications laid down in the tender documents or proposes any new conditions, whatsoever shall be summarily rejected.

8. **PROCEDURE FOR SUBMISSION AND OPENING OF TENDERS:**

a. Tenders must be submitted on the tender documents issued by the Accepting Officer. Intimation of tender quoted by a letter, telegram or telex will not be accepted.

b. Tenderers are expected not to propose any alterations to any of the conditions laid down in the tender. Stipulated conditions embodied in the tender shall be binding on the tenderers.

c. In view of the postal and other delays the tenders should be posted sufficiently in advance of the last date and time fixed for receipt of tenders or be sent by a special messenger. Tender received late shall be rejected.

d. The procedure for submission and opening of tenders has been set out in details in tender documents.

9. Drawings must be returned along with the tender documents duly stamped and signed. These Drawings are for reference only.

10. **VALIDITY OF TENDERS**

Tenderers should note that their tenders should remain open for consideration for a minimum period of 90 days from the last date fixed for the receipt of tenders. The validity period may, however be extended by mutual agreement. The tenderer

shall not be allowed to cancel or withdraw the tender during the initial validity period of 90 days.

11. For Electrical, civil and structural works, Tenderers must possess respective licenses from the respective authorities valid in Orissa for doing such works.

SECTION-VIII

LIST OF APPROVED MAKES

LIST OF APPROVED MAKES

Sl.No.	Equipment	Approved makes
1.	33KV OUTDOOR VCB	AREVA/SIEMENS/ABB
2.	33kV CT, PT	CGL/LAXMI ENGG/ PRAGATI/MEHRU/TELK
3.	33KV ISOLATOR (HCDB)	G NANDY/ ABB/S&S/SIEMENS/ HIVELM
4.	30KV LA	ABB/AREVA/BHEL/CGL/OBLUM
5.	33KV Indoor load break switch fuse panel	A BONDS STRANDS/DRIESHER PANIKKER/SIEMENS
6.	HT insulator & bushing	JAYSHREE/WSI/MODERN/OBLUM/BHEL
7.	Transformer	AREVA/CGL/KEC/Marsons, Agra/PETE, Hyderabad/AEG, Kolkata
8.	C & R Panels	ECC/PCE PROJECTS/SYSTEM CONTROL & AUTOMATION/ELECTRO ALLIED PRODUCTS
9.	Relays	AREVA
10.	Ammeter, Voltmeter	AE/IMP
11.	Multifunction meter	CONZERVE/SATEC/SECURE/SCHNEIDER
12.	Tri vector meter	CONZERVE/SATEC/SECURE/SCHNEIDER
13.	Annunciator	MINILEC/PROCON
14.	T-N-C & L-R Switch	AREVA/KAYCEE
15.	Auxiliary relays	AREVA
16.	Master trip relay	AREVA
17.	Air Circuit breaker (draw out type)	ABB (Type Emax, PR 121P LSIG) / SCHNEIDER (Type MASTERPACT NW, MICROLOGIC 6.0A) / SIEMENS (Type 3WL, ETU 27B)
18.	MCCB	ABB (Type Tmax, Release - TMA) / SCHNEIDER (Type NS, Release-TM/Electronic) /SIEMENS (Type VL, Release - TM)
19.	ACDB/LDB/Fabricated panels	ECC/PCE PROJECTS/SYSTEM CONTROL & AUTOMATION/ELECTRO ALLIED PRODUCTS/ALFA AUTOMATION
20.	Battery, Battery charger	EXIDE/HBL/AMCO/CALDYNE
21.	MCB, DB 10KA	ABB/SIEMENS/LEGRAND/SCHNEIDER
22.	Switch, Fuse, Contactor, Bimetallic overload relay	ABB/SIEMENS/SCHNEIDER
23.	HT Power cable	CCI/ GLOSTER/HAVELLS/NICCO/POLYCAB/ UNIVERSAL
24.	LT Power and Control cables	CCI/ GLOSTER/HAVELLS/NICCO/POLYCAB/ UNIVERSAL/FINOLEX/ASIAN
25.	Cable gland	DOWELS/ELECTRO WERKE/CCI

Sl.No.	Equipment	Approved makes
26.	Cable lug	DOWELS/JAINSON/ISMAL
27.	Terminal block	CONNECT WALL/ELMEX/WAGO
28.	Cable termination, jointing kit	CCI/RAYCHEM/M-SEAL
29.	Lighting luminaires with lamps	BAJAJ/CGL/PHILIPS
30.	Emergency lighting luminaire with built in battery and charger	PROLITE
31.	Welding receptacle (Metal clad)	BCH/CGL/GE/ANCHOR/
32.	Clamps, connectors for switchyard	RASTRA UDYOG/INDUSTRIAL SPARE PRODUCT/ELECTROMECH & TRANSTEC
33.	ACSR conductor	CABCON/LUMINO
34.	RTU	ABB/AREVA/GE/HONEYWELL/SIEMENS
35.	Transducers	ABB/AREVA/SCHNEIDER/SIEMENS
36.	Ethernet switch	NORTEL/CISCO/HP
37.	GSM/GPRS modem	GEOTECH SYSTEMS/SV TEL/RAVIRAJ TECHLOGIES
38.	Any other material	As approved by NIT/Consultant.

33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS.

SECTION-IX : PROPOSAL EXHIBIT SHEETS

PART-I : TECHNICAL

CONTENTS

ANNEXURE-I

PROPOSAL PARTICULARS

(To be filled by Bidder)

ANNEXURE-I

PROPOSAL PARTICULARS

01. Bidder's Complete Company Name and address, telephone No., fax no. and E-mail ID :

02. Bidder's Proposal Number :

03. Bidder's Proposal Date :

04. Bidder's Proposal Validity :

05. Name and Designation of the Officer of the Bidder to whom all references shall be made for expeditious technical co-ordination :

06. Earnest money deposit :-

    a) If deposited, give references :

    b) If not, give reasons :

07. Copy of Income Tax Clearance Certificate furnished :

08. Terms of Payment :-

    a) Terms of payment as per Owner's Specification is acceptable :

    b) If not, specify terms of payment :

09. Delivery :-

    a) Delivery period in months for complete equipment from the date of issue of 'Letter of Intent' (allowing time for approval of drawings and test certificates) :

    b) Is the delivery period guaranteed under penalty :

10. Conformance :-

a) Is the equipment offered strictly in accordance with Owner's Specification ? :

b) If not, have the Deviation sheet been duly filled-up ? :

c) Are proposal data sheets duly filled-up ? :

d) All drawings, document, type test Certificates furnished ? :

11. Performance guarantee period for the equipment offered :-

a) From the date of commissioning at site :

b) From the date of dispatch :
:

ANNEXURE-II

TECHNICAL PARTICULARS

(To be filled by Bidder)

TECHNICAL PARTICULARS

FOR

33KV VACUUM CIRCUIT BREAKER

1.0 Nominal System Voltage (kV)

2.0 System Short Circuit Current at rated system voltage (kA sym.)

3.0 APPLICABLE INDUSTRY STANDARD

4.0 DESIGN AND CONSTRUCTION REQUIREMENTS

4.1 General

Model Designation

Configuration

Separate Operating Mechanism/ pole or common operating mechanism

Three Pole Auto-Reclosing required?

4.2 Performance Characteristics and Rating

Maximum Rated Voltage (kVrms)

Rated Lightning Impulse withstand voltage (BIL) (kV peak)

Rated Switching Impulse withstand voltage (BSL) (kV peak)

One Minute Power Frequency withstand Voltage (kV rms)

Rated Continuous Current (A)

Maximum DC resistance of the power carrying circuit from terminal to terminal of circuit breaker (Ohms)

Temperature rise at rated continuous current of circuit breaker

Main Contacts (°C)

Terminals (°C)

Conducting Joints (°C)

Rated 3-phase symmetrical short circuit interrupting current (at maximum rated voltage) (kArms)

Asymmetrical Short-Circuit interrupting Current (kArms)

Rated Short Time withstand Current (kA rms) for 3 sec

Rated Short Circuit making current (kApeak)

Rated maximum interrupting time (cycles or ms)

Closing Time (ms)

Arcing Time (ms) - maximum
- minimum

Rated Reclosing Time (ms)

Rated Close-Open Time (ms)

Rated Permissible Tripping Delay (Sec.)

Rated opening time (ms)

Rated Voltage Range Factor (K)

Rated Out-of-Phase breaking current capability (kA)

Rated Line Charging Current
Breaking Capability (A)

Rated Cable Charging Current
Breaking Capability (A)

Rated small inductive current
breaking capability (A)

Rated Reactive Current breaking
capability, if applicable (A)

Rated Transient Recovery
Voltage for Short Line Faults (kVpeak)

Rated Characteristics of Short Line Faults:

Amplitude Constant

R.R.R.V factor (kV/μs kA)

The critical line length (L%)

Rated Transient Recovery voltage for

Terminal Fault (kVpeak)

Maximum Operating Current (DC):

Closing Coil (A)

Tripping Coil (A)

Range of Rated Control and auxiliary
Supply Voltages:

Control (Vdc)

Tripping (Vdc)

Operating Mechanism
(Vdc/ac)

4.3 CONSTRUCTION

Tank Material of Construction

Phase spacing

No. of breaks per pole

Provision of grading capacitors:

- No. of Capacitor per pole
- Total Capacitance (pF) per pole

Maximum Noise Level at 3-meter distance

External Metal to Metal Striking Distances:

Phase to ground (mm)

Phase to Phase (mm)

4.4 Total Number of Spare
Auxiliary Contacts:

Normally Open

Normally Closed

Rated current (Adc)

Rated voltage (Vdc)

4.5 SF6 GAS SYSTEM

Reference Industry Standard to which the
SF6 Gas Conforms

Rated Operating SF6
Gas Pressure (kPa)

Maximum Operating SF6
Gas Pressure (kPa)

Minimum operating SF6
Gas Pressure (kPa)

Minimum operating SF6
Gas Density (Kg/m^3)

Close lockout pressure (kPa)

Trip lockout pressure (kPa)

Maximum Relative Leakage Rate
per Year (%)

Operating Pressure of Rupture Disc/
Pressure Relief Valve, if provided (kPa)

Total quantity of SF6 Gas required
to fill each breaker (Kg)

Equipment to be provided for SF6 gas
filling, removing, maintaining and testing

4.6 OPERATING MECHANISM

Type of Operating Mechanism

Manufacturer's Designation

Rated Voltage of Charging Motor
(Vdc/Vac)

Rated Current of Charging Motor (A)

Maximum Starting Current of the
motor (A)

Number of Phases/Wires of Motor

Rated control voltage for closing/
tripping (Vdc)

Space Heaters:

Voltage (Vac)

Wattage (W)

Spring-Operated Mechanism (if applicable):

Number of close-open operations that can be performed by the mechanism before having recharge

Time required to charge the closing spring (Sec.)

4.7 BUSHING

Name of Manufacturer

Type and designation number

Rated voltage (kV)

Rated current (A)

Power Frequency Wet/Dry withstand voltage(kVrms)

Lightning Impulse withstand voltage (kVpeak)

Switching Impulse withstand voltage (kVpeak)

Creepage Distance (mm)

Color of Bushing

Cantilever loading (kN)

Mounting details

Bolt circle diameter of the flange (mm)

No. of bolts

Size of bolts (mm)

Terminal

Type

Size

No. of holes (if applicable)

Dimensional Drawing of bushing provided?

4.8 OTHER GENERAL INFORMATION

Net weight of complete circuit breaker:

with SF6 Gas (Kg)

without SF6 gas (Kg)

Weight of Support Structure(Kg)

Overall Height (mm)

Overall Depth (mm)

Overall Width (mm)

Impact loading of circuit breaker during open and close operations (kg)

GA drawing furnished with the bid?

TECHNICAL DATA SHEET

FOR

33KV ISOLATOR

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

1.1 Ratings:

Nominal System Voltage (kV rms)

Power frequency withstand (kV rms)

- To earth

- Across open disconnect

Lightning Impulse Withstand Voltage (BIL)
(kV peak)

- To earth

- Across open disconnect

Switching Impulse Withstand Voltage (BSL)
(kV peak)

- To earth

- Across open disconnect

Line Charging Current Breaking
Capability per IEC 265-2 provided?

Transformer Magnetizing Current Breaking
Capability per IEC 265-2 provided?

Rated Continuous Current (A rms)

Rated Short-Time Withstand
Current, 3 sec (kA rms)

Rated Peak Withstand Current (kA)

Maximum r. i. v. (μV)

1.2 Construction

Installation (Outdoor or Indoor)

Type of Break (Center, Side or Vertical)

Model Designation

Isolator Application (Transformer Switching, Line Switching, Bus Transfer Switching per IEC 1128, etc.)

Mounting position of Isolator (Horizontal, Inverted or Vertical)

Terminal Pads

For Conductor: Size (mm^2)

For Tubular Bus:Size (mm)

Material (Al or Cu)

Additional Accessories (Arcing Horns, Corona Ring, Insulated Operating Pipe, etc.)

2.0 Support Insulators:

Bidder to fill up separate data sheet attached.

3.0 Operating Mechanism:

Type

Auxiliary Switches:

Number of Spare Contacts

Rated Current (A)

Rated Voltage (Vdc)

4.0 Grounding Switch

Grounding Switch provided as per SLD?

Type

Rated Short-Time Withstand Current for 3 second (kA rms)

Electromagnetic Coupling:

Rated Induced Current and Voltage (Class A or Class B per IEC 1129)

Electrostatic Coupling:

Rated Induced Current and Voltage (Class A or Class B per IEC 1129)

Auxiliary Switches:

Number of Spare Contacts

Rated Current (A)

Rated Voltage (Vdc)

TECHNICAL DATA SHEET

FOR

33KV CURRENT TRANSFORMER

1.0 GENERAL

Nominal System Voltage (kV)

System short circuit current (kA sym.)
at rated system voltage.

Type of System Grounding

Installation (Outdoor/Indoor)

2.0 APPLICABLE INDUSTRY STANDARD(S)

3.0 DESIGN AND CONSTRUCTION REQUIREMENTS

4.0 RATING

Rated Primary Current (A)

Rated Secondary Current (A)

4.0 CONTINUOUS THERMAL CURRENT RATING FACTOR

Multi ratio CTs

Single ratio CTs

Rated Short Time Thermal Current-Ith (kA rms)

Short time thermal current duration (sec.)

Rated Dynamic Current (kA peak)

Rated primary short circuit current -I_{PSC} (kA) and duration

Temperature Rise at rated continuous Thermal current over design ambient (°C)

a) Winding

b) Oil at top

c) Exposed current carrying parts

5.0 Construction

Type & designation

Type of Insulation (Mineral Oil filled/Fluid/Cast Resin)

Manufacturer's type/designation

5.1 Insulating Oil /Fluid

Reference standard

Oil volume in liter

5.2 High Voltage Insulator Housing

Name of Manufacturer

Type

Make Designation

Creepage Distance (mm)

Colour

Cantilever Strength (kN)

Whether CT bushing is hermitically

sealed or not

5.3 Terminals

Primary Terminal Connector:

a. Conductor Material (Al or Cu)

b. Size (mm^2)

Degree of protection of enclosure for secondary terminal box

6.0 Primary Winding for Free Standing Type CTs

Bar Primary

Wound Primary

Material

Winding Insulation and Class

Rated Maximum Voltage (kV)

BIL (kV peak)

Power Frequency Withstand Voltage (kV rms)

- 1 minute dry (kV rms)

- 10 sec. Wet (kV rms)

7.0 Secondary Winding 33kV IC 33KV OG

Core 1

Purpose (metering/protection)

Type of protection

Ratio

	33kV IC	33kV OG
Accuracy class		
Burden (VA)		
Instrument security factor		
<u>For class PS CTs</u>		
Rated symmetrical short circuit current factor -K_{SSC}		
Dimensioning parameter -K		
Excitation limiting secondary voltage -U_{al} (Volts)*		
Accuracy limiting secondary exciting current – I_{al} (mA)		
Secondary excitation current-I_{mag} at half excitation limiting secondary voltage (mA)		
Secondary winding resistance –R_{ct} (ohm)		
<u>Core 2</u>		
Purpose (metering/protection)		
Type of protection		
Ratio		
Accuracy class		
Burden (VA)		
Instrument security factor		

	33kV IC	33kV OG
For class PS CTs		
Rated symmetrical short circuit current factor -K_{SSC}		
Dimensioning parameter -K		
Excitation limiting secondary voltage -U_{al} (Volts)*		
Accuracy limiting secondary exciting current – I_{al} (mA)		
Secondary excitation current-I_{mag} at half excitation limiting secondary voltage (mA)		
Secondary winding resistance –R_{ct} (ohm)		
Core 3		
Purpose (metering/protection)		
Type of protection		
Ratio		
Accuracy class		
Burden (VA)		
Instrument security factor		
For class PS CTs		
Rated symmetrical short circuit current factor -K_{SSC}		
Dimensioning parameter -K		
Excitation limiting secondary voltage -U_{al} (Volts)*		

	33kV IC	33kV OG
Accuracy limiting secondary exciting current – I_{al} (mA)		
Secondary excitation current-I_{mag} at half excitation limiting secondary voltage (mA)		
Secondary winding resistance –R_{ct} (ohm)		
Core 4		
Purpose (metering/protection)		
Type of protection		
Ratio		
Accuracy class		
Burden (VA)		
Instrument security factor		
For class PS CTs		
Rated symmetrical short circuit current factor -K_{SSC}		
Dimensioning parameter -K		
Excitation limiting secondary voltage -U_{al} (Volts)*		
Accuracy limiting secondary exciting current – I_{al} (mA)		
Secondary excitation current-I_{mag} at half excitation limiting secondary voltage (mA)		
Secondary winding resistance		

–R_{ct} (ohm)

8.0 Characteristic curves

Magnetization curve of CT cores

Ratio and phase angle error

9.0 Weight, dimension and enclosure protection

Total weight (Kg)

Weight of oil (Kg)

Overall dimension (mm)

Mounting details

Degree of protection of enclosure for secondary terminal box.

10.0 Partial discharge level in pico coulomb

TECHNICAL DATA SHEET

FOR

33KV VOLTAGE TRANSFORMER

1.0 GENERAL

Nominal System Voltage (kV)

System short circuit current (kA sym.)
at rated system voltage

Type of System Grounding

Installation (Outdoor/Indoor)

2.0 APPLICABLE INDUSTRY STANDARD

3.0 DESIGN AND CONSTRUCTION REQUIREMENTS

4.0 Ratings

Maximum Rated Primary Voltage
(kV rms) (Phase to Ground)

Rated secondary voltage (V rms)
(Nominal) :

a. Secondary - 1

b. Secondary - 2

Any tap required on
Secondary-1 or Secondary-2 winding

If yes, What is the tap Voltage

- Secondary -1 (V rms)
- Secondary -2 (V rms)

Rated burden (VA)

Secondary-1

Secondary-2

Continuous Thermal Burden (VA)

Rated capacity of capacitor (pF)

Maximum loss factors at 50 Hz
And rated voltage

Rated Voltage Factor

Winding insulation and class

Winding Material (Al or Cu)

BIL of Winding (kV peak)

Power Frequency Withstand
Voltage of Winding (kV rms)

Accuracy class :

Secondary - 1

Secondary – 2

4.0 Construction
Type of PT

Manufacturer's type
Designation

5.0 Insulating Oil

Reference standard

Oil volume in liter

6.0 High Voltage Bushings

Name of Manufacturer

Type

Make Designation

Rated Voltage (Nominal) (kV rms)

Rated current (A)

BIL (kV peak)

Power Frequency withstand voltage :
(Wet withstand for outdoor bushings)

1 minute dry (kV rms)

10 sec. wet (kV rms)

Creepage distance (mm)

Color

Cantilever Strength (kg)

7.0 Terminals

Primary Terminal Connector :

a. For Conductor Material (Al or Cu)

b. Size (mm^2)

c. Number of Conductor/phase

PT secondary fuse rating (A)

8.0 Weight, dimension and enclosure protection

Total weight (Kg)

Weight of oil (Kg)

Overall dimension (mm)

Mounting details

Degree of protection of enclosure
for secondary terminal box.

TECHNICAL DATA SHEET

FOR

33KV LIGHTNING ARRESTOR

1.0 SYSTEM DATA

Nominal System Voltage (kV)

System Fault Current Level at
Rated System Voltage (kA)

Max. Duration of Ground Fault (ms)

System Neutral Grounding

BIL of Equipment to be protected
(kVpeak)

2.0 APPLICABLE INDUSTRY STANDARD

3.0 DESIGN AND CONSTRUCTION REQUIREMENT

4.0 General

Type

Model Designation

Location (Indoor/Outdoor)

5.0 Performance Characteristics and Ratings

Rated Voltage (kVrms)

Line Discharge Class

Dielectric Withstand for Housing

- Lightning impulse withstand voltage, with 1.2/50 μs waveform(kVpeak)

- One minute power frequency withstand Voltage. (kVrms)

Nominal Discharge Current (Lightning Impulse Classifying Current) With 8/20 μs Wave-Form (kA)

High Current Impulse Capability With 4/10 μs Waveform (kA peak)

Long Duration Wave Withstand Capability

- Current (A)

- Duration (ms)

Maximum Lightning Impulse Residual Voltage with 8/20 μs waveform (kVpeak) at a Discharge (classifying) Current of :

- 5 kA
- 10 kA
- 20 kA
- 40 kA

Maximum Switching Surge Residual Voltage (kVpeak) at a Discharge Current of :

- 0.5 kA
- 1 kA
- 2 kA
- 3 kA

Maximum Steep Current/Front-of-Wave Residual Voltage Based on 1/> 2 or 0.5μs Waveform, as Applicable (kVpeak) at a Discharge Current of :

- 10 kA
- 20 kA

Temporary over voltage capability (kVrms) for :

- 1 second
- 10 seconds

Maximum R.I.V (μv)

Maximum External Insulation Levels

Power frequency Dry Withstand Voltage (kVrms)

Power frequency Wet Withstand Voltage (kVrms)

Lightning Impulse Withstand Level (kVpeak)

Switching Impulse Withstand Level (kVpeak)

Leakage Current Through Arrester at MCOV (mA)

Maximum Energy Absorption Capability

i) kj/kV of Arrester Rating
ii) kj/kV of MCOV

5.0 Construction

Pressure Relief Capability (rms symmetrical)

High current, short duration (kA)

Low current, long duration (A)

Porcelain Housing

Colour

Creepage Distance (mm)

Bending Failing Load (kN)

Cantilever Strength min. (kN)

Torsional Strength (kN)

Compression Strength (kNm)

No. of stacks in each unit

Height (mm)

Internal Pressure Required to Operate Pressure Relief Device as a Percent of Pressure Required to Burst Porcelain (%)

Mounting Arrangement

Mode of mounting
(Self supporting/bracket mounting)

Bolt circle diameter (mm)

No. of holes

Size of bolts (mm)

Accessories

Scale range of the leakage Ammeter (mA)

Dia of the grading ring, if applicable (mm)

Terminals

Type

Material (Al or CU)

MISCELLANEOUS

Minimum Clearance, Between Live Parts and Earth Parts (mm)

Minimum Permissible Centre to Centre Distance Between Arresters (mm)

Overall Height of Arrester (mm)

Weight of Arrester (kg)

TECHNICAL DATA SHEET

FOR

33KV INSULATORS

A. POST INSULATORS

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

Application: (Indoor/Outdoor)

2.0 Stack Assembly

(Tapered/Uniform)

3.0 Electrical Ratings

Outdoor:

Nominal System voltage
(kV rms)

Basic Impulse withstand
Voltage (kV peak)

Power Frequency withstand
voltage, Wet (kV rms)

Critical Impulse Flashover,
Positive (kV peak)
Maximum r. i. v. (μV)

4.0 Mechanical Ratings:

Bending Failing Load or Cantilever Strength (kN)

Tension Strength (kN)

Torsion Strength (kN.m)

Compression Strength (kN)

5.0 Material:

Insulator Shell

Insulator Glaze

6.0 Dimensions

Insulator Overall Height (mm)

Insulator Weight (kg)

Leakage Distance (mm)

7.0 Mounting:

Top:

Bolt Circle (mm)

Number of Bolt

Bolts Arrangement (90°)

Bolt Size (mm)

Kind of Thread (UNC)

Base:

Bolt Circle (mm)

Number of Bolt

Spacing of Bolts (90°)

Bolt Size (mm)

Kind of Thread (UNC)

Adapter Plates or Spacers required?

Size

B. TENSION INSULATORS

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

2.0 Insulator type
(Superfog/Fog/Aerodynamic)

Number of insulators per string

3.0 Ratings

Combined Mechanical and Electrical Strength (kN)

Tension proof load (kN)

Electrical Values

Low frequency dry flashover (kV)

Low frequency wet flashover (kV)

Critical impulse flashover, Positive (kV)

Critical impulse flashover, negative (kV)

Low frequency puncture Voltage (kV)

RIV low frequency test voltage (rms to ground) (kV)

Maximum RIV at 1000 KHz (µV)

Weight per unit (kg)

Insulator Shell Material

4.0 Dimension :

Coupling type (ANSI - J/K)
(IEC - size 16A/20)

Minimum leakage distance per unit (mm)

Shell diameter (mm)

Spacing distance (mm)

C. SUSPENSION INSULATORS

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

2.0 Insulator type (Superfog/Fog/Aerodynamic)

Number of insulators per string

3.0 Ratings

Combined Mechanical and Electrical Strength (kN)

Tension proof load (kN)

Electrical Values

Low frequency dry flashover (kV)

Low frequency wet flashover (kV)

Critical impulse flashover, Positive (kV)

Critical impulse flashover, negative (kV)

Low frequency puncture Voltage (kV)

RIV low frequency test voltage (rms to ground) (kV)

Maximum RIV at 1000 KHz (µV)

Weight per unit (kg)

Insulator Shell Material

4.0 Dimension :

Coupling type (ANSI - J/K)

(IEC - size 16A/20)

Minimum leakage distance per unit (mm)

Shell diameter (mm)

Spacing distance (mm)

TECHNICAL DATA SHEET

FOR

33KV CONTROL AND RELAY PANELS

1.0 APPLICABLE INDUSTRY STANDARD

2.0 DESIGN AND CONSTRUCTION REQUIREMENTS

General

Degree of protection

Panel Dimensions in mm (WxDxH) for

33KV Control & Relay Panel

Number of Shipping Sections

3.0 Relays, Meters and Instruments

Complete list of the required Protective Relays, Meters and Instruments Provided?

Drawing Attachments:

a. Relay and Metering One-Line Diagram

b. Front and Rear Panel Layout

c. Rear Panel Wiring/ Interconnection Block Diagrams

d. BOQ of all materials with ratings, make, model and specification

e. Terminal plan

f. Panel foundation plan

Technical Literature or Catalogs of All Required Relays, Meters and Instruments Provided?

Relay make and models for:

33kV line overcurrent protection

33kV line earth fault protection

Master trip relay, hand reset

Trip circuit supervision relay

DC supply supervision relay

Auxiliary relays

Antipumping relay

Meters

Type, make and models for:

Ammeter

Voltmeter

Tri-vector meter

Digital Multifunction meters

Panel cut out dimension

Multifunction meters

Reference standard

Input voltage

Input current

Input/output isolation

Measurement functions

Details of front panel display

Display type

Communication protocol

Burden (VA)

Dimension

Panel cut out

Tri-vector meters

Reference standard

Input voltage

Input current

Input/output isolation

Measurement functions

Details of front panel display

Display type

Communication protocol

Burden (VA)

Data retention (years)

Pulse output

Dimension

Panel cut out

Enclosure material

Transducers

Type, make and model for:

Current transducer

Voltage transducer

Watt transducer

VAR transducer

Dual output?

DC Output range

Auxiliary supply

Power consumption (VA)

Response time

Input/output isolation

Accuracy class

4.0 Annunciator System

Make and model

Supply voltage

Number of windows for

- 33kV IC line
- 33kV OG line

Window sizes

Display device

Facia type

Window/LED colour

Flash rate

Response time

Input signal

Interrogation voltage

Output contacts

Contact rating

Architecture (Integrated/Non integrated?)

Power consumption per Window (W)

Overall dimension (mm)

Panel cut out (mm)

5.0 Control Switches

Type or Model No.

Contact Ratings:

AC Voltage (Vrms)

DC Voltage (Vdc)

Current (A)

Number of Contacts

6.0 LED Lamps

a) Make

b) Type & Cat. No.

c) Watts/Voltage

d) Lamp & Lens replaceable from front.

7.0 Semaphore Indicators

a) Make

b) Type & Cat. No.

c) Watts/Voltage

8.0 Miscellaneous Electrical Features

Space Heater Power (Watts)

9.0 Mimic Bus Diagram

Mimic bus material

Colour

Thickness

10.0 Wiring and Terminal Blocks

Type of Insulated Wire

Type of Terminal Blocks
(Contractor to provide literature or catalog)

11.0 Auxiliary Power

Nominal DC Power Voltage (Vdc)

Operating Voltage range (Vdc)

Nominal AC Power Voltage (Vrms)

12.0 Grounding

Size of Ground Bus (mm x mm)

Material

TECHNICAL DATA SHEET
FOR
33KV INDOOR LOAD BREAK SWITCH FUSE UNIT

1. Make

2. Type

3. Reference Standard

4. Voltage (Nom./Max.) KV

5. Phase, Frequency No. Hz

6. Short Circuit Rating

   a) Interrupting Symmetrical MVA
   b) Short-time for 3 sec KA rms

7. Insulation Level

   a) Impulse Withstand KVp
   b) 1-min 50Hz voltage withstand KV rms

8. Metal-clad construction ? Yes /No
9. Degree of Protection
10. Minimum thickness of sheet metal used mm

11.0 Construction

11.1 Working zone limits from FFL mm

11.2 All meters , switch & relays flush mounted type Yes/No

11.3 Minimum clear space required at

a) Front mm

b) Rear mm

11.4 Typical vertical section

Overall dimension and weight : mm Kg.

i) Incomer

ii) Transformer fdr.

12.0 Bus Bar

12.1 Material & Grade

12.2 Reference Standard

12.3 Cross sectional Area mm^2

12.4 Continuous current (at site condition, 50^0C ambient and within cubicle)

12.5 Maximum temp. rise over 50^0C ^0C

12.5 Short time current for 3 sec KA rms

12.7 DC resistance at 85^0C Ohm/m/ph

12.8 Minimum clearance of bare bus bar and connection.

a) Phase to phase mm

b) Phase to ground mm

12.9 Bus bar provided with

a) Insulating sleeve

b) Phase barriers

c) Cast resin shrouds for joint

12.10 Bus Connections

a) Silver plated

b) Made with antioxide grease

12.11 Bus support insulator

a) Make

b) Type

c) Reference Standard

d) Voltage Class KV

d) Min.creepage distance mm

f) Cantilever strength Kg/cm^2

g) Net weight Kg

h) Spacing mm

13.0 Load Break Switch

13.1 Make

13.2 Type

13.3 Reference Standard

13.4 Rated Voltage KV

13.5 Rated Frequency Hz

13.6 No. of poles No.

13.7 Rated Currents

a) Continuous (at site condition 50^0C ambient & within cubicle) Amp.

b) Short-time current for 3 sec. KA rms

13.8 Max.Temp.rise over 50^0C ambient ^{0}C

13.9 Rated operating duty

13.10 Interrupting capacity at rated

voltage and operating duty.

a) Symmetrical KA rms

b) Assymmetrical KA rms

13.11 Rated making current KA peak

13.12 Insulation Level

a) Impulse voltage withstand with
1.2 x 50 micro sec. wave KV peak

b) 1-min 50 Hz voltage withstand KV

13.13 Type test report on identical equipment furnished.

14.0 FUSE

14.1 Make

14.2 Type

14.3 Reference standard

14.4 Rupturing capacity KA rms

14.5 Continuous current at 50^{o}C ambient & within cubicle Amps

14.6 Cut off currents KA peak

14.7 Fuse characteristics furnished for various fuse ratings

15.0 Control & Indications

15.1 **Control Switches**

a) Make

b) Type & Cat.No.

c) Contact rating at : 240V A.C. 110V D.C

d) Make & continuous Amp

e) Break (Inductive) Amp.

15.2 Lamps

a) Make

b) Type & Cat. No.

c) Watts/Voltage

d) Series resistance Ohm.

e) Lamp & Lens replaceable from front.

15.3 Selector Switches

a) Make

b) Type & Cat.No.

c) Contact rating at : 240V A.C. 110V D.C

d) Make & continuous Amp

e) Break (Inductive) Amp.

16.0 Current Transformer

a) Make

b) Type

c) Reference Standard

d) CT ratios

e) Rated frequency

f) Short Circuit Withstand

g) Short-time current for 3 sec. KA rms

h) Dynamic current KA peak.

i) Class of Insulation

j) Temp. rise over 50^0C ambient ^{0}C

k) Basic Insulation level KV peak

l) CT magnetisation curve furnished.

m) Metering C.T. : VA Burden Class/ALF or ISF

i) Incomer

i) Transformer feeder

17.0 Voltage Transformer

a) Make

b) Type

c) Reference Standard

d) Voltage ratio

e) Rated frequency

f) Accuracy class

g) VA burden

h) Over voltage factor

i) Continuous

ii) 30 seconds

i) Class of Insulation

j) Temp-rise over

50^0C ambient ^{0}C

k) Basic Impulse level Kvp peak

l) Winding Connection

i) Primary

ii) Secondary

m) Fuses

i) Continuous rarings

H.V./L.V Amps.

ii) Symmetrical fault

rating HV/LV KA rms.

18.0 Meters

a) Make

b) Type

c) Reference Standard

d) Size

e) Scale

f) Accuracy class

19.0 Terminal Block

a) Make

b) Type

c) Cat.No.

d) 20% spare terminals furnished

20.0 Cable Termination

a) Removable Gland Plate details

21.0 Ground Bus

a) Ground bus furnished

b) Material

c) Size

22.0 Name Plate

a) Material

b) Thickness mm

c) Size for mm

i) Panel

ii) Equipment/devices

23.0 Space Heater/Plug Socket

a) Cubicle Heater

i) Thermostat controlled?

ii) Wattage

iii) Voltage

b) Plug Socket

i) Type

iii) Rating

24.0 A.C./D.C. Supply

a) Isolating switches fuse unit
for incoming supply :

i) A.C. Type & Rating

ii) D.C. Type & Rating

b) Isolating switch fuse unit
at each cubicle :

i) A.C. supply - Type & Rating

ii) D.C. supply Type & Rating

25.0 Tropical Protection

a) Any special treatment for tropical protection ?

b) Screens are of corrosion resistant materials ?

26.0 Painting

Finish of switchgear

a) Inside

b) Outside

TECHNICAL DATA SHEET

FOR

STATION SERVICE TRANSFORMER

1.0 General

1.1 Make

1.2 Type

1.3 Reference Standard

2.0 Rating

2.1 Rated Output Kva

2.2 Type of Cooling

2.3 Rated Voltage KV

H.V.

L.V.

2.4 Rated Current Amps

H.V.

L.V

2.5 No . of phases

2.6 Rated frequency Hz

2.7 Vector Group reference

3.0 Temperature

3.1 Reference ambient tamp

3.2 Temp rise over reference ambient

a) In Oil by thermometer ^{O}C

b) In winding by resistance ^{O}C

4.0 Tappings

4.1 Type

4.2 Capacity

4.3 Range – Steps x % Variation

4.4 Taps provided on H.V. winding

5.0 Insulation level KV/KVp

5.1 H.V.

5.2 L.V.

5.3 L.V.Neutral

6.0 Impedances at principal tap

Rated current & frequency %

6.1 Impedance

6.2 Reactance

6.3 Resistance at 75^0

6.4 Zero Sequence Impedance

6.5 Zero sequence capacitance of L.V.

Winding uf/ph

7.0 Guranteed losses at principal tap full load at

75^0 C KW

7.1 No load losses

7.2 Load losses

8.0 Efficiency at 75^0 C and

0.8 power factor lag %

8.1 At full load

8.2 At ¾ full load

8.3 At ½ full load

8.4 Maximum Efficiency

8.5 Load and power factor at which it occurs

9.0 Regulation at full load at 75^0 C %

9.1 At unity power factor

9.2 At 0.8 power factor lagging

10.0 No load current referred to HV Amps

10.1 At 90% rated voltage

10.2 At 100% rated voltage

10.3 At 110% rated voltage

11.0 Approx max flux density Web/m^2

11.1 At 90% rated voltage

11.2 At 100% rated voltage

11.3 At 110% rated voltage

12.0 Max.current density Amps/cm^2

12.1 H.V. Winding

12.2 L.V. Winding

13.0 Withstanding time without injury for Sec

13.1 Three phase dead short circuit at terminal With rated voltage maintained on the other Side

13.2 Single phase short circuit at terminal with Rated voltage maintained on other side

14.0 Cooling System

14.1 Details of Tank

14.2 Material

14.3 Thickness of sides mm

14.4 Thickness of bottom mm

14.5 Thickness of cover mm

15.0 Core

15.1 Type – Core or Shell

15.2 Core of material

15.3 Thickness of lamination mm

16.0 Coils

16.1 Type of Coil :

a) H.V.

b) L.V

17.0 Conductor material

17.1 Insulating material

a) H.V. – turn

b) L. V. – turn

c) L.V. – Earth

d) H.V. – L.V

18.0 Tap-Changer

18.1 Make

18.2 Type

18.3 Rated Current

18.4 Insulating Oil

18.5 Approx. Volume liter

18.6 10% excess oil furnished?

18.7 Oil conforms to

19.0 Bushings

19.1 Make

19.2 Type

19.3 Reference Standard

19.4 Voltage class KV

19.5 Creepage distance mm/MV

19.6 Weight

19.7 Free space required for busing removal

19.8 Test terminals for H.V. bushing provided

19.9 Reference standard

19.10 Minimum Clearance

19.11 Between phases :

a) In air mm

b) In oil mm

19.12 Terminal Connections

19.13 H.V.

19.14 L.V

19.15 L.V. Neutral

H.V Neutral

20.0 Marshalling Box

20.1 Weather proof suitable for outdoor

20.2 Degree of protection

21.0 Terminal Blocks

21.1 Make

21.2 Type

21.3 20% Spare terminals furnished ?

21.4 Wiring

21.5 Cable Type

21.6 Voltage grade Volt

21.7 Conductor size mm^2

21.8 Trip & Alarm Contacts Ratings

21.9 Voltage 110 Volt D.C

21.10 Rated/Making Current Amps.

22.0 Accessories

The transformer furnished with fittings and Accessories as per IS?

23.0 Detail of Conservator

23.1 Volume of conservator

23.2 Volume of oil between the highest And lowest levels

24.0 Approx .Overall dimension

24.1 Length mm

24.2 Breadth mm

24.3 Height mm

25.0 Approx. Weights

25.1 Core and Coil Kg

25.2 Tank and fittings Kg

25.3 Oil Kg

25.4 Total weight Kg

TECHNICAL DATA SHEET
FOR
DISTRIBUTION TRANSFORMER

1.0	General		
1.1	Make		:
1.2	Type		:
1.3	Reference Standard		:
2.0	Rating		
2.1	Rated Output	MVA	:
2.2	Type of Cooling		:
2.3	Rated Voltage	KV	
2..3.1	H.V.		:
2..3.2	L.V.		:
2.4	Rated Current	Amps	
2..4.1	H.V.		:
2..4.2	L.V		:
2.5	No . of phases		:
2.6	Rated frequency	Hz	:
2.7	Vector Group reference		:
3.0	Temperature		
3.1	Reference ambient tamp		:
3.2	Temp rise over reference ambient		:
3.2.1	In Oil by thermometer	^{o}C	:
3.2.2	In winding by resistance	^{o}C	:

4.0 Tappings :

4.1 Type :

4.2 Capacity :

4.3 Range – Steps x % Variation :

4.4 Taps provided on H.V. winding :

4.5 Highest design operating voltage for the tappings

- Continuous operation (%) :

- Emergency operation (%) :

5.0 Insulation level KV/KVp

5.1 H.V. :

5.2 L.V. :

5.3 H.V.Neutral :

5.4 Switching Impulse Withstand Voltage (BSL):

6.0 Separate Source Power Frequency Withstand Voltage

HV winding (kV rms) :

LV winding (kV rms) :

HV neutral end (kV rms) :

7.0 Impedance Voltage natural cooling power base and reference temp. of 75°C (%)

a) At Principal Tap (Guaranteed values)

HV – LV :

Reactance :

Resistance :

b) At Extreme Plus Tap

HV – LV :

c) At Extreme Minus Tap

HV – LV :

8.0	Zero-sequence impedance on natural cooling power base (%)				
a)	At Principal Tap (Guaranteed values)				
	HV – LV		:		
b)	At Extreme Plus Tap				
	HV – LV		:		
c)	At Extreme Minus Tap				
	HV – LV		:		
9.0	Design X/R ratio		:		
10.0	**Guaranteed losses** at principal tap, natural cooling base, rated voltage, rated frequency and at 75^0 C				
10.1	No load losses	KW	:		
10.2	Load losses	KW	:		
10.3	Auxiliary losses	KW	:		
11.0	Efficiency at 75^0 C	%	:	At 0.8 pf lag	At unity pf
11.1	At full load		:		
11.2	At ¾ full load		:		
11.3	At ½ full load		:		
11.4	Maximum Efficiency		:		
11.5	Load and power factor at which it occurs		:		
12.0	Regulation at full load at 75^0 C	%	:		
12.1	At unity power factor		:		
12.2	At 0.8 power factor lagging		:		
13.0	No load current referred to HV	Amps			
13.1	At 90% rated voltage		:		
13.2	At 100% rated voltage		:		
13.3	At 110% rated voltage		:		

14.0 Max flux density Web/m^2

14.1 At 90% rated voltage :

14.2 At 100% rated voltage :

14.3 At 110% rated voltage :

14.4 Saturation voltage of core material (% Un) :

15.0 Max.current density Amps/cm^2 :

15.1 H.V. Winding :

15.2 L.V. Winding :

16.0 Maximum Symmetrical short circuit current for which windings are designed to thermally withstand for 3 seconds:

HV winding (kA) :

LV winding (kA) :

17.0 Maximum Asymmetrical short circuit current for which the windings are mechanically designed:

HV winding (kA) :

LV winding (kA) :

18.0 Noise Level at full rated power :

19.0 Conservator Expansion Device Material :

20.0 Whether suitable for parallel operation :

21.0 Details of Tank :

21.1 Material :

21.2 Thickness of sides mm :

21.3 Thickness of bottom mm :

21.4 Thickness of cover mm :

21.5 Min. Thickness of radiator plates (mm) :

21.6 Maximum Positive Withstand Pressure

of Tank and Radiators (kPa) :

21.7 Minimum Vacuum Withstand (kPa) :

22.0 Core :

22.1 Type – Core or Shell :

22.2 Core of material and grade :

22.3 Thickness of lamination mm :

23.0 Coils :

23.1 Type of Coil :

c) H.V. :

d) L.V :

23.2 Conductor material :

23.3 Insulating material :

e) H.V. – turn :

f) L. V. – turn :

g) L.V. – Earth :

h) H.V. – L.V :

24.0 On Load Tap Changer

Manufacturer :

Type Designation :

24.1 Number of steps :

Step Voltage (%) :

Tapping Range (%) :

Rated Through Current (A) :

Short Circuit Current (kA) :

Location (External or Internal) :

Voltage Class (kVrms) :

BIL (kVpeak) :

24.2 Motor drive unit:

Type :

Power :

Rated voltage (Vac) :

Number of phases :

Control voltage (Vac) :

Space heater (Vac) :

Heater power (W) :

Provision of parallel operation :

alongwith Supervisory Equipment :

24.3 Oil/Gas Surge Relay for OLTC

Manufacturer :

Type Designation :

Trip Contact Current Rating at 110 Vdc (A) :

24.4 Pressure Relief Device for OLTC

Manufacturer :

Type Designation :

Operation Range (From__to__kPa) :

Resealing Pressure (kPa) :

Number of alarm/trip contacts :

Alarm Contact Current Rating at 110 Vdc (A) :

25.0 Insulating Oil :

25.1 Volume in litre :

25.2 10% excess oil furnished? :

25.4 Oil preservation system provided? Type?

25.5 Manufacturer :

25.6 Make Designation :

25.7 Applicable Industry Standards :

25.8 Class of Oil :

26.0 <u>Bushings</u>

26.1 High Voltage Bushings

Manufacturer :

Type designation :

Material :

Location (top, side, others) :

Terminal take off angle :

(vertical, horizontal, angle)

Number :

Rated Voltage (kV) :

Rated Maximum Voltage (kV) :

Rated current (A) :

BIL (kVpeak) :

Switching Impulse Withstand

Voltage (kVpeak) :

Power Frequency Dry/Wet

Withstand Voltage (kVrms) :

Creepage distance (mm) :

Cantilever strength (kN) :

Mounting details

Hole circle diameter of the flange (mm) :

Number of bolts :

Hole diameter (mm) :

Terminal

Type :

Size :

No. of holes :

26.2 Low Voltage Bushings

Manufacturer :

Type Designation :

Material :

Location (Top, side, others) :

Terminal take off angle :

(vertical, horizontal, angle)

Number :

Rated voltage (kV) :

Rated maximum voltage (kV) :

Rated current (A) :

BIL (kVpeak) :

Power Frequency Dry/Wet Withstand

Voltage (kVrms) :

Creepage Distance (mm) :

Cantilever strength (kN) :

Mounting details

Hole circle diameter

of the flange (mm) :

Number of bolts :

Hole diameter (mm) :

Terminal

Type :

Size :

No. of holes :

26.3 HV Neutral Bushings

Manufacturer :

Type designation :

Material :

Location (top, side, others) :

Terminal take-off angle :

(vertical, horizontal, angle)

Rated Voltage (kV) :

Rated Current (A) :

BIL (kVpeak) :

Power Frequency Dry/Wet Withstand

Voltage (kV rms) :

Creepage distance (mm) :

Cantilever strength (kN) :

Mounting details

Hole circle diameter of

the flange (mm) :

Number of bolts :

Hole diameter (mm) :

Terminal

Type :

Size :

No. of holes :

27.0 Marshalling Box :

27.1 Weather proof suitable for outdoor :

27.3 Degree of protection :

27.4 Terminal Blocks :

27.5 Make :

27.6 Type :

27.7 20% Spare terminals furnished ? :

27.8 Mounting (Ground/tank) :

28.0 Winding Temperature Indicator :

28.1 Manufacturer :

28.2 Type Designation :

28.3 Provision of Maximum Indicator :

28.4 Adjustment Range of Alarm and

Trip Contacts (From_to_°C) :

28.5 Adjustment Range of Forced

Cooling Contacts (From_to_°C) :

28.6 Contact Current Rating at 110 Vdc (A) :

28.7 Number of contacts :

29.0 Oil Temperature Indicator

29.1 Manufacturer :

29.2 Type Designation :

29.3 Type of Liquid Sensing Element :

29.4 Provision of maximum indicator :

29.5 Adjustment Range of Alarm and
Trip contacts (From_to_°C) :

29.6 Adjustment Range of Forced
Cooling contacts (From_to_°C) :

29.7 Contact Current Rating at 125 Vdc (A) :

29.8 Number of contacts :

30.0 Buchholz Relay

30.1 Manufacturer :

30.2 Type Designation :

30.3 Alarm/Trip Contact Current Rating
at 110 Vdc (A) :

31.0 Pressure Relief Device

31.1 Manufacturer :

31.2 Type Designation

31.3 Pressure Range for Operation
(From_to_kPa) :

31.4 Resealing Pressure (kPa) :

31.5 Number of alarm/trip contacts :

31.6 Alarm Contact Current Rating at 110 Vdc (A) :

32.0 Cooling Equipment

32.1 Fans

Number of cooling fans :

Number of cooling fan groups :

Power rating of each fan (W) :

Supply voltage (Vac) :

Number of phases :

Number of wires :

32.2 Total fan consumption at

full load (kW) :

Degree of protection for fan blades :

33.0 Oil Level Indicator for the Main Tank

Manufacturer :

Type Designation :

Alarm Contact Current Rating at 110 Vdc (A) :

34.0 Oil level indicator for OLTC

Manufacturer :

Type designation :

Alarm contact current rating at 110 Vdc(A) :

35.0 Drain, Filter and Sampling Valves

Type & Size of Oil Drain Valve (mm) :

Type and Size of Filtration :

Valves (mm) :

Size of Oil Sampling Valve/s (mm) :

Type & Size of Radiator Valves (mm) :

36.0 Bushing Current Transformers

36.1 High Voltage Neutral Bushing Current Transformers

Manufacturer :

Type Designation :

Core 1:

Type of Protection :

(back up/differential/REF Protection etc)

Ratio (A) :

Accuracy Class :

Burden (VA)/Resistive burden -R_b (ohms) :

Core 2: Purpose

Type of Protection :

(back up/differential/REF Protection etc)

Ratio (A) :

Accuracy Class :

Burden (VA)/Resistive burden -R_b (ohms) :

Secondary winding Resistance :

at 20°C –R_{ct} (ohm)

Knee point voltage (V) :

Secondary excitation current, Imag (A) :

36.2 Bushing Current Transformers for W.T.I.

Manufacturer :

Type Designation :

Ratio

- HV :
- LV :

Burden (VA) :

Accuracy Class :

37.0 Terminations

37.1 Termination for HV Winding

Open Bushings (oil/Air)

Type of conductor :

Conductor material :

Conductor size (mm²) :

37.2 Termination for LV Winding

Cable Box

Type of cable :

Cable size (mm²) :

Material :

	Number per phase		:
	Method of termination		:
	(Pothead, stress cone, heat shrinkable)		:
	Number of terminations		:
	Terminal enclosure required		:
	Type (Air, Oil)		:
	Incoming cable take off method		:
	(Vertical, horizontal, Angle to horizontal)		
38.0	Wiring		:
38.1	Cable Type		:
	Voltage grade	Volt	:
	Conductor size	mm^2	:
	Trip & Alarm Contacts Ratings		:
	Voltage	110 Volt D.C	:
	Rated/Making Current	Amps.	:
39.0	Accessories		:
	The transformer furnished with fittings and Accessories as per Annexure?		
40.0	Auxiliary supply		
	AC Voltage for Motors and Controls (Vac)		:
	Number of phases		:
	Number of wires		:
	DC Voltage for Control and Protection.(Vdc)		:
41.0	Approx .Overall dimension		:
41.1	Length	mm	:
41.2	Breadth	mm	:
41.3	Height	mm	:
41.4	Crane lift for un-tanking core and coil assembly (Including sling)	mm	:

42.0	Approx. Weights		:
42.1	Core and Coil	Kg	:
42.2	Tank and fittings	Kg	:
42.3	Oil	Kg	:
42.4	Total weight	Kg	:
42.5	Shipping Data		:
42.6	Weight of the heaviest package Kg		:
43.0	Dimension of the largest package (L x B x h):		
44.0	Tests		:
44.1	Routine Tests as per IS?		:
44.2	Tank pressure test :		:
	a) Test Pressure	KN/m^2	:
	b) Duration	Hours	:
44.3	Tank Vacuum Test		
	a) Vacuum	KN/m^2	:
	b) Duration	Hours	:
44.4	Core bolt withstand voltage for 1 min KV		:
44.5	Type test quoted?		

TECHNICAL DATA SHEET

FOR

BATTERY AND BATTERY CHARGER

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

Battery Application

System Description

Grounded/ungrounded
D.C. System

No. of Wires

Battery Bank Nominal
Voltage or D. C. System
rated voltage (Vdc)

Minimum permitted
voltage (Vdc)

Maximum permitted
voltage (Vdc)
(during boost)

Recommended float
charging voltage
at 25°C (Vdc/cell)

Maximum boost
voltage (Vdc/cell)

End of Discharge
Voltage (Vdc/Cell)

No. of cells forming
the battery bank

Open circuit voltage
(Vdc/cell)

Battery Loading

a. Continuous load ___ Amps for 10 hours

b. Short duration load ____ Amps for 1 hour

c. Momentary Load ____ Amps for __ hours

d. Short duration load ____ Amps for 1 min

Battery Ampere hours Capacity as computed based on 10 hours discharge rate (including all correction factors) (AH)

Minimum battery bank voltage based on end of discharge cell voltage (Vdc)

Battery type or Model No.

Manufactured and tested as per Standards

Composition:

a. Plates composition

Positive Plate
Negative Plate

b. Separators

c. Retainer

d. Container and cover

e. Connectors

Plate configuration

Positive Plate

Negative Plate

Oxygen Index of Cover and container

Internal resistance of battery bank including inter-cell and inter-tier

connectors in fully charged condition (mΩ)

Internal resistance of individual cell (mΩ)

Cross section of inter-cell connectors (mm^2)

Battery terminal short circuit current (A) :

Time for total discharge during short circuit (sec.)

Maximum discharge rate
Discharge duration (minutes/seconds)
Discharge current (A)

Recommended maximum recharge current following discharge (A)

Float charging current at the recommended float voltage setting (mA/AH) :

Maximum Self discharge rate per month at 25°C (%)

Guaranteed Service Life (minimum) under operating conditions (years)

Maximum allowable deep discharge/ percent of discharge depth

Electrolyte density at 25°C

Temperature correction factor for electrolyte density at maximum level (kg/m^3)

Temperature correction factor for electrolyte density at minimum level (kg/m³) :

Electrolyte volume per cell (litres) :

Maximum gassing rate at the recommended boost voltage (mL/AH/Cell/Month)

Material of Battery rack

Racking of Battery (single tier/two tiers)

Total weight of the cell (kg)

Cell Dimensions

Height (mm)

Width (mm)

Depth (mm)

2.0 BATTERY CHARGER

2.1 DESIGN AND CONSTRUCTION REQUIREMENTS

a) Performance characteristics and ratings.

Rated output voltage of the charger (V_{DC})

Rated Input voltage (V_{AC})
No. of phases and wires of input supply

Charger Output current rating (A)

Continuous DC load to be catered to by the charger per load profile (A)

Float charging current to be catered to by the charger (A)

Battery Recharging time (max.) (Hrs)

Type of Battery (VRLA/Lead Acid Vented/Ni-Cad)

No. of cells

AH capacity

- 8 H discharge rate
- 10 H discharge rate

Parallel operation between chargers required?

Adjustable charging range for float and boost mode (%)

Steady state Voltage regulations under specified conditions (%)

Max. Voltage Transients (%)

- with battery connected
- with battery disconnected

Max. Transient Recovery time to (m.Sec)

- Steady state conditions Max.
- Full recovery

Ripple Voltage with battery disconnected Max. (%)

AC Voltage fluctuations range (%)

Audible noise level at 1.5 m Max. (db)

2.2 CONTROL & PROTECTION

Current limit adjustment range
Min. (%)

Power walk-in time to full load (Secs)

Surge protection provided?

Short circuit rating of :

- AC Circuit breaker (kA)
- DC Circuit breaker (kA)

2.3 CONSTRUCTION

Type of mounting, Floor/wall

conduit/cable entry (top/bottom)

Any Forced cooling required?

Total Weight of panel (kg)

Overall dimensions of
charger panel (mm)

Width

Height

Length

Incoming cable size, mm^2

Outgoing cable size, mm^2

TECHNICAL DATA SHEET

FOR

33KV POWER CABLES

1.0 **Ratings**

Voltage rating (KV)

Conductor dc resistances per km at 20°C (Ω)

Conductor ac resistance per km at 20°C (Ω)

Minimum insulation resistance per km at 20°C (MΩ)

Maximum permissible continuous conductor temperature (°C)

Maximum rated temperature of insulation material (°C)

Maximum permissible continuous jacket temperature (°C)

2.0 **Conductor Material (Cu or Al)**

Ref. standard

Size

Number of strands per Conductor

Diameter of compacted strand (mm)

Number of Conductors

Conductor Cross Sectional area (mm²)

Outer diameter of conductor (mm)

3.0 **Conductor screening**

Material

Average thickness of screening (mm)

4.0 **Insulation Material**

Average thickness of insulation (mm)

Outer diameter over insulation (mm)

5.0 **Insulation screening**

5.1 Material of non metallic part

5.2 Thickness of non metallic part

5.3 Material of metallic part

5.4 Thickness of metallic part

5.5 Short time current rating of metallic screen

6.0 **Inner sheath**

6.1 Material and type

6.2 Thickness

6.3 Diam. over inner sheath

7.0 **Armour**

7.1 Ref. standard

7.2 Material

7.3 Number of wires

7.4 Conductor cross section

7.5 Short time current rating

8.0 **Outer jacket material**

8.1 Average jacket thickness (mm)

8.2 Overall diameter of cable (mm)

9.0 Reference standard for core identification

10.0 Cable weight (kg/km)

10.1 Reel and cable weight (kg)

10.2 Cable length per Reel (m)

10.3 Total quantity (m)

10.4 Cable reel diameter (mm)

10.5 Cable reel width (mm)

10.6 Maximum pulling tension (kN)

10.7 Minimum bending radius (mm)

TECHNICAL DATA SHEET

FOR

415V DISTRIBUTION BOARDS

1.0	DB ASSEMBLY			:
1.1	Make			:
1.2	Type			:
1.3	Reference Standard			:
1.4	Voltage (Nom./Max.)		Volt	:
1.5	Phase, Frequency	No., Hz		:
1.6	Short Circuit Rating			
	a) Interrupting Symmetrical		KA	:
	b) Short time for 1 sec.	KA rms		:
1.7	Insulation Level			
	1-min., 50 Hz Voltage withstand		KV rms	:
1.8	Construction			
	a) Metal clad, air insulated, floor mounting		Yes/No	:
	b) Suitable for mounting against building wall	Yes/No		:
1.9	Enclosure			
	a) Degree of Protection			:

b) Minimum thickness of sheet metal mm :

1.10 DB fully assembled, wired and tested at factory Yes/No :

2.0 CONSTRUCTION

2.1 Design

a) Completely compartmentalised :

b) Working height limits from floor level mm :

2.2 Control Compartment

a) Provided with individual front access door :

2.3 DB section provided with

a) Removable back cover :

b) Full height cable chamber :

2.4 Horizontal wireway for inter panel wiring provided for each MCC/DB :

2.5 All meters, relays, lamps etc. flush mounted type :

2.6 Vertical Section Size

a) DB (L x D x H) mm :

3.0 BUSBAR

3.1 Make :

3.2 Material & Grade :

3.3 Reference Standard :

3.4 Continuous currents at site condition, 50^{o}C ambient and within cubicle :

a) Main Busbar Amp :

b) Vertical Busbar (minimum) Amp :

3.5 Conductor Section

a) Main Busbar mm^2 :
b) Vertical Busbar mm^2 :

3.6 Max. temp. rise over 50^oC ambient ^oC :

3.7 Short-time current for 1 second KA rms :

3.8 Separate chamber/phase barrier/ shrouding provided for

a) Main Busbar :
b) Vertical Busbar :

3.9 Bus Connections

a) Silver plated :

b) Provided with anti-oxide grease :

c) Bimetallic connectors between dissimilar metals :

3.10 Minimum clearance of bare busbar and connection

a) Phase to phase mm :
b) Phase to ground mm :

3.11 Busbar support spacing mm :

3.12 Busbars colour coded Yes/No :

3.13 Bus Support Insulator

a) Make :

b) Type :

c) Reference Standard :

d) Voltage Class KV :

e) Minimum Creepage Distance mm:

f) Cantilever Strength Kg/cm^2 :

g) Net Weight Kg :

4.0 CONTROL MODULE

4.1 Control Modules :

a) Fully drawout for MCCs Yes/No:

b) Fixed type for Dbs Yes/No:

4.2 Power/Control disconnects silver plated for good contacts :

4.3 Drawout Modules of same type & rating are physically & electrically interchangeable :

4.4 Module sizes (L x D x H)

a) Incomer with

1250 A ACB mm :

800 A ACB mm :

630 A ACB mm :

b) Outgoing feeder with

400 A MCCB mm :

250 A MCCB mm :

160 A MCCB mm :

100 A MCCB mm :

63 A MCCB mm :

32 A MCCB mm :

5.0 CIRCUIT BREAKER

5.1	Make		:
5.2	Type		:
5.3	Reference Standard		:
5.4	Rated Voltage	KV	:
5.5	Rated Frequency	Hz	:
5.6	No. of Poles	No.	:
5.7	Rated Currents		
	a) Continuous (at site condition, 50°C ambient & within cubicle)	Amp	:
	b) Short-time Current for 1 second	KA rms	:
5.8	Max. temp. rise over 50^{o}C ambient^{o}C		:
5.9	Rated Operating Duty		:
5.10	Interrupting Capacity at rated voltage and operating duty		
	a) Symmetrical	KA rms	:
	b) Asymmetrical	KA rms	:
5.11	Rated Making Current	KA.peak	:
5.12	Insulation Level		
	a) 1 min 50 Hz withstand	KV rms	:
5.13	Operating Mechanism		
	a) Type		:
	b) Trip free or fixed trip		:
5.14	Circuit Breaker provided with		
	a) Drawout feature having SERVICE,		

TEST & ISOLATED positions :

b) Mechanical safety interlock :

c) Automatic safety shutter :

d) Manual operating handle :

e) Emergency manual trip :

f) Mechanical ON-OFF indications :

g) Overload release :

h) Shortcircuit release :

i) Auxiliary switch with 6 NO + 6 NC contacts :

5.15 Range of release

a) Overload :

b) Short Circuit :

6.0 SWITCHES

6.1 Make :

6.2 Type :

6.3 Reference Standard :

6.4 Switch furnished with :

a) Operating handle :

b) Door interlock :

c) Provision for padlocking in ON & OFF Positions. :

6.5 All feeders provided with bolted disconnect link :

6.6 Current Ratings at 50`C ambient & within cubicle

(a) :

(b) :

(c) :

(d) :

(e) :

(f) :

6.7 Breaking current @ 415V A.C. or 110V D.C.

(a) :

(b) :

(c) :

(d) :

(e) :

(f) :

7.0 FUSE

7.1 Make :

7.2 Type :

7.3 Reference standard :

7.4 Rupturing capacity KA rms :

7.5 Continuous current at 50^{o}C ambient & within cubicle Amps :

7.6 Cut off currents KA peak :

7.7 Fuse characteristics furnished for various fuse ratings :

8.0 CONTACTORS

8.1 Make :

8.2	Type			:
8.3	Reference standard			:
8.4	Duty class			:
8.5	Utilization category			:
8.6	Operating Coil Voltage			
	a)	Rated		:
	b)	Pick-up		:
	c)	Drop-out		:
8.7	Continuous Current rating @ 50^{o}C & within cubicle		A	:
8.8	Power Consumption			
	a)	During closing	VA	:
	b)	After closing	VA	:
8.9	Auxiliary Contacts furnished per Contactor :			
	a)	Normally open (NO)		:
	b)	Normally closed (NC)		:
8.10	Aux. Contact rating			
	a)	Make & Continuous	Amp	:
	b)	Break (Inductive) at		:
		240V A.C.	Amp	:
		220V D.C.	Amp	:
8.11	Time range of delayed dropout contactors furnished		Sec.	:
8.12	Thermal Overload Relay & Single Phase Preventor			

a) Temperature compensated ? :

b) Hand Reset ? :

c) No. & type of contacts :

d) Thermal overload characteristics furnished :

e) Tolerance on current injection

1 - pole :

2 - pole :

3 - pole :

9.0 PUSHBUTTON & LAMPS

9.1 Push Button

a) Make :
b) Type :
c) Cat.No. :
d) Contact Rating :

Make & Continuous Amp :

Break (inductive)

240V A.C. Amp :
110V D.C. Amp :

9.2 Lamps

a) Make :
b) Type :
c) Cat. No. :
d) Watts/Voltage :
e) Series resistor Ohm :
f) Lamp & lens replaceable from front

10.0 METER

10.1 Make :

10.2 Type :

10.3 Reference Standard :

10.4 Size :

10.5 Scale :

10.6 Accuracy class :

11.0 CURRENT TRANSFORMER

11.1 Make :

11.2 Type :

11.3 Reference Standard :

11.4 C.T. Ratings

a) Current ratio :
b) Rated burden :

c) Accuracy class :

Protection
Metering

12.0 SECONDARY WIRING

12.1 Type of Insulation :

12.2 Voltage Grade :

12.3 Conductor material :

12.4 Conductor size (minimum)

a) Potential Circuit mm^2 :

b) Current & Control Circuit mm^2 :

12.5 Wires identified at both ends with ferrules :

13.0 TERMINAL BLOCK

13.1 Make :

13.2 Type :

13.3 Cat. No. :

13.4 Voltage Grade :

13.5 20% spare terminals furnished :

14.0 BUS DUCT CONNECTION

14.1 Bus duct connection included as per drawing/billl of materials :

14.2 Average length assumed for bus duct:

15.0 CABLE TERMINATION

15.1 Cable entry provision from top & bottom ? :

15.2 Cable termination & connection arrangement furnished as specified :

15.3 Power Cable Lugs

a) Type :

b) Materials :

15.4 Power Cable Glands

a) Make :

b) Type :

c) Materials :

d) With tapered washers :

15.5 Removeable Gland Plate

a) Material for multicore cable :

b) Material for I/C cable :

c) Thickness of the plate :

16.0 GROUND BUS

16.1 Ground bus furnished ? :

16.2 Material :

16.3 Size :

17.0 NAME PLATE

17.1 Material :

17.2 Thickness :

17.3 Size :

18.0 SPACE HEATER

18.1 Cubicle Heater

a) Thermostat controlled :

b) Wattage :

c) Voltage :

18.2 Provision made for motor heater supply :

18.3 Cubicle/Motor heater provided with individual switch fuse units :

19.0 TROPICAL PROTECTION

a. Any special treatment for tropical protection :

b. Screens are of corrosion resistant materials :

20.0 PAINTING

Finish of MCC/DB

a. Inside :

b. Outside :

21.0 TEST

22.1 Routine tests on DB to be performed :

a.

b.

c.

d.

23.0 TYPICAL DRAWINGS/DATA FURNISHED

23.1 General arrangement :

23.2 Foundation plan :

23.3 Control scheme :

23.4 Bill of Materials :

24.0 OVERALL DIMENSIONS & WEIGHTS

	Name of DB	Dimensions (L x D x H) mm	Approximate Weights KG
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

(Add more sheets, if required)

TECHNICAL DATA SHEET

FOR

DATA ACQUISITION SYSTEM

1.00.00 RTU

01.	Data transmission rate	:
02.	Communication ports	:
03.	Communication protocol with Master station	:
04.	Communication protocol with MFM	:
05.	Analog/Status data transfer to Master station	:
06	Analog Input Channel	
07	Digital Input	
08	Digital Output	
09	Real Time Clock stability	
10	Temperature	

2.00.00 GSM/GPRS MODEM

01.	Make & Type	:
02.	Frequency Band.	:
03.	Data & SMS	:

04. Power Output :

900 MHz

1800 MHz

05. Operating Temp :

06 Humidity

07 Remote Control

08 Baud Rate

09 Antenna

10 SIM Card Holder

VA Burden
Total burden during data

Communication

Total burden during stand by

Service Indicating

3.00.00 CABLES

01. Cables of Indoor area :

a) Conductor :

b) Insulation :

c) Inner & Outer sheath :

d) Armour :

03. Cables for wiring at Subscriber's end : .

4.00.00 BATTERY & CHARGER

01. Make & Type :

02. AH capacity :

03. DC voltage :

04. Charger :

05. Rating :

TECHNICAL QUERIES FOR DATA ACQUSITION SYSTEM

For the clarity with regard to the system offered by the Bidder, the following questionnaire is required to be answered point wise as per the Technical Specifications :

01. Is the system offered fully digital and uses the technology as specified in the tender.

a) YES ☐ b) NO ☐

02. Is the system offered the state-of-art and belongs to prevailing series of system introduced by the Supplier across the globe.

a) YES ☐ b) NO ☐

03. Is the system offered fully compliant with tender requirements and specification ?

a) YES ☐ b) NO ☐

04. Is the system offered fully compliant to DAS Software specified ?

a) YES ☐ b) NO ☐

05. Is the system offered based on the Open System Architecture ?

a) YES ☐ b) NO ☐

06. Is the system up-gradation involve any processor up-gradation or any of the other common control cards and cabinet ?

a) YES ☐ b) NO ☐

07. Number of installation of same series in INDIA

i) 0 - 10
ii) 10 - 25
iii) 25 – 50
iv) 50 – 100
v) Above 100

08. Is the system offered supports system management to provide modular options for effective and easy system management ?

a) YES ☐ b) NO ☐

09. Is the system offered automatic check though series of tests the normal operation ?

a) YES ☐ b) NO ☐

10. Is the system offered has the provision of instant fault information by raising external alarm ?

a) YES ☐ b) NO ☐

11. Is the system offered support remote maintenance facility for trouble indication and recording and Automatic Line Testing ?

a) YES ☐ b) NO ☐

12. Is the system warranty for 36 months from the date of commissioning ?

a) YES ☐ b) NO ☐

ANNEXURE-III

MANDATORY SPARES

ANNEXURE -III

MANDATORY SPARE (ELECTRICAL)

Bidder shall quote for the mandatory spares indicated below. In case, the bidder does not consider any item and add any item, the Bidder shall indicate it.

Sl. No.	Description	Quantity (Nos.)
1.	DISTRIBUTION TRANSFORMER	
	a) H.T. Bushing with metal parts.	2 nos.
	b) L.T. Bushing with metal parts.	2 nos.
	c) Oil Level gauge for main tank conservator.	2 nos.
	d) Oil Temperature Indicator (OTI).	2 nos.
	e) Winding Temperature Indicator (WTI).	2 nos.
	f) Buchholz Relay.	2 nos.
	g) Silica gel Breather for main tank.	2 nos.
	h) Oil Inlet/Outlet Valve	2 nos.
	i) Water Inlet/Outlet Valve	2 nos.
	j) Oil Sampling Valve	2 nos.
	k) Gas Release device	2 nos.
2.	33KV OUTDOOR VCB	
	a) Vacuum Bottle, 36kV,1250 Amp	2 Nos.
	b) Spring Charging Mechanism	1 No.
	c) Closing Coil 110V D.C	1 No.
	d) Tripping Coil 110V D.C	1 No.
	e) Breaker Control switch with pistol grip handle	2 Nos.
	f) Local/Remote selector switch	2 Nos.
	g) Control fuse 2A/6A/20A	6 Nos. each
	h) H.T. Bushing with metal parts.	1 No.
	i) Indicating lamps of each colour	2 sets
3.	33kV ISOLATOR	
	a) Aux. switch with 6 NO + 6 NC contacts	3 nos.
	b) Main contact assembly	2 nos.
	c) Interlocking coil 110V D.C	1 no.
	d) H.T. Bushing with metal parts	3 nos.
	e) Operating mechanism assembly	2 nos.

Sl. No.	Description	Quantity (Nos.)
4.	33kV INSULATORS	
	a) Post insulator, 2kN	2 nos.
	b) Pin insulator	6 nos.
	c) 11kV Disc insulator, 70kN	15 nos.
5.	36kV LA	
	a) 36 kV LA	3 nos.
	b) Surge Counter	3 nos.
6.	33kV CONTROL & RELAY PANEL	
	a) Protective relay each type	1 no.
	b) Auxiliary relay each type	1 no.
	c) Ammeter each type	1 no.
	d) Voltmeter (0-36kV)	1 no.
	e) Ammeter selector switch	1 no.
	f) Voltmeter selector switch	1 no.
	g) HRC Control Fuse 2/6/20 Amp. rating	6 Nos. each
	h) Indication lamps suitable for 240 Volt AC	12 Nos.
	i) Local/Remote selector switch	1 No.
	j) Push Button Station	2 Nos.
	k) Miniature Circuit Breakers 2/16 Amp. rating	1 No. each
	l) Breaker control switch, TNC	1 No.
	m) Auxiliary contactor 2NO+2NC, 110 V DC coil	1 No.
	n) Semaphore indicators	2 nos.
	o) Digital multifunction meter	1 no.
7.	33kV LOAD BREAK SWITCH PANEL	
	a) HT Fuse each type	3 nos. each
	b) Ammeter each type	1 no. each
	c) Voltmeter each type	1 no. each
	d) Miniature Circuit Breakers 2/16 Amp. rating	1 No. each
	e) Digital multifunction meter	1 no.
8.	BATTERY CHARGER AND DCDB	
	a) HRC fuse links of each rating	2 nos.
	b) MCB of each rating	1 no.

Sl. No.	Description	Quantity (Nos.)
	c) Indicating lamps of each colour and size	1 no.
	d) Diode/Thyristor of each rating	1 no.
	e) Pulse firing PCB	1 no.
	f) Indicating type fuse for thyristor	6 nos.
9.	415V DB	
	a) Closing coil for each rating of ACB	1 each
	b) Tripping coil for each rating of ACB	1 each
	c) Microprocessor based built in release each type with ACBs	2 nos. each
	d) Control fuse of each rating	2 nos.
	e) Indicating lamps of each colour/size	12 nos.
	f) Thermo magnetic release each type with MCCBs	2 nos. each
	g) Bus support insulators	6 nos. each type
10.	LIGHTING SYSTEM	
	a) Normal lighting fixtures each type	6 nos.
	b) Emergency lighting fixtures each type	2 nos.
	c) MCB of each rating	4 nos.
	d) Starters for 36W FTL	20 nos.
	e) Ballast for 36W FTL	10 nos.
	f) 240V, 20A, 3 pin receptacles	5 nos.
	g) 5A kit kat switches	30 nos.
	h) 5A, 240V socket	10 nos.

ANNEXURE -III

MANDATORY SPARE (DAS)

Bidder shall quote for the mandatory spares indicated below. In case, the bidder does not consider any item and add any item, the Bidder shall indicate it.

SL. NO.	ITEM	QUANTITY (NOS.)
01.	DAS Server	1
02.	Metering Server	1
03.	RTU with all accessories	1
04.	RTU DI Module	1
05.	RTU Communication Module	1
06.	RTU AI Module	1
07.	RTU Power Supply Module	1
08.	GSM/GPRS Modem with all accessories	1
09.	Ethernet Switch	1
10.	Any other item, deemed necessary to be included by the Contractor	

ANNEXURE-IV

MAINTENANCE SPARES

The Bidder shall quote Maintenance spare parts for operation and maintenance for a period of five (5) years.

SL. NO.	ITEM	QUANTITY (NOS.)

ANNEXURE-V

COMMISSIONING SPARES

The Bidder shall quote Commissioning spare parts.

SL. NO.	DESCRIPTION	QUANTITY (NOS.)
01.		
02.		
03.		
04.		
05.		
06.		
07.		
08.		
09.		
10.		

ANNEXURE-VI

LIST OF TOOLS AND TACKLES

The Bidder shall tabulate below the item-wise list of tools furnished by him for the operation and maintenance of the equipment supplied under this Specification and whose total cost has been indicated separately in **PRICE TABULATION SHEET**.

SL NO.	DESCRIPTION	QUANTITY (NOS.)
01.		
02.		
03.		
04.		
05.		
06.		
07.		
08.		
09.		
10.		
11.		
12.		

ANNEXURE-VII

DRAWING SUBMISSION SCHEDULE

SL. NO.	DRAWING	SUBMISSION OF DRAWINGS FOR APPROVAL IN WEEKS AFTER ISSUE OF "LETTER OF INTENT"
01.		
02.		
03.		
04.		
05.		
06.		
07.		
08.		
09.		
10.		

The Bidder shall also furnish the time in weeks for resubmission of reviewed / commented drawings from Owner from the date of receipt.

The Bidder shall also submit completion schedule in the form of Bar Chart showing different activities and corresponding time for supply and installation of complete equipment

ANNEXURE-VIII

DEVIATION SHEET : PART-A

If the proposal has got any deviation from the Technical Specification, the Bidder shall tabulate these deviations clause by clause in this Schedule. Add more sheets, if required.

CLAUSE NO.	D E V I A T I O N S

ANNEXURE-IX

DEVIATION SHEET : PART-B

If the proposal has got any deviation from the tendering conditions and the General Conditions of Contract, the Bidder shall tabulate these deviations clause by clause in this Schedule. Add more sheets, if required.

CLAUSE NO.	D E V I A T I O N S

33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS.

SECTION-IX : PROPOSAL EXHIBIT SHEETS

PART-II : PRICE

PRICE PART

CONTENTS

ANNEXURE-I

PRICE TABULATION SHEET

SL. NO.	DESCRIPTION	PRICE IN INDIAN RUPEES (INR)
1.00.00	Tenderer's lumpsum proposal price for Design, Engineering, Planning, Procurement, manufacture, fabrication, supply, painting testing at site & works, delivery at site, receiving, unloading, storage, insurance, handling, erection, final check-up, final testing, trial run, commissioning and handing over including Performance Testing including all taxes and duties for all equipment and services as per scope outlined in the specification **including mandatory spares, maintenance spares, personal protective equipments, special tools & tackles, all accessories & auxiliary equipments and erection & commissioning spares including consumables.**	

SL. NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE (BOTH IN WORDS & FIGURES)	TOTAL PRICE (BOTH IN WORDS & FIGURES)
A.	Design, Engineering, Planning, Procurement, manufacture, fabrication, supply, testing at works, packing, forwarding, freight, freight insurance, delivery at site including all taxes and duties for all plant, equipment and services as per scope outlined in the specification	Lot.	Lump sum		
B.	Mandatory Spares	One (1) Lot	Lump sum		
C.	Erection and Commissioning spares including consumables	One (1) Lot	Lump sum		
D.	Tools and Tackle	One (1) Lot	Lump sum		
E.	Freight charges inclusive of insurance		%		
F.	Maintenance Spares	One (1) Lot	Lump sum		
2.00.00	Receiving, unloading, storage, site handling, erection, final check-up, testing at site, trial run, commissioning, handing over including Performance Testing				
A.	Receiving, unloading, site handling, and erection charges	One (1) Lot	Lump sum		
B.	Testing charges	One (1) Lot	Lump sum		
C.	Commissioning charges	One (1) Lot	Lump sum		
D.	Annual Comprehensive Maintenance charge		Lump sum		

Note :

1. BOQ provided is indicative and for tender purpose only, based on typical system conceived for the project. Bidder shall quantify the actual qty, based on the line of products offered taking into cognizance all accessories that may be required for completeness and successful execution of the job as per the tender requirement.

2. This contract shall be an item rate contract. The Contractor shall be paid for actual quantity of work done, as measured at site including any deviation plus or minus. The rate of any non-schedule items of work shall be derived as per conditions of this contract.

SCHEDULE OF WORKS

ELECTRICAL

PROJECT : 33KV RING MAIN INCLUDING 33/0.433KV SUBSTATIONS AT NIT CAMPUS, ROURKELA

ANNEXURE-I

SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY													UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY	(RS.) (In figures)	(RS.) (In words)	(RS.) (In figures)	(RS.) (In words)	(RS.) (In figures)	(RS.) (In figures)	
A	**BOQ OF MAJOR EQUIPMENT**																				
1	33KV, 630A, 25KA/3 SEC OUTDOOR VCB	NOS.	1	3										4							
2	33KV, 400A, 25KA/1 SEC CENTER ROTATING DOUBLE BREAK ISOLATOR WITH EARTH SWITCH	SETS		3	1	1	1	1	1		1		1	10							
3	33KV, 400A, 25KA/1 SEC CENTER ROTATING DOUBLE BREAK ISOLATOR WITHOUT EARTH SWITCH	SETS	2	4	2	2	3	3	4	1	6			27							
4	33KV,10KA LA, 1 PHASE	NOS.		9	3	3	3	3	3	3	3			30							
5	33KV, 2 SECONDARY WINDING LPT, 1 PHASE, WDG. 1 WITH 50VA, CL-0.5 & WDG. 2 WITH 50VA, CL-0.5	NOS.		3										3							
6	33KV, 3 CORE CT WITH 1 CORE OF 200/1A WITH CL-5P10, 1 CORE WITH 200/1A CL-0.5, 10VA & 1 CORE WITH 200/1A CL-0.5, 10VA, 1 PHASE FOR I/C BAY	NOS.		3										3							
7	33KV, 2 CORE CT WITH 1 CORE OF 200/1A WITH CL-5P10 & 1 CORE WITH 200/1A CL-0.5, 10VA, 1 PHASE FOR O/G BAY	NOS.	3	6										9							
8	33KV POST INSULATOR	NOS.	6	18										24							
9	33KV SINGLE TENSION STRING FOR ACSR DOG	SETS		6										6							
10	33KV SINGLE TENSION STRING FOR ACSR RABBIT	SETS		6	12	12	24	27	36		48			165							
11	33KV PIN INSULATOR	NOS.			9	6	12	9	15	3	18			72							
12	11M LONG LIGHTNING CUM LIGHTING POLE	NOS.		2										2							
13	33KV, 20A HORN GAP FUSE	SETS		1	1	1	2		1	1				7							

(*) Inclusive of taxes and duties.

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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY												UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
14	33KV, 32A HORN GAP FUSE	SETS						2	2		4			8							
15	33KV INDOOR SWITCHBOARD WITH LOAD BREAK SWITCH & FUSE AS PER SLD	SETS										1		1							
16	33/0.433KV, 100KVA 3PH, STATION SERVICE TRANSFORMER	NOS.		1										1							
17	33/0.433KV, 500KVA 3PH, DISTRIBUTION TRANSFORMER	NOS.			1	1	2		1	1				6							
18	33/0.433KV, 750KVA 3PH, DISTRIBUTION TRANSFORMER	NOS.						2	2		4			8							
19	**33KV 4 POLE STRUCTURE AS PER LAYOUT**	SETS			**1**	**1**								**2**							
20	**33KV 6 POLE STRUCTURE AS PER LAYOUT**	SETS					**1**	**1**						**2**							
21	**33KV 8 POLE STRUCTURE AS PER LAYOUT**	SETS							**1**					**1**							
22	**33KV 10 POLE STRUCTURE AS PER LAYOUT**	SETS									**1**			**1**							
23	33KV 2 POLE STRUCTURE AS PER LAYOUT	SETS								1				1							
24	33KV (UE) CABLE TERMINATION KIT (OUTDOOR TYPE) FOR 3C-150 SQ. MM. AL XLPE CABLE	SETS	3	3	2		2	1	2		2		3	18							
25	33KV (UE) CABLE TERMINATION KIT (INOOR TYPE) FOR 3C-150 SQ. MM. AL XLPE CABLE	SETS										6		6							
26	ACSR DOG CONDUCTOR FOR 33KV BUS-BARS, BAYS & JUMPERS/DROPPERS/TERMINATIONS.	METER	**40**	220										260							
27	ACSR RABBIT CONDUCTOR FOR CONNECTION OF 33/.433KV 100KVA STN. SER. TRAFO & JUMPERS/DROPPERS/TERMINATIONS.	METER		20										20							

(*) Inclusive of taxes and duties.
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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY												UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
28	STRINGING, SAGGING & TENSIONING, JUMPER CONNECTION OF 33KV SINGLE CIRCUIT 3 PHASE OHL ON 11M LONG STEEL POLE STRUCTURE INCLUDING SUPPLY OF ACSR RABBIT	METER											2760	2760							
29	33KV CRP FOR I/C BAY	NOS.		1										1							
30	33KV CRP FOR O/G BAY	NOS.	1	2										3							CRP for WESCO shall be outdoor kiosk type.
31	415V DB AS PER SLD	NOS.				1	1	1	1	1	2	1		8	Provide unit rate for each type of DB in a separate sheet.						Provide unit rate for each type of feeders in a separate sheet for future adjustments
32	415V BAY MARSHALLING KIOSK FOR 33KV BAYS	NOS.		2										2							All interlock among isolators and CB shall be in BMK.
33	415V ACDB WITH 200A TPN MCCB I/C AND OUTGOING FEEDERS CONSISTING OF 2 NOS. 63A TPN MCB, 2 NOS. 32A TPN MCB, 6 NOS. 16A TPN MCB AND 6 NOS. 10A SPN MCB FEEDERS	NOS.		1										1							
34	110V, 75AH SMF VRLA BATTERY BANK	SET		1										1							
35	110V DC BATTERY CHARGER WITH INTEGRATED DCDB	NOS.		1										1							
36	415V WALL MOUNTED Aux. DB COMPRISING OF 1 NO. 63A TP MCB INCOMING AND 12 NOS. 10A SP MCB OUTGOING FEEDERS, INDICATION LAMPS ETC. FOR MISC. Aux. SUPPLIES SUCH AS TRAFO MARSHALLING BOX. ETC.	NOS.		1	1	1	1	1	1	1	1	1		9							
37	11M HIGH SINGLE POLE STRUCTURE WITH BEAM **(UC152)**, PAINTED WITH TWO COATS OF PRIMER AND TWO COATS OF APPROVED SHADE, FOR LINE DEVIATION UPTO 0-5 DEG COMPLETE WITH ALL ACCESSORIES LIKE V-CROSS ARM, POLE TOP BRACKET, PIN INSULATOR, NUTS, BOLTS & FASTNERS, EARTHING MATERIALS, AND FOUNDATION MATERIALS INCLUDING FABRICATION AS PER GA DRAWING SUBJECT TO APPROVAL OF FINAL ROUTE SURVEY & PROFILE DRG.	NOS.											11	11							

(*) Inclusive of taxes and duties.
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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY												UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
38	11M HIGH SINGLE POLE STRUCTURE WITH BEAM **(UC152)**, PAINTED WITH TWO COATS OF PRIMER AND TWO COATS OF APPROVED SHADE, FOR LINE DEVIATION ABOVE 5-90 DEG COMPLETE WITH ALL ACCESSORIES LIKE V-CROSS ARM, POLE TOP BRACKET, PIN INSULATOR, TENSION INSULATOR, REQUIRED NO. OF STAY SET, NUTS, BOLTS & FASTNERS, EARTHING MATERIALS AND FOUNDATION MATERIALS INCLUDING FABRICATION AS PER GA DRAWING SUBJECT TO APPROVAL OF FINAL ROUTE SURVEY & PROFILE DRG.	NOS.											4	4							
39	11M HIGH SINGLE POLE STRUCTURE WITH BEAM **(UC152)**, PAINTED WITH TWO COATS OF PRIMER AND TWO COATS OF APPROVED SHADE, WITH EXTENSION OF POLE HEIGHT VARYING 750-1500MM FOR MAINTAINING PROPER SAG TO MEET UP GROUND CLEARANCE BY ISMC 100X50X6 WITH ALL ACCESSORIES LIKE V-CROSS ARM, POLE TOP BRACKET, PIN INSULATOR, TENSION INSULATOR, REQUIRED NO. OF STAY WIRE ETC. AS PER GA DRAWING SUBJECT TO APPROVAL OF FINE ROUTE SURVEY & PROFILE DRG., ALL FITTINGS, FABRICATION, EARTHING MATERIALS AND FOUNDATION MATERIALS LIKE CONCRETE, SAND, STONE ETC.	NOS.											17	17							
40	11M HIGH DOUBLE POLE STRUCTURE WITH BEAM **(UC152)**, PAINTED WITH ONE COAT OF PRIMER AND TWO COATS OF APPROVED SHADE, FOR TRANSITION POINTS FROM OHL TO UG CABLE COMPLETE WITH ALL ACCESSORIES LIKE BRACKET, PIN INSULATOR, TENSION INSULATOR, REQUIRED NO. OF STAY SETS, NUTS, BOLTS & FASTNERS, EARTHING MATERIALS AND FOUNDATION MATERIALS INCLUDING FABRICATION AS PER GA DRAWING SUBJECT TO APPROVAL OF FINE ROUTE SURVEY & PROFILE DRG.	NOS.											2	2							
41	11M HIGH DOUBLE POLE STRUCTURE WITH BEAM **(UC152)**, PAINTED WITH TWO COATS OF PRIMER AND TWO COATS OF APPROVED SHADE, FOR OHL TENSION POINTS COMPLETE WITH ALL ACCESSORIES LIKE VERTICAL BRACKET, PIN INSULATOR, TENSION INSULATOR, REQUIRED NO. OF STAY SETS, NUTS, BOLTS & FASTNERS, EARTHING MATERIALS AND FOUNDATION MATERIALS INCLUDING FABRICATION AS PER GA DRAWING SUBJECT TO APPROVAL OF FINAL ROUTE SURVEY & PROFILE DRG.	NOS.											1	1							

(*) Inclusive of taxes and duties.
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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY												UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
42	11M HIGH FOUR POLE STRUCTURE WITH BEAM **(UC152)**, PAINTED WITH TWO COATS OF PRIMER AND TWO COATS OF APPROVED SHADE, FOR LINE TAPPING COMPLETE WITH ALL ACCESSORIES LIKE VERTICAL BRACKET, PIN INSULATOR, TENSION INSULATOR NUTS, BOLTS & FASTNERS, EARTHING MATERIALS AND FOUNDATION MATERIALS INCLUDING FABRICATION AS PER GA DRAWING SUBJECT TO APPROVAL OF FINAL ROUTE SURVEY & PROFILE DRG..	NOS.										2	2							
B	**BOQ OF 33KV CLAMPS & CONNECTORS**																			
1	**TERMINAL CONNECTOR FOR BREAKER PAD TO RECEIVE HORIZONTALLY**																			
	a) ACSR DOG	NOS.		18										18						
	b) 1.5" AL TUBE	NOS.	6											6						
2	**TERMINAL CONNECTOR FOR ISOLATOR TO RECEIVE HORIZONTALLY**																			
	a) ACSR RABBIT	NOS.		6	18	18	24	24	30	6	42			168						
	b) ACSR DOG	NOS.	6	36										42						
	c) 1.5" AL TUBE	NOS.	6											6						
3	**TERMINAL CONENCTOR FOR CT STUD/PAD TO RECEIVE HORIZONTALLY**																			
	a) ACSR DOG	NOS.		18										18						
	b) 1.5" AL TUBE	NOS.	6											6						
4	**TERMINAL CONNECTOR FOR PT STUD/PAD TO RECEIVE HORIZONTALLY**																			
	a) ACSR DOG	NOS.		3										3						
5	**TERMINAL CONNECTOR FOR LA TO RECEIVE HORIZONTALLY**																			
	a) ACSR RABBIT	NOS.		3	3	3	3	3	3	3	3			24						
	b) ACSR DOG	NOS.		9										9						
6	**TERMINAL CONNECTOR FOR PI TO RECEIVE VERTICALLY/HORIZONTALLY**																			

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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY												UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
	a) ACSR DOG	NOS.		18										18							
	b) 1.5" AL TUBE	NOS.	6											6							
7	**TERMINAL CONNECTOR FOR 100KVA STATION SERVICE TRANSFORMER STUD/PAD TO RECEIVE VERTICALLY**																				
	a) ACSR RABBIT	NOS.		3										3							
8	**TERMINAL CONNECTOR FOR 500/750KVA DISTRIBUTION TRANSFORMER STUD/PAD TO RECEIVE VERTICALLY**																				
	a) ACSR RABBIT	NOS.			3	3	6	6	9	3	12			42							
9	**T- CONNECTOR FOR**																				
	a) ACSR DOG TO ACSR DOG	NOS.		9										9							
	b) ACSR RABBIT TO ACSR RABBIT	NOS.		3	9	9	15	15	21		27			99							
10	**PG CLAMP FOR**																				
	a) ACSR DOG TO ACSR RABBIT	NOS.		3										3							
11	**TENSION STRING**																				
	a)SINGLE TENSION STRING FOR ACSR DOG CONDUCTOR (WITH TENSION CLAMP & TURNBUCKLE)	SETS		3										3							
	b)SINGLE TENSION STRING FOR ACSR DOG CONDUCTOR (WITH TENSION CLAMP & WITHOUT TURNBUCKLE)	SETS		3										3							
	c)SINGLE TENSION STRING FOR ACSR RABBIT CONDUCTOR (WITH TENSION CLAMP)	SETS		6	12	18	24	27	36	3	48			174							
12	TERMINAL CONNECTOR FOR 33KV CABLE TERMINATION KIT TO RECEIVE ACSR DOG VERTICALLY	NOS.		9										9							
13	TERMINAL CONNECTOR FOR 33KV CABLE TERMINATION KIT TO RECEIVE ACSR RABBIT VERTICALLY	NOS.			6	9	6	3	6		6			36							
14	TERMINAL CONNECTOR FOR 33KV CABLE TERMINATION KIT TO RECEIVE 1.5" AL TUBE HORIZONTALLY	NOS.	9											9							
C	**BOQ OF CABLE TRAY & RACK**																				

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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY												UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
1	450MM WIDE G.S. PRE-FABRICATED LADDER TYPE CABLE TRAY	METER		140	25	30	90			40		150		475							
2	600MM WIDE G.S. PRE-FABRICATED LADDER TYPE CABLE TRAY	METER						75	85		90	50		300							
3	300MM WIDE PERFORATED CABLE TRAY	METER	30	45	25	15	45	35	40	20	40	30		325							
4	ISA 50x50x6 GS CABLE TRAY SUPPORTING RACK	Kg.	70	350	60	110	280	260	310	150	360	400		2350							
D	**BOQ OF EARTHING (FOR SUBSTATION)**																				
1	50X8 mm GS FLAT EARTH GRID CONDUCTOR	METER	100	1500	220	220	340	340	610	130	810	50		4320							
2	50x6 G.S. FLAT ALONG CABLE TRENCH.	METER		150	10	70	105	105	100	75	140	150		905							
3	32mm DIA, 3M LONG M.S. ROD ELECTRODE IN UNTREATED PIT	NOS.	2	9	5	7	8	8	12	3	14			68							
4	40mm DIA, 3M LONG PERFORATED G.I. PIPE ELECTRODE IN TREATED PIT FOR LA,LPT, TR. NEUTRAL, TOWER WITH PEAK AND GRID CORNER AS APPLICABLE.	NOS.	4	18	5	5	7	7	8	5	10	3		72							
5	EQUIPMENT EARTHING CONDUCTOR BY 35X6mm. G.S. STRIP FOR CRP,ACDB,BATTERY CHARGER,SLDB, OLDB ETC. AS APPLICABLE	METER		60	10	30	30	40	40	30	60	30		330							
E	**B.O.Q. OF ELECTRONIC EARTHING FOR CONTROL BUILDING & DB ROOM**																				
1	40mm DIA, 3M LONG PERFORATED G.I. PIPE ELECTRODE IN TREATED EARTH PIT.	NOS.		2	2	2	2	2	2	2	2	2		18							
2	1C-35 SQMM XLPE CU FRLS CABLE FROM EARTH GRID CONDUCTOR TO EARTH BUS.	METER		25	25	25	25	25	25	25	25	25		225							
3	400X100X10 THK GS ELECTRONIC EARTH BUS WITH MOUNTING INSULATORS	NOS.		1	1	1	1	1	1	1	1	1		9							
F	**B.O.Q OF LIGHTNING PROTECTION FOR SWYD & CONTROL BUILDING / DB ROOM**																				

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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

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		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
1	25X6 mm GS FLAT HORIZONTAL AIR TERMINATION	METER		35	25	25	25	35	30	25	50			250							
2	32X6 mm GS FLAT DOWN CONDUCTOR	METER		75	40	50	70	75	90	30	115			545							
3	BOLTED TEST LINK CONSISTING OF 32X6 MM G.S. FLAT & HARDWARE	NOS.		1	1	1	1	1	1	1	2			9							
4	32mm DIA, 3M LONG PERFORATED MS ROD ELECTRODE IN TREATED EARTH PIT	NOS.		1	1	1	1	2	1	1	2			10							
6	VERTICAL SPIKE, 50? G.I. PIPE , 2M LONG	NOS.		-	4	4	6	6	8	2	10			40							
7	VERTICAL SPIKE, 50? G.I. PIPE , 1.5M LONG	NOS.		6										6							
G	**BOQ OF HV & LV POWER CABLE**																				
1	33kV(UE), 3C-150 sqmm AL XLPE	METER	250										3580	3830							
2	1.1kV, 3.5C-240 sqmm AL XLPE	METER		30		45	190	255	145	51	510	100		1326							
3	1.1kV, 4C-16 sqmm AL XLPE	METER		25		**20**	**20**	**20**	**20**	**20**	**40**	**20**		**185**							
4	1.1kV, 4C-10 sqmm AL XLPE	METER				**20**	**20**	**20**	**20**	**20**	**20**	**20**		**140**							
5	1.1kV, 2C-2.5 sqmm CU. XLPE	METER	**200**	20	0	25	65	60	25	25	120	30		570							
H	**BOQ OF CONTROL CABLE**																				
1	1.1KV, 3C-1.5 sqmm CU PVC	METER	**75**	**50**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**		**325**							
2	1.1KV, 3C-2.5 sqmm CU PVC	METER		310	0	0	0	0	0	0	0	0		310							

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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

Sl.No.	ITEM DESCRIPTION	QUANTITY												UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF SUPPLY & DELIVERY AT SITE (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	UNIT RATE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	TOTAL PRICE OF SUPPLY & DELIVERY AT SITE (*)	TOTAL PRICE OF RECEIVING, SITE STORAGE INSURANCE, SITE TRANSPORTA-TION, ERECTION, TESTING & COMMISSIONING (*)	REMARKS
		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
3	1.1KV, 5C-1.5 sqmm CU PVC	METER		630	70	65	120	75	150	50	240	100		1500							
4	1.1KV, 5C-2.5 sqmm CU PVC	METER	20	380										400							
5	1.1KV, 7C-1.5 sqmm CU PVC	METER	100	150										250							
6	1.1KV, 10C-1.5 sqmm CU PVC	METER	20	285	25	20	55	60	120	25	145	30		785							
I	**BOQ OF LIGHTING MATERIAL**																				
1	**Lighting fixtures**																				
1.1	Pendant mounted Indoor industrial rail type luminaire with reflector and suitable for 2x36W FTL (Bajaj type BJIE 236 or eqv.)	Nos.		7		4	5	6	6	4	10	20		62							Including supply of lamps
1.2	Pendant mounted indoor industrial vapour proof luminaire with 2 x 40W FTL (Bajaj type BJI 240VP or eqv.)	Nos.		1										1							-- do --
1.3	Pendant mounted Indoor industrial rail type luminaire suitable for 2x36W FTL (Bajaj type BJIR 236 or eqv.)	Nos.		2										2							-- do --
1.4	Road lighting luminaire with 2X36W CFL lamp (Bajaj type BJSLF 236 CFL or equivalent)	Nos.	3	12	4	7	9	9	10	5	14	6		76							-- do --
1.5	Post top lantern with 2X11W CFL (Bajaj type BJGLI 211 or equivalent)	Nos.		2	2	2	2	2	2	2	2			16							-- do --
1.6	DC emergency luminaire with 1X40W FTL with built in battery & charger (Prolite type PEL 140 M or eqv.)	Nos.		4		2	2	2	2	2	3	4		21							-- do --
2	**Socket outlets**																				
2.1	240V, 5A, 3 pin, industrial switch socket outlet	Nos.		4		1	1	1	1	1	2	3		14							
2.2	240V, 15A, 3 pin, industrial switch socket outlet	Nos.		4		2	2	2	2	2	3	3		20							
3	1400 mm sweep ceiling fan with electronic regulator	Nos.		1	1	1	1	2	1	1	2	2		12							

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ANNEXURE-I
SCHEDULE OF WORKS & PRICES (ELECTRICAL)

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		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
4	300mm sweep exhaust fan	Nos.		1										1							
5	415V, 32A, 10kA for 1 sec, 3 phase, 4 wire **Sub Lighting Distribution Board** (SLDB) with the following feeders:	Nos.		1		1	1	1	1	1	1	1	1	9							For indoor lighting, wall mounted
5.1	32A TPN MCCB incomer = 1 no.																				
5.2	10A SPN MCB outgoing = 12 nos.																				
6	415V, 32A, 10kA for 1 sec, 3 phase, 4 wire **Outdoor Lighting Distribution Board** (OLDB)(double door design) with auto/manual changeover contactor circuit by time switch/photocell and having following feeders:	Nos.		1	1	1	1	1	1	1	1	1		9							For indoor lighting, wall mounted
6.1	32A TPN MCCB incomer = 1 no.																				
6.2	6A SPN MCB outgoing = 6 nos.																				
7	**Switchboard (normal supply) :**																				
7.1	Type-A (3 switch, 1 socket)	Nos.		1										1							Piano type switch and 5A, 3 pin socket
7.2	Type-B (4 switch, 1 socket)	Nos.		2										2							Piano type switch and 5A, 3 pin socket
7.3	Type-C (4 switch, 1 electronic regulator,1 socket)	Nos.		1										1							Piano type switch and 5A, 3 pin socket
7.8	Type-D (5 switch, 1 electronic regulator,1 socket)	Nos.				1	1	1	1	1	2	2		9							Piano type switch and 5A, 3 pin socket
8	**Point wiring :**																				
8.1	Type-1 : Mains wiring starting from SLDB upto JB/switchboards by 2 nos. 1C-2.5 mm^2 CU PVC wire including supply and installation of 25mm GI conduit, conduit accessories, pull boxes, JBs, 16 SWG GI earthing wire, hardwares etc. (Average length = 10m)	NOS.		4	1	1	1	1	1	1	2	2		14							
8.2	Type-2 : Point wiring starting from SLDB/Switchboard upto lighting fixtures/ceiling fans/exhaust fans by 2 nos. 1C-2.5 mm^2 Cu PVC wire including supply and installation of 20 mm GI conduit, conduit accessories, pull boxes, JBs, 16 SWG GI earthing wire, down rods, supporting channels, hardwares etc.	NOS.		16	1	7	8	9	9	7	15	32		104							
8.3	Type-3 : Point wiring starting from OLDB upto JB for outdoor lighting fixtures by 1 no. 2C-2.5 mm^2 CU PVC cable laid partly in trench and partly buried (Average length = 15m)	NOS.	3	5	1	2	3	5	4	2	6			28							

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SCHEDULE OF WORKS & PRICES (ELECTRICAL)

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		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
8.4	Type-4 : Point wiring starting from Outdoor JB to outdoor lighting fixtures by 1 no. 2C-2.5 mm^2 CU PVC cable laid along structure (Average length = 15m)	NOS.	3	12	4	7	9	9	10	5	14			70							
J	**BOQ of control cable gland and lugs.**																				
1	Heavy duty tinned copper lug with insulated sleeves suitable for multi wire copper conductors with a cross section of 1.5/2.5 sqmm.	Nos.											1700	1700							
2	Nickle plated brass , double compression heavy duty cable gland suitable for CU PVC armoured control cable.	Nos.											250	250							
K	**BOQ of LV power cable gland and lugs.**																				
1	Heavy duty tinned copper lug with insulated sleeves suitable for XLPE single/stranded wire aluminium conductors of following sizes:																				
1.1	240 mmsq.	Nos.											420	420							
1.2	16 mmsq.	Nos.											90	90							
1.3	10 mmsq.	Nos.											130	130							
1.4	4 mmsq.	Nos.											200	200							
1.5	2.5 mmsq. CU	Nos.											130	130							
2	Nickle plated brass , double compression heavy duty cable gland suitable for AL XLPE armoured LV power cable.																				
2.1	240 mmsq.	Nos.											140	140							
2.2	16 mmsq.	Nos.											25	25							
2.3	10 mmsq.												25	25							
2.4	4 mmsq.	Nos.											35	35							
2.5	2.5 mmsq. CU	Nos.											60	60							

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SCHEDULE OF WORKS & PRICES (ELECTRICAL)

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		UNIT	*WESCO TAPP-ING*	*MRS*	*SS-1*	*SS-2*	*SS-4*	*SS-5*	*SS-6 & 9*	*SS-7*	*SS-8*	*SS-10*	*33KV RING MAIN*	TOTAL QTY							
L	**Dismantling and handing over of existing 11kV pole structures and transformers inside existing S/S-1, S/S-2, S/S-3, S/S-4, S/S-5, S/S-6 and S/S-7.**												LOT	LOT							
M	**Dismantling and handing over of existing 11kV pole structures along with all supporting steel, accessories and equipment for the existing 11kV overhead ring main system.**												LOT	LOT							
N	**SHOCK TREATMENT CHART**	NOS.											9	9							
O	**RUBBER MAT 1.1KV**	SQ.Mtr.											200	200							
P	**FIRE EXTINGUISHER, SAND BUCKETS**	Nos.											LOT	LOT							

GRAND TOTAL (BOTH IN FIGURES AND WORDS) =

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SCHEDULE OF WORKS

CIVIL AND STRUCTURAL

SCHEDULE OF QUANTITIES & RATES - CIVIL & STRUCTURAL WORK

SUBSTATIONS & POWER DISTRIBUTION FOR NIT (ROURKELLA)

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
1.0	**EARTHWORK**					
1.1	Earthwork in excavation in the following types of soil and					
	rock upto and including 2.00 metres lift including bailing/					
	pumping out any water accumulating inside the					
	excavated pit/trench, shoring, strutting (as directed by					
	the Engineer) adequate protection during excavation/					
	drilling/ blasting, transporting the excavated soil for 100					
	m lead & stacking selectively including disposing off the					
	rubbish, rock fragments, excess spoils, etc. in the area					
	as directed by the Engineer, all complete as per					
	drawing, specification and direction of the Engineer.					
	Shoring shall be paid under relavant items.					
	a) Ordinary & Hard soil	1700	Cu.M			
1.1a	Extra over item no. **1.1(d)** above for more	100				
	than 2.0 m lift upto 4.0 m lift.					
1.2	Earthwork in backfilling including watering and compac-					
	tion at all elevations around foundations, walls, wells,					
	tunnels, pits, culverts, trenches, road approaches and in					
	plinth filling & area filling as per specs. & drawings and					
	as directed by the Engineer with selected spoil within a					
	lead of 100 m (filling in layers not exceeding 250 mm in					
	loose thickness. Watered as necessary, each layer of					
	filling to be compacted to achieve a dry density of not					
	less than 95% of the Proctor density).	500	Cu.M			
1.2a	Extra over item no. 1.1 or 1.2 above for					
	more than 100 m lead upto 1.0 km lead	100	Cu.M			
1.3	Supplying, filling and compacting morum with					
	needle vibrator for a maximum depth of 1.0 m					
	in each layer in flooded condition in foundations,					
	walls, plinths and in other areas as per					
	drawing, specification and direction of Engineer.	50	Cu.M			
1.3a	Supplying, filling and compacting sand					
	for a maximum depth of .3 m					
	in each layer in flooded condition in foundations,					
	walls, plinths, trenche and in other areas as per					
	drawing, specification and direction of Engineer.	150	Cu.M			
	Note: Sand fill will be placed in trenches carefully before and					
	and after cable laying without disturbing/damaging cables					
1.4	Providing shoring in foundations, tunnels, pits, trenches					
	etc. as required including supply of all materials and					
	removal of shoring after completion of the work.					
	a) Open timbering	Rate Only	Sq.M			
	b) Close timbering	Rate Only	Sq.M			
	NOTE:-					

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
	Items 1.4 shall be paid only for protecting					
	existing structures directed by the engineer.					
2.0	**CONCRETE WORK PLAIN AND REINFORCED**					
2.1	Supplying and laying in position plain cement concrete					
	of following nominal mixes (by volume) using graded					
	crushed stone (40 mm down) as coarse aggregate					
	including mixing , conveying, laying, compacting and					
	curing etc.complete as per drawings, specifications and					
	directions of the Engineer.					
	a) M5/M10/M15	Rate Only	Cu.M			
2.2	Supplying and laying in position plain cement concrete					
	of following nominal mixes (by volume) using graded					
	crushed stone (20 mm down) as coarse aggregate					
	including mixing , conveying, laying, compacting and					
	curing etc.complete as per drawings, specifications and					
	directions of the Engineer.					
	a) M - 10	70	Cu.M			
2.2(a)	Supplying and laying in position design mix of cement					
	concrete of following grades for reinforced concrete work					
	in foundation (including slab on grade) & substructure in					
	all kinds of work using graded crushed stones as					
	coarse aggregate including mixing, conveying, laying,					
	compacting and curing etc. complete as per drawings					
	specifications and directions of the Engineer.					
	(i) & (ii) Deleted					
	(iii) M-25 (with 40 mm down coarse agg.)	Rate Only	Cu.M			
	(iv) M-25 (with 20 mm down coarse agg.)	500	Cu.M			
2.2(b)	Supplying and laying in position design mix cement					
	concrete of following grades for reinforced concrete					
	work in superstructure in all kinds of work using					
	graded crushed stones (20 mm down) as coarse					
	aggregate including mixing, conveying laying,					
	compacting and curing etc.complete as per drawings,					
	specifications and direction of the Engineer					
	(i) M - 20	Rate Only	Cu. M			
	(ii) M - 25	280	Cu. M			
2.3	**Deleted**					
2.4	Supplying, cutting, bending and binding with 18 gauge					
	annealed soft iron wire and placing in position following					
	types of reinforcements, of all diameters to RCC					
	members as per drawings, specifications and direction					
	of the Engineer.					
	(a) MS round bar	Rate Only	Tonnes			
	(b) High yield strength steel deformed bars	70	Tonnes			

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
2.5	Supplying , installing dismantling and removing					
	following classes/class of formworks for					
	foundation and sub-structures below elevation					
	(+) 0.00 in all kinds of work including necessary					
	rendering of concrete surfaces after exposure					
	as per drawings, specification and direction of					
	the Engineer					
	(a) Ordinary	750	Sq.M			
2.6	Supplying, installing, dismantling and removing following					
	classes/class of formwork for super structures in all					
	kinds of work including necessary rendering of concrete					
	surface after expoxure as per drawings, specifications					
	direction of the Engineer.					
	(a) Plywood/steel (for formed surface)	1900	Sq.M			
2.7	Making & supply, fix in position and remove forms for					
	pockets & opening less than 0.1 Sq.m in area including					
	necessary rendering of concrete surface after exposure.	10	R.M			
	(Maximum depth of pocket will be 0.5 m)					
2.8	Supplying, fabricating and installing following embedded					
	items in cement concrete, as per drawings and specifi-					
	cations including all necessary templates as required					
	(a) Anchor bolt assembly complete with					
	sleeves, nuts, washers, anchor plates etc.	200	Kgs			
	(b) Insert plates, edge protection angles,					
	pipe sleeves, hangers, conduits and					
	other miscellaneous embedded fixtures					
	of MS items.	1800	Kgs			
2.9	Forming expansion/isolation joints in concrete as per					
	drawings and specifications using Bitumen boards/					
	Expanded polysyrene boards complete with bitumen					
	sealing compound including supply of all materials					
	(a) 25 mm Thick	Rate Only	Sq.M			
2.10	Forming Isolation joint with 1mm th. alkathene					
	sheets as per drawing & specifiaion including					
	supply of all materials.	Rate Only	Sq.M			
2.11	Supplying and filling the expansion joints of following					
	dimensions with bitumen/other joint sealing compound					
	including thorough cleaning of the joints, as per manu-					
	facturer's specification and as directed by Engineer.					
	(a) 25 mm x 12 mm	5	Sq.M			
2.12	Supplying and providing grout under base plate					
	of structures, column bases, base plate of					
	equipment, pockets of foundtions etc, with					
	non-shrink free flow cementious grout					
	(shrinkkomp or equivalent) including mixing,					
	surface cleaning, backing, furnishing side					

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
	forms for exposed surfaces with chamfering					
	and curing complete as per manufacturers					
	specifications and direction of the Engineer.	0.5	Cu.M			
2.13	Supply and laying 50 thick precast reinforced cement					
	concrete elements of following grade of					
	concrete at various elevations in all kinds of					
	works including supply of materials, formwork,					
	mixing, laying, compacting and curing,					
	storing, handling, transporting, erection					
	without damage, setting in position with					
	cement sand mortar (1:2 by volume),					
	grouting / welding etc. complete as per					
	drawings, specifications and direction of					
	Engineer. (Cost of reinforcement to be					
	paid sepeately under reinforcement item)					
	(a) M - 25	30	Sq.M			
2.14	Supplying, fabricating and installing in					
	concrete following rungs as per specification,					
	drawings and direction of the Engineer.					
	(a) 20 mm dia MS Rung	Rate Only	Tonnes			
2.15	Providing and mixing water proofing admixture of					
	approved quality in concrete/ mortar to make the					
	concrete waterproof for underground structure like					
	basement, tunnels etc. as per manufacturer's					
	specifications and with manufacturer's supervision as					
	decided by the Engineer.	Rate Only	Kg			
2.16	Extra over item no. 2.2(a) for integral neat cement					
	finish with floating & trowelling	400	Sq.M			
3.0	**STRUCTURAL STEEL AND SHEETING WORK**					
3.1	Supply, fabricate, transport and erect structural steel					
	work of following categories including all necessary					
	connection materials and connections (including					
	welding and bolting, nuts, washers, gussets, etc.					
	complete), & a shop coat of red-oxide					
	primer (ready mixed paint conforming to IS: 2074)					
	and two coats of final finish painting					
	(aluminium paint conforming to IS:2339)					
	as per Drawings, Specifications and direction of					
	the Engineer.					
	a) Steel work using rolled sections only with or without					
	end cleats/plates for connections.	Rate Only	Tonne			
	b) Steel work in latticed/battened structures for beams					
	and columns	**22**	Tonne			
	c) Same as a) but with tubular sections	Rate Only	Tonne			
	Note: Connecting material shall be measured under 3.1b)					
	d) Miscellaneous steel work in ladders, hand railing					
	gratings sag/tie rods, platforms/walk-ways					

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
	using chequered plates/gratings.	4	Tonne			
4.0	**MASONRY AND ALLIED WORK**					
4.1	Supply, mix, place in position compact and cure 40 mm					
	thick damp proof coarse with cement concrete 1:1.5:3					
	nominal mix by volume (1 cement:1.5 sand: 3 graded					
	stone aggregate with 10 mm down agreegates)					
	including an admixture or waterproofing compound					
	like "PLASTOCRETE-N" of Sika Qualcrete (at the rate					
	of 0.5% by weight of cement) or equivalent with all					
	materials and labour complete as per drawings and					
	specifications and direction of Engineer.	15	Sq.M			
4.2	Supply and laying in position brickwork with locally					
	available best quality bricks (minimum crushing					
	strength 50 kg/Sq.cm in foundation, subrstructure &					
	trenches at all levels upto plinth in cement -sand mortar					
	including mixing mortar, laying bricks, raking joints,					
	curing andincluding supply and erection of					
	necessaryscaffolding & working platform complete with					
	allmaterials as per drawings and specifications.	90	Cu.M.			
4.3	Same as 4.2 but for superstructure	260	Cu.M.			
4.4	Same as above item 4.2 but brickwork in half brick thick					
	panels in cement mortar 1 :4 (1 cement : 4 coarse sand)	50	Sq.M			
4.5	18 mm thick (minimum) cement-sand plastering (in two					
	layers) under layer 12 mm thick cement plaster 1 : 5					
	(cement : coarse sand) finished with top layer of 6 mm					
	thick cement plaster of MIX 1: 6 (cement : fine sand) to					
	exterior faces of wall, beams, columns & other					
	structures at various elevations including mixing, laying,					
	finishing, curing, necessary scaffolding work, working					
	platforms complete with all materials as per drawings,					
	specifications and instructions of the Engineer.	1500	Sq.M.			
4.6	12 mm thick (minimum) cement - sand plaster (1:6) (1					
	cement:6 coarse sand) to interior faces of walls, beams,					
	columns, drains, RC channels, in roof & other structures					
	at various elevations including mixing, laying, finishing,					
	curing and necessary scaffolding work, working					
	platforms, complete with all materials as per drawings,					
	specifications and instructions of the Engineer.	700	Sq.M.			
4.7	Providing 20 mm x 12 mm drip course at various					
	elevations to chajja, window & door heads,					
	parapets and all other projections etc. with all					
	materials, labour etc. complete as per drawings,					
	specifications and instruction of the Engineer.	20	R.M.			
5.0	**DOORS, WINDOWS, LOUVRES ETC.**					
5.1	Supplying, fabricating and fixing in position 45 mm thick					
	hollow metal flush door including pressed steel frame					
	(pressed steel frame shall be as per itemno. 5.1)					

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
	shutter shalll be 1.25 mm thick MS sheet with both					
	faces plain flushed form approved manufacturer					
	including shop coating with approved Red lead primer					
	and final painting in position with a coat of approved					
	primer and two coats of synthetic enamel paint of					
	approved make and shade etc. complete with all					
	materials, labour as per drawing, specification and					
	instruction of the Engineer.					
	a) Single leaf doors	40	Sq.M.			
	b) Double leaf doors	9	Sq.M.			
	Note: All fittings and fixtures (except mortice lock and					
	door closures which will be paid as per item 5.2)					
	to be included.					
5.2	Supplying, fabrication and erecting in position,					
	pressed steel frames manufactureed from					
	commercial steel sheet 1.25 mm thick					
	including hinges jamb lock jambs, beads,					
	angle threshold of mild steel angle of section					
	50 x 25 mm for external doors or base ties					
	with 1.25 mm pressed mild steel welded or					
	rigidly fixed together by mechanical means,					
	adjustable lugs with split tail to each jamb					
	including steel butt hinges 2.5 mm thick with					
	mortar guards, lock, strike plate, shock					
	absorbers, shop coating with approved Red					
	lead primer after pretreatment of the surface					
	and finally painting in position with a coat of					
	approved white metal primer and two coats					
	of synthetic enamel paint of approved make					
	and shade, complete with all materials,					
	fittings labour as per drawing, specification					
	and instruction of the Engineer :					
	a) For 105 mm profile	140	RM			
5.3	Providing and fixing the following with all fittings and					
	fixtures					
	a) 6 lever 100 mm Mortice latch and pair					
	of lever handles, all parts brass, suitable					
	for single/double shutter as per drawings,					
	specification & instruction of Engineer	6	Each			
	j) Hanging Floor door stopper	2	Each			
	k) Overhead bright finished brass					
	hydraulic door closure of approved					
	brand (Oil sealed best quality)					
	i) For door weighing 61 - 80 Kg	6	Each			
5.4	Supplying, including assembly, fitting and					
	fixing in position steel windows (openable,					
	fixed or partly-openable type), louvres,					

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
	ventilators (top, bottom or central hung)					
	conforming to IS:1361at various elevations					
	including frames, shutters, transom,					
	mullions, couplings, brass pegs & handle,					
	still lugs, all fittings & fixtures, caulking					
	with mastic, grouting the frames in masonry					
	or concrete, a shop coat of approved Red lead					
	primer, and final painting in position with a					
	coat of approved primer and two (2) coats of					
	synthetic enamel paint of approved make					
	and shade etc. complete as per drawings,					
	specifications and instructions of the Engineer.	120	Sq.M.			
	(Glass will be measured and paid					
	separately under relevant item)					
5.5	Supplying, fitting and fixing clear sheet glass					
	(superior quality first grade) to metal windows,					
	doors, vision panels, partitions etc. at various					
	elevations including supplying putty, mastic					
	cement etc. cleaning after fixing, with all					
	materials etc. complete as per drawings					
	and specifications.					
	a) 4 mm thick clear sheet glass	120	Sq.M.			
	b) 5.5 mm thick clear sheet glass	Rate Only	Sq.M.			
6.0	**FLOOR FINISH AND ALLIED WORK**					
6.1	Supply and laying 40 mm thick grey patent stone					
	flooring consisting of (1 : 1.5 : 3) cement - sand -					
	stone chips underbed and 6 mm thick (1:1) cement -					
	sand topping, top finished with neat cement with 6 mm					
	thick glass dividing strips (panels size 1M x 1M on an					
	average, except in stairs), complete including curing.	Rate Only	Sq.M.			
6.2	Supply and laying 20 mm thick grey patent stone sill,					
	skirting and dado to match floor finish with 1:3 cement-					
	coarse sand underbed and 6 mm thick topping (1 part					
	cement and 1 part sand by volume), finished with neat					
	cement including rounding off corners and junctions,					
	curing, etc. complete.	38	Sq.M.			
7.0	**ROOF WATER PROOFING & ALLIED WORK**					
7.1	Providing two coats of polymer modified waterproof flexible					
	cement slurry layer like SIKA Topseal as per					
	manufacturer's specifications (including corrections of roof					
	slope) on roof surface & parapets	**700**	Sq.M			
7.2	Supplying and laying 40 mm average thick-					
	ness concrete 1:2:4 (1 cement: 2 sand: 4 6mm down					
	stonechips) with at various elevations including fillet 150 x					
	150 mm and other work with integral cement					
	waterproofing compound (0.2% Plastocrete Plus					
	or equivalent) & 3% polyurethane fibers including sprinkle					
	sand and finished snooth by hard trowelling.	700	Sq.M			

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
8.0	**PAINTING, WHITE WASHING & POLISHING**					
8.1	Supplying and finishing with three or more					
	coats for a uniform finish with water proof					
	cement paint of approved brand and					
	shade to surfaces of concrete, masonry,					
	plastered surfaces, etc. at all elevations					
	and including preparation of surface,					
	necessary scaffolding work etc., complete					
	with all materials and labour.					
	a) "Super Snowcem" or equivalent	1500	Sq.M.			
8.2	Supplying and applying three (3) coats of					
	white wash to walls, ceiling etc., at					
	various elevations including preparation of					
	surfaces, cleaning etc. complete with all					
	materials, labour, scaffolding work as per					
	specifications.	1150	Sq.M.			
8.3	Similar to item 8.2 but for providing two (2)					
	coats of cement wash instead of white wash.	Rate Only	Sq.M			
9.0	**MISCELLANEOUS WORK**					
9.1	Providing & laying 50 mm thick cement concrete to					
	plinth protection and pavement over a layer of dry					
	brick ballast or stones 40 mm nominal size well rammed					
	and consolidated grouted with fine sand 75 mm thick					
	with (1:2:4) (1 cement : 2 coarse sand: 4 graded					
	stone aggregate 20 mm nominal size) including a					
	floating coat of neat cement finish with making					
	chequers of approved pattern over pavement.	180	Sq.M			
9.2	Supplying and laying 100 mm thick					
	bed of well compacted and consolidated brick ballast					
	(nominal size 40 mm) mixed with surki in the					
	proportion of 6:1 under ground floor slab, pavement or					
	similar items (150 mm thick dry bed shall be					
	rammed and consolidated by pavement vibrators or					
	other means to the desired thickness of 100 mm).					
		35	Cu.M			
9.3	Providing & laying 150 mm hard soling at ground floor					
	level with 40 mm down graded stone chips and inters-					
	tices filled with sand and compacted by vibrating rollers.	Rate Only	Cu.M			
9.4	Providing and laying class NP-3 concrete pipes on class					
	B bedding including trench excavation, backfilling, jointing					
	collars with 1:2 cement: sand mortar all complete of the					
	following diameters					
	i) 150 mm	120	RM			
	ii) 250 mm	60	RM			

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
10.0	**SANITARY AND PLUMBING**					
10.1	Supplying, fitting and installing cast iron pipes and					
	fittings (conforming to IS:1230) for roof drainage and					
	floor drainage, with all bends, junctions, offset shoes,					
	inspecting doors, roof/ floor gratings etc. including					
	caulking the joints with lead as per specification, fixing					
	in position with clamps, nails, spacers etc. and painting					
	with one coat of approved metal primer and two coats of					
	synthetic enamel paint of approved make & shade,					
	for the following diameter of pipes :					
	a) 75 mm - diameter	Rate Only	RM			
	b) 100 mm - diameter	10	RM			
	c) 150 mm - diameter	30	RM			
10.2	Supplying, fitting and fixing Roof drain heads with CI high					
	domed gratings, as per drawing including fabricating roof					
	drainhead from 6 mm thick MS plates at various					
	elevations, including connection to roof drain pipes, lead					
	caulking,supports, hangers etc. painted with one (1)					
	coat of Red lead paint and finally painted with two coats					
	of synthetic enamel paint over a coat of white metal					
	primer paint, complete with all materials, labour etc. as					
	per drawings & specifications for:					
	a) 75 mm - diameter roof drain pipe	Rate Only	Each			
	b) 100 mm - diameter roof drain pipe.	4	Each			
	c) 150 mm - diameter roof drain pipe.	8	Each			
11.0	**ROADS & DRAINS**					
11.1	Excavation in Ordinary Soil upto 1.5mts depth by					
	mechanically / manually for all types of foundation &					
	disposal of same upto 1km.	Rate Only	CuM			
11.2	Backfilling with Morum brought from outside with a lead					
	of 1km.(This item includes levelling, compaction etc					
	as per requirement of site engineer incharge)	Rate Only	CuM			
11.3	Providing & laying Subbase 225 mm loose					
	compacted to 150 mm with vibratory roller inclusive of					
	filling of joint, watering, compaction, preparation of					
	subgrade & necessary formation of camber	550	SqM			
11.3	Providing & laying WBM in two layers 110 mm loose					
	compacted to 80 mm with vibratory roller inclusive of					
	filling of joint, watering, copaction & necessary					
	formation of camber (total thickness 160 mm)	Rate Only	SqM			
11.4	Providing & laying M30 grade road of 250mm thick					
	concrete with 75 micron LDPE film with 20mm					

	DESCRIPTION	APPROX QTY.	UNIT	Rate		Amount
				Rs. in Words	Rs. in Figures	Rs. in Figures
	downsize aggregate	500	SqM			
11.5	Providing 300 mm wide brick drain upto 600 mm depth					
	with 230 mm brickwork and 20 mm thick plastering					
	125 th. M-10 baseincluding excavation etc. complete	300	RM			
12.0	**MISCELLANEOUS ITEMS**					
12.1	Dismantling of following works with care (to recover as					
	much serviceable material as possible), store					
	serviceable material, remove unusable material and					
	thus making the site clear for further construction.					
	a) PCC including flooring	Rate Only	Cu.M			
	b) RCC work	Rate Only	Cu.M			
	c) Masonry works	5	Cu.M			
12.2	Design, supply, fabricate, transport and erect structural					
	steel grilled Gates for entrance as per					
	approved design and drawing, and dierction of the					
	Engineer.	500	Kg			
	Note:					
	The gate shall be painted with a shop coat of red-oxide					
	zinc-chromate primer (ready mixed paint conforming to					
	IS:2074) over and two coats of final finish					
	painting (synthetic enamel paint conforming to IS:2932					
	& IS:2933). The gate shall be supported on close fitting					
	of the Enguneer and shall be provided with approved					
	locking arrangements					
12.3	Supplying, fitting and fixing of galvanized barbed wire					
	having 3-10 g mm twisted bars with 2 points barbs					
	2 600 mm on L 65 X 65 X 6 (Y-type) fixed on top					
	of RCC columns, including supplying, fitting & fixing of					
	standard hook, eye hook & turn-buckle all complete as					
	per drawings, specifications and direction of the					
	Engineer.(There are 3 lines of barbed wire- each line will be)					
	measured, L shall be separately measured)	950	RM			
12.4	Providing and fixing “Chain Link Fencing” made of hot					
	dipped galvanised steel wire of 6 gauge conforming to					
	IS :2721 including fixing to any type of post and struts,					
	including providing and securing with galvanised					
	staples or steel pins etc. as directed.	220	SqM			
	Note: Mesh size shall be 75 mm square; Supports shall					
	be separately measured.					
12.5	Providing 50 mm size gravel filling 200 mm thick in					
	Substation areas including preparation of subgrade,					
	clearing of weeds	1050	SqM			

ANNEXURE-I
SCHEDULE OF WORKS FOR
CIVIL & STRUCTURAL

	DESCRIPTION	**APPROX QTY.**	**UNIT**	**Rate**		**Amount**
				Rs. in Words	**Rs. in Figures**	**Rs. in Figures**
	GRAND TOTAL					

SCHEDULE OF ITEMS FOR CIVIL CONSTRUCTION

N O T E S :

1. Details of the items under this Schedule shall be read in conjunction with corresponding specifications, drawings and other tender documents.

2. The work shall be carried out as per drawings, specifications, the description of the items in this schedule and/or instructions by the Engineer.

3. Items of work provided in this Schedule but not covered in the Specification shall be executed strictly as per instructions of the Engineer.

4. Unless specifically mentioned otherwise in the contract, the Tenderer shall quote for the finished items and shall provide for the complete cost towards labour, materials, erection and dismantling of necessary scaffolding, levies, taxes, insurance, transport, storage, repairs, rectifications, maintenance till handing over, revenue expenses, contingencies, overheads, profits and all incidental items not specifically mentioned but reasonably implied and necessary to complete the works according to the contract.

5. The quantities are approximate and some of the items may not be needed for construction while extra items may be added. The rates shall be firm for any variation in quantity if the total price remains within ± of 25% of quoted price.

6. In case of discrepancy in the Schedule of Items, Specifications & Tender Drawings the order of preference shall be as follows :

   a) Description of work in the Schedule of Items.

   b) Civil engineering specification in the tender

   c) Tender Drawings

.....
Signature of the Tenderer

SCHEDULE OF WORKS

DATA ACQUISITION SYSTEM (DAS)

SCHEDULE OF WORKS FOR DAS SYSTEM

SL. NO.	DESCRIPTION	QNTY	UNIT	UNIT RATE-SUPPLY	UNIT RATE-ETC	TOTAL AMOUNT
A.	**DAS System**	One (1)	Lump sum			
01.	DAS Server (Web enabled) in Hot Stand By mode with mouse, keyboard ,monitor and all accessories	1	No.			
02.	Metering Server (Web enabled) in Hot Stand By mode with mouse, keyboard ,monitor and all accessories	1	No.			
03.	Engineering Work Station/Operator Work Station with mouse, keyboard and monitor and with the all accessories	1	No.			
04.	A3 Size Laser Jet Printer with connecting cable and other accessories	1	No.			
05.	Ethernet Switch with necessary accessories	1	No.			
06.	DAS Software for data collection from meters connected locally or that are located in remote locations, through modem communication and local retrieval and access from the existing Server etc, as per the tender requirement	1	No.			
07.	Remote Terminal Unit (RTU) complete with DI,DO,AI,AO modules and communication ports viz. RS485,RS232 and complete with all necessary software for configuration and reporting facility at the Server, as per the tender requirement	10	No.			
08.	Portable Configuration and Maintenance Tool for RTU	1	Set			

SL. NO.	DESCRIPTION	QNTY	UNIT	UNIT RATE-SUPPLY	UNIT RATE-ETC	TOTAL AMOUNT
09.	GSM/GPRS modem with SIM card,optical cord, RS232 serial cable, Antenna and RF Coaxial cable.	10	Set			
10.	Uninterrupted Power Supply with 30 mins back up for DAS and Metering Server and Master RTU	1	No.			
11.	Uninterrupted Power Supply with 30 mins back up for all RTU except at Master RTU	9	No.			
12.	Firewall system between DAS Server and existing NIT Server	1	Set			
13.	Shielded 2 core twisted pair cable for connecting the MFM/TVM to Modem		Lot			
14.	STP CAT6 cable for connecting RTU		Lot			

Note : All prices shall be in Rupees and shall be inclusive of all taxes and duties.

ANNEXURE -III

MANDATORY SPARES (ELECTRICAL)

The Bidder shall quote Mandatory spares excluding packing / forwarding, freight and taxes and duties The prices shall remain valid for one year from the date of opening of Price Part.

Sl. No.	Description	Quantity (Nos.)	Unit Price (Rs.)	Total Price (Rs.)
1.	DISTRIBUTION TRANSFORMER			
	a) H.T. Bushing with metal parts.	2 nos.		
	b) L.T. Bushing with metal parts.	2 nos.		
	c) Oil Level gauge for main tank conservator.	2 nos.		
	d) Oil Temperature Indicator (OTI).	2 nos.		
	e) Winding Temperature Indicator (WTI).	2 nos.		
	f) Buchholz Relay.	2 nos.		
	g) Silica gel Breather for main tank.	2 nos.		
	h) Oil Inlet/Outlet Valve	2 nos.		
	i) Water Inlet/Outlet Valve	2 nos.		
	j) Oil Sampling Valve	2 nos.		
	k) Gas Release device	2 nos.		
2.	33KV OUTDOOR VCB			
	a) Vacuum Bottle, 36kV,1250 Amp	2 Nos.		
	b) Spring Charging Mechanism	1 No.		
	c) Closing Coil 110V D.C	1 No.		
	d) Tripping Coil 110V D.C	1 No.		
	e) Breaker Control switch with pistol grip handle	2 Nos.		
	f) Local/Remote selector switch	2 Nos.		
	g) Control fuse 2A/6A/20A	6 Nos. each		
	h) H.T. Bushing with metal parts.	1 No.		
	i) Indicating lamps of each colour	2 sets		
3.	33kV ISOLATOR			
	a) Aux. switch with 6 NO + 6 NC contacts	3 nos.		
	b) Main contact assembly	2 nos.		

Sl. No.	Description	Quantity (Nos.)	Unit Price (Rs.)	Total Price (Rs.)
	c) Interlocking coil 110V D.C	1 no.		
	d) H.T. Bushing with metal parts	3 nos.		
	e) Operating mechanism assembly	2 nos.		
4.	33kV INSULATORS			
	a) Post insulator, 2kN	2 nos.		
	b) Pin insulator	6 nos.		
	c) 11kV Disc insulator, 70kN	15 nos.		
5.	30kV LA			
	a) 30 kV LA	3 nos.		
	b) Surge Counter	3 nos.		
6.	33kV CONTROL & RELAY PANEL			
	a) Protective relay each type	1 no.		
	b) Auxiliary relay each type	1 no.		
	c) Ammeter each type	1 no.		
	d) Voltmeter (0-36kV)	1 no.		
	e) Ammeter selector switch	1 no.		
	f) Voltmeter selector switch	1 no.		
	g) HRC Control Fuse 2/6/20 Amp. rating	6 Nos. each		
	h) Indication lamps suitable for 240 Volt AC	12 Nos.		
	i) Local/Remote selector switch	1 No.		
	j) Push Button Station	2 Nos.		
	k) Miniature Circuit Breakers 2/16 Amp. rating	1 No. each		
	l) Breaker control switch, TNC	1 No.		
	m) Auxiliary contactor 2NO+2NC, 110 V DC coil	1 No.		
	n) Semaphore indicators	2 nos.		
	o) Digital multifunction meter	1 no.		
7.	33kV LOAD BREAK SWITCH PANEL			
	a) HT Fuse each type	3 nos. each		
	b) Ammeter each type	1 no.		

Sl. No.	Description	Quantity (Nos.)	Unit Price (Rs.)	Total Price (Rs.)
		each		
	c) Voltmeter each type	1 no. each		
	d) Miniature Circuit Breakers 2/16 Amp. rating	1 No. each		
	e) Digital multifunction meter	1 no.		
8.	BATTERY CHARGER AND DCDB			
	a) HRC fuse links of each rating	2 nos.		
	b) MCB of each rating	1 no.		
	c) Indicating lamps of each colour and size	1 no.		
	d) Diode/Thyristor of each rating	1 no.		
	e) Pulse firing PCB	1 no.		
	f) Indicating type fuse for thyristor	6 nos.		
9.	415V DB			
	a) Closing coil for each rating of ACB	1 each		
	b) Tripping coil for each rating of ACB	1 each		
	c) Microprocessor based built in release each type with ACBs	2 nos. each		
	d) Control fuse of each rating	2 nos.		
	e) Indicating lamps of each colour/size	12 nos.		
	f) Thermo magnetic release each type with MCCBs	2 nos. each		
	g) Bus support insulators	6 nos. each type		
10.	LIGHTING SYSTEM			
	a) Normal lighting fixtures each type	6 nos.		
	b) Emergency lighting fixtures each type	2 nos.		
	c) MCB of each rating	4 nos.		
	d) Starters for 36W FTL	20 nos.		
	e) Ballast for 36W FTL	10 nos.		
	f) 240V, 20A, 3 pin receptacles	5 nos.		
	g) 5A kit kat switches	30 nos.		
	h) 5A, 240V socket	10 nos.		

Sl. No.	Description	Quantity (Nos.)	Unit Price (Rs.)	Total Price (Rs.)
		Grand Total (INR)		

ANNEXURE-II

MANDATORY SPARES (DAS)

The Bidder shall quote Mandatory spares excluding packing / forwarding, freight and taxes and duties The prices shall remain valid for one year from the date of opening of Price Part.

SL. NO.	ITEM	QUANTITY (NOS.)	UNIT PRICE (INR)	TOTAL PRICE (INR)
1.	DAS Server	1		
2.	Metering Server	1		
3.	RTU with all accessories	1		
4.	RTU DI Module	1		
5.	RTU Communication Module	1		
6.	RTU AI Module	1		
7.	RTU Power Supply Module	1		
8.	GSM/GPRS Modem with all accessories	1		
9.	Ethernet Switch	1		
10.	Any other item, deemed necessary to be included by the Contractor			
			Grand Total (INR)	

ANNEXURE-III

COMMISSIONING SPARES

The Bidder shall quote Commissioning spare parts for commissioning excluding all taxes and duties, freight.

SL. NO.	DESCRIPTION	QUANTITY (NOS.)	UNIT PRICE F.O.R. (INR)	TOTAL PRICE (INR)
01.				
02.				
03.				
04.				
05.				
06.				
07.				
08.				
09.				
10.				
			Grand Total (INR)	

ANNEXURE-IV

MAINTENANCE SPARES

The Bidder shall quote Maintenance spare parts for operation and maintenance for a period of ten (10) years. The prices shall be excluding all taxes and duties, freight and quoted price shall remain firm after commissioning of the equipment for one year.

SL. NO.	ITEM	QUANTITY (NOS.)	UNIT PRICE (INR)	TOTAL PRICE (INR)
01.				
02.				
03.				
04.				
05.				
06.				
07.				
08.				
09.				
10.				
			Grand Total (INR)	

ANNEXURE-V

TOOLS AND TACKLES PRICE SHEET

The Bidder shall quote below item wise prices to site for tools and tackles furnished by him for the operation and maintenance of equipment supplied under this specification. The price shall be exclusive of all taxes & duties, freight & transit insurance.

SL. NO.	DESCRIPTION	QUANTITY (NOS.)	UNIT PRICE F.O.R. (INR)	TOTAL PRICE (INR)
01.				
02.				
03.				
04.				
05.				
06.				
			Grand Total (INR)	

NOTES :

01. In case of discrepancy between prices in figures and prices in words, the prices in words shall prevail.

02. Prices are inclusive of all requirements as specified in the Bid document.

03. Quoted prices shall be net of discounts, if any. Conditional discounts, if offered, shall not be considered for evaluation.

04. In the un-priced copy of price schedule attached with the un-priced bid, bidder must indicate “Q” (for Quoted) or “NQ” (for not Quoted) against each item as applicable.

05. Bidder must quote their prices in this format only. This format shall not be changed. For any deviation to this format, offer shall be rejected.

ANNEXURE-VI

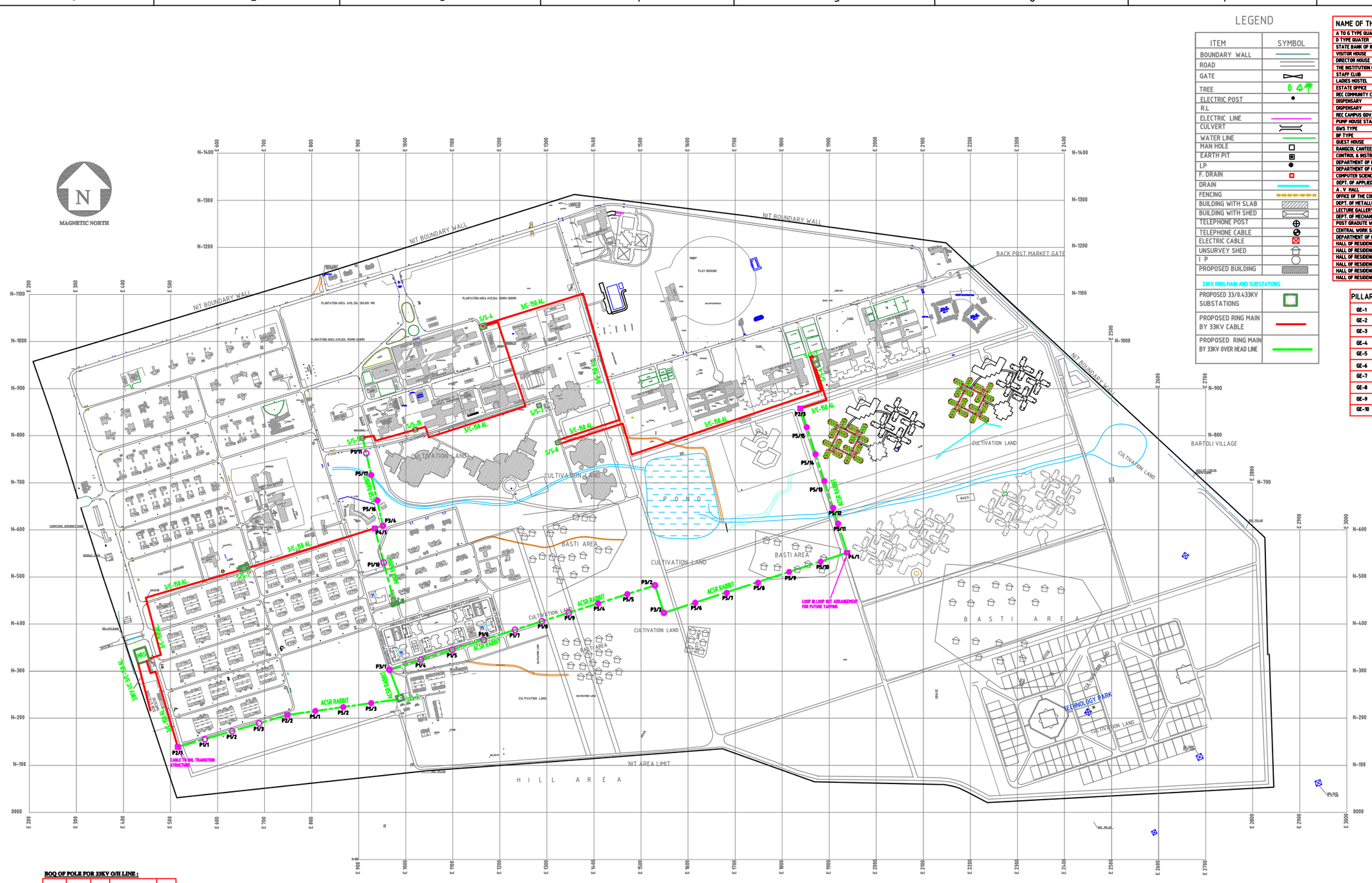
DECLARATION SHEET

I, ... certify that all the above typed-in data and information pertaining to this specification are correct and are true representation of the equipment covered by our formal Proposal dated .....

I hereby certify that I am duly authorised representative of the supplier whose name appears above my signature.

Bidder's Name	:	.....
Authorised Representative's Signature	:	.....
Authorised Representative's Name (Typed)	:	.....
Manufacturer's Intent	:	The Manufacturer hereby agrees fully to comply with the requirements and intent of this specification for the price indicated.
Authorised Representative's Signature	:	.....

FILE NAME : NITRKLE002 08.12.09



LEGEND

ITEM	SYMBOL
BOUNDARY WALL	
ROAD	
GATE	
TREE	
ELECTRIC POST	
R.L	
ELECTRIC LINE	
CULVERT	
WATER LINE	
MAN HOLE	
EARTH PIT	
LP	
F. DRAIN	
DRAIN	
FENCING	
BUILDING WITH SLAB	
BUILDING WITH SHED	
TELEPHONE POST	
TELEPHONE CABLE	
ELECTRIC CABLE	
UNSURVEY SHED	
I P	
PROPOSED BUILDING	
33KV RING MAIN AND SUBSTATIONS	
PROPOSED 33/0.433KV SUBSTATIONS	
PROPOSED RING MAIN BY 33KV CABLE	
PROPOSED RING MAIN BY 33KV OVER HEAD LINE	

NAME OF THE BUILDING	FLOOR TYPE
A TO G TYPE QUATER	G
D TYPE QUATER	G+1
STATE BANK OF INDIA	G
VISITOR HOUSE	G+1
DIRECTOR HOUSE	G+1
THE INSTITUTION OF ENGINEERS (INDIA)	G
STAFF CLUB	G
LADIES HOSTEL	G+1
ESTATE OFFICE	G
REC COMMUNITY CENTRE	G
DISPENSARY	G
DISPENSARY	G
REC CAMPUS GOV. HIGH SCHOOL	G / G+1
PUMP HOUSE STAFF QUARTER	G
GW5 TYPE	G
BF TYPE	G+1
GUEST HOUSE	G+1
RAMGOL CANTEEN	G+1
CONTROL & INSTRUMENTATION LABORATORY	G+1
DEPARTMENT OF MINING ENGINEERING	G+1
DEPARTMENT OF CERAMIC ENGINEERING	G+1
COMPUTER SCIENCE ENGINEER AND APPLICATION	G+2
DEPT. OF APPLIED ELEC. INSTRUMENTATION ENGG.	G+2
A . V HALL	G
OFFICE OF THE CONTROLAR EXAM. (EE OFFICE)	G+2
DEPT. OF METALLURGICAL &MATERIALS ENGG.	G+1
LECTURE GALLERY	G
DEPT. OF MECHANICAL ENGINEERING	G+1
POST GRADUTE WINGS MECH. METALLURGY	G+1
CENTRAL WORK SHOP	G
DEPARTMENT OF CHEMICAL ENGINEERING	G+2 / G+1
HALL OF RESIDENCE NO.-1	G+2
HALL OF RESIDENCE NO.-2	G+2
HALL OF RESIDENCE NO.-3	G+2
HALL OF RESIDENCE NO.-4	G+2
HALL OF RESIDENCE NO.-5	G+2
HALL OF RESIDENCE NO.-6	G+1

PILLAR	RL	NORTH	EAST
GE-1	233.371	+1005.380	+992.921
GE-2	234.736	+952.590	+902.526
GE-3	229.666	+1050.163	+738.578
GE-4	233.046	*****	*****
GE-5	228.507	*****	*****
GE-6	240.725	*****	*****
GE-7	243.572	*****	*****
GE-8	236.841	*****	*****
GE-9	240.400	*****	*****
GE-10	243.856	*****	*****

BOQ OF POLE FOR 33KV O/H LINE :

SL. NO.	LEGEND	TYPE		QTY.
1		PI	SINGLE POLE W/O ANGLE	11
2		P2	DOUBLE POLE	03
3		P3	SINGLE POLE WITH ANGLE	04
4		P4	4 POLE	02
5		P5	SINGLE POLE WITH EXTENSION	17

NOTE:

1. 11M LONG STEEL BEAMS WILL BE USED (8M ABOVE GROUND & 2M BELOW GROUND) FOR STRINGING 33KV O/H LINE.
2. LOCATION AND NUMBER OF POLES FOR 33KV O/H LINE ARE INDICATIVE. THE CONTRACTOR SHALL PREPARE THE DETAIL DRAWING ON THE BASIS OF DETAIL SURVEY AND SUBMIT THE SAME TO THE PURCHASER FOR APPROVAL.
3. FOR 33KV OHL CRADDLE GUARD SHALL BE PROVIDED AT ALL ROAD CROSSINGS AND FROM POLE NO. P3/1 TO P1/7 IN D-FLAT AREA.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
4	NOTE-3 ADDED REGARDING CRADDLE GUARD	UP	SKD	SM	02.6.10
3	REVISED AS PER SITE DISCUSSIONS ON 27.03.10	UP	SKD	SM	28.03.10
2	REVISED AS PER SITE DISCUSSIONS ON 07.01.10	UP	SKD	SM	07.01.10
1	REVISED AS PER NIT, RKL'S COMMENTS	UP	SKD	SM	08.12.09

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www.satcon.in

CLIENT:– NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:– 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

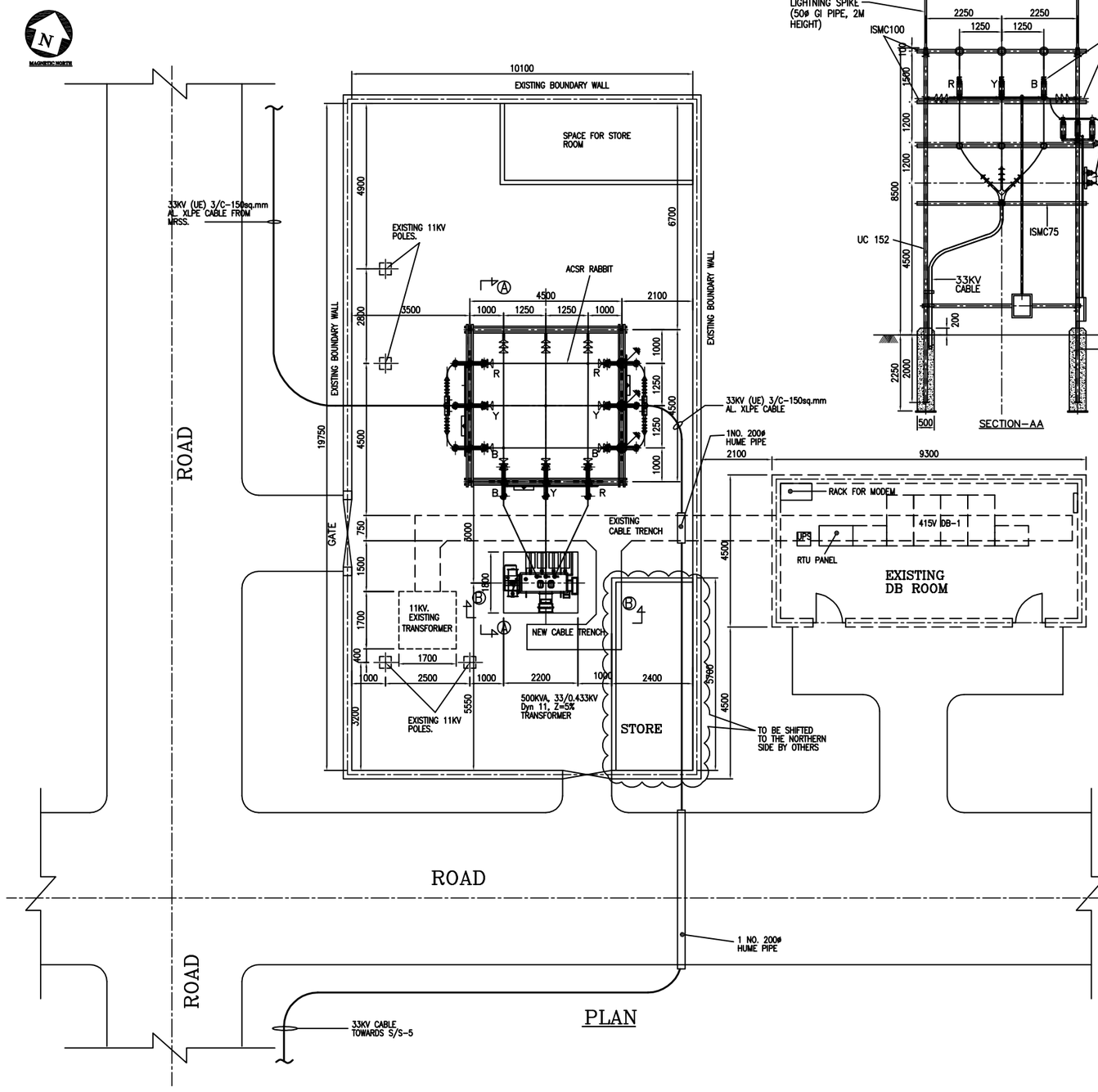
	NAME	DATE
DRWN.	UP	08.11.09
CHKD.	SKD	08.11.09
APPD.	SM	09.11.09
SCALE	1:4000	
JOB.NO.	XXXXX	

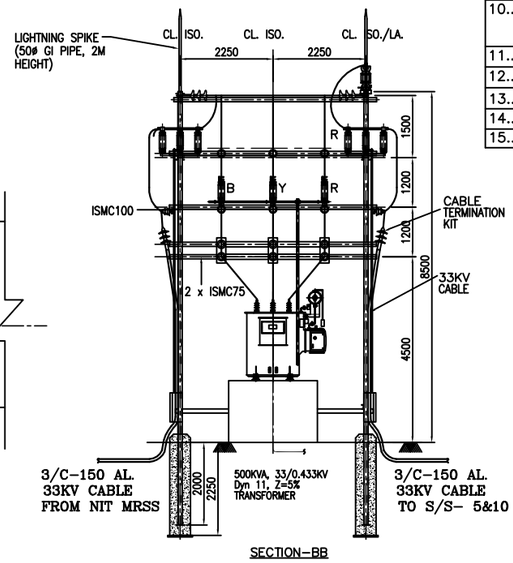
TITLE:- PROPOSED ROUTE OF 33KV RING MAIN AND LOCATION OF 33/0.433KV SUBSTATIONS

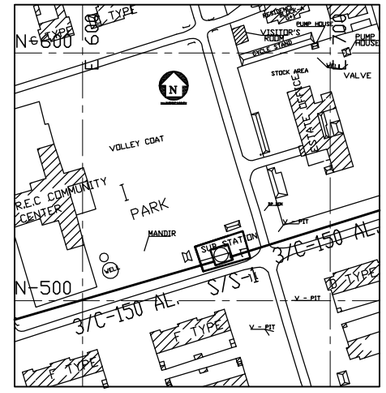
DRG.NO:- NIT-RKL-E-LAY-002 | SHT. 01 OF 01 | REV. 04

SHT. SIZE:-A1

FILE NAME : XXXXXX







KEY PLAN

BOQ OF MAJOR MATERIALS:-

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
1..	33KV, 400A DOUBLE BREAK ISOLATOR	3 SETS.
2..	33KV, 20A, HORN GAP FUSE	1 SET.
3..	33KV, 10KA. L.A., 1ø	3 NOS.
4..	33KV, TENSION INSULATOR STRING WITH TENSION CLAMP.	12 NOS.
5..	33KV, PIN INSULATOR.	9 NOS.
6..	33KV, CABLE TERMINATION KIT FOR 3/C-150 sq.mm AL. XLPE CABLE.	2 SETS.
7..	33KV, 4 POLE STRUCTURE	1 NO.
8..	500KVA, 33/0.433KV TRANSFORMER.	1 NO.
9..	3.5C x 240 sq.mm AL. XLPE L.T. POWER CABLE	USE EXISTING CABLE
10..	415V DB.	USE EXISTING DB
11..	ACSR RABBIT	45 M
12..	LIGHTNING SPIKE (50ø GI PIPE, 2M HEIGHT)	4 NOS.
13..	RTU FOR DAS	1 NO.
14..	UPS FOR RTU	1 NO.
15..	GSM/GPRS MODEM FOR DAS	1 NO.

NOTE:

1. ALL DIMENSIONS ARE IN mm.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION NO. NITRKL-33kVRM-TD-01.
3. EXISTING 11KV POLES AND TRANSFORMER SHALL BE DISMANTLED AND HANDED OVER TO NIT, RKL AFTER COMMISSIONING OF THE 33KV SYSTEM.
4. EXISTING EQUIPMENT/POLES/CABLE TRENCH/ROOM ARE SHOWN BY DOTTED LINE.

REF. DRAWINGS:

1. NIT-RKL-E-LAY-002 : OVERALL LAYOUT OF 33KV RING MAIN.
2. NIT-RKL-E-SLD-002 : SLD OF SUBSTATION-1 SHT. 3 OF 10.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	02.6.10

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CLIENT:- NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:- 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

	NAME	DATE
DRWN.	UP	11.01.10
CHKD.	SKD	11.01.10
APPD.	SM	15.01.10
SCALE	1:100	
JOB.NO.	XXXXX	

TITLE:- ELECTRICAL LAYOUT OF SUBSTATION-1 (FOR COLONY)

DRG.NO:- NIT-RKL-E-LAY-003 | SHT. 01 OF 01 | REV. 1

SHT. SIZE:-A2

FILE NAME : XXXXXXX

TO S/S-6&9
33KV OHL
ACSR RABBIT

39500

EXISTING BOUNDARY WALL

29000

4000 | 1500 | 6500 | 18500

3000

B Y R

1000 | 1250 | 1250 | 1000 = 4500

3000 | 1000 | 1250 | 1250 | 1000 | 3000 = 4500

1800

2200

4200

W

RACK FOR MODEM

CABLE TRENCH

UPS

415V DB-2

1200 | 800 | 3500 | 1000

RTU PANEL

CONTROL ROOM

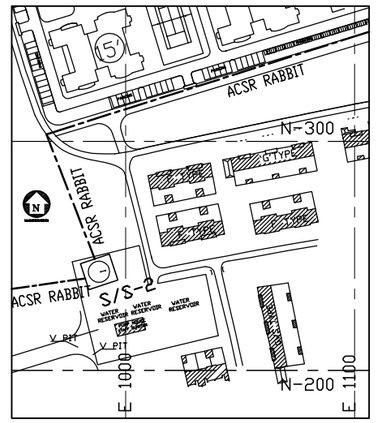
2M WIDE WALKWAY

FROM MRSS
33KV OHL
ACSR RABBIT

EXISTING BOUNDARY WALL

RESERVOIR &
PUMP HOUSE

PUMP HOUSE ROAD



KEY PLAN

PLAN

LIGHTNING SPIKE
(50ø GI PIPE, 2M
HEIGHT)

2250 | 2250

1250 | 1250

CL. LA. | CL. ISO. | CL. ISO.

2250 | 2250

TO S/S-6&9
33KV OHL
ACSR RABBIT

FROM MRSS
33KV OHL
ACSR RABBIT

ISOLATOR

ISMC100

PIN
INSULATOR

HGF

2 x ISMC
75

UC 152

100 | 1900 | 1200 | 1200 | 8500 | 4500 = 19500

3300

3000

2250 | 2000 = 4250

500

500KVA, 33/0.433KV
Dyn 11, Z=5%
TRANSFORMER

LV CABLE
TO 415V DB

SECTION-AA

SECTION-BB

BOQ OF MAJOR MATERIALS:-

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
1..	33KV, 400A DOUBLE BREAK ISOLATOR	3 SETS.
2..	33KV, 20A, HORN GAP FUSE	1 SET.
3..	33KV, 10KA. L.A., 1ø	3 NOS.
4..	33KV, TENSION INSULATOR STRING WITH TENSION CLAMP.	12 NOS.
5..	33KV, PIN INSULATOR.	6 NOS.
6..	33KV, 4 POLE STRUCTURE	1 NO.
7..	500KVA, 33/0.433KV TRANSFORMER.	1 NO.
8..	3.5C x 240sq.mm AL. XLPE L.T. POWER CABLE	30 M
9..	415V DB.	1 NO.
10..	ACSR RABBIT	45 M
11..	LIGHTNING SPIKE (50ø GI PIPE, 2M HEIGHT)	4 NOS.
12..	RTU FOR DAS	1 NO.
13..	UPS FOR RTU	1 NO.
14..	GSM/GPRS MODEM FOR DAS	1 NO.

NOTE:

1. ALL DIMENSION ARE IN mm.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION NO. NITRKL-33KVRM-TD-01.
3. EXISTING 11KV POLES AND TRANSFORMER SHALL BE DISMENTLED AND HANDED OVER TO NIT, RKL.
4. EXISTING 11KV POLES ARE IN ABANDONED STATE AT PRESENT. HENCE THESE WILL BE REMOVED FIRST TO MAKE ROOM FOR PROPOSED 33KV SUBSTATION.
5. HEIGHT OF NEW DB ROOM SHALL BE 3.5M CLEAR.

REF. DRAWINGS:

1. NIT-RKL-E-LAY-002 : OVERALL LAYOUT OF 33KV RING MAIN.
2. NIT-RKL-E-SLD-002 : SLD OF SUBSTATION-2 SHT. 4 OF 10.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	02.6.10

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CLIENT:- NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:- 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

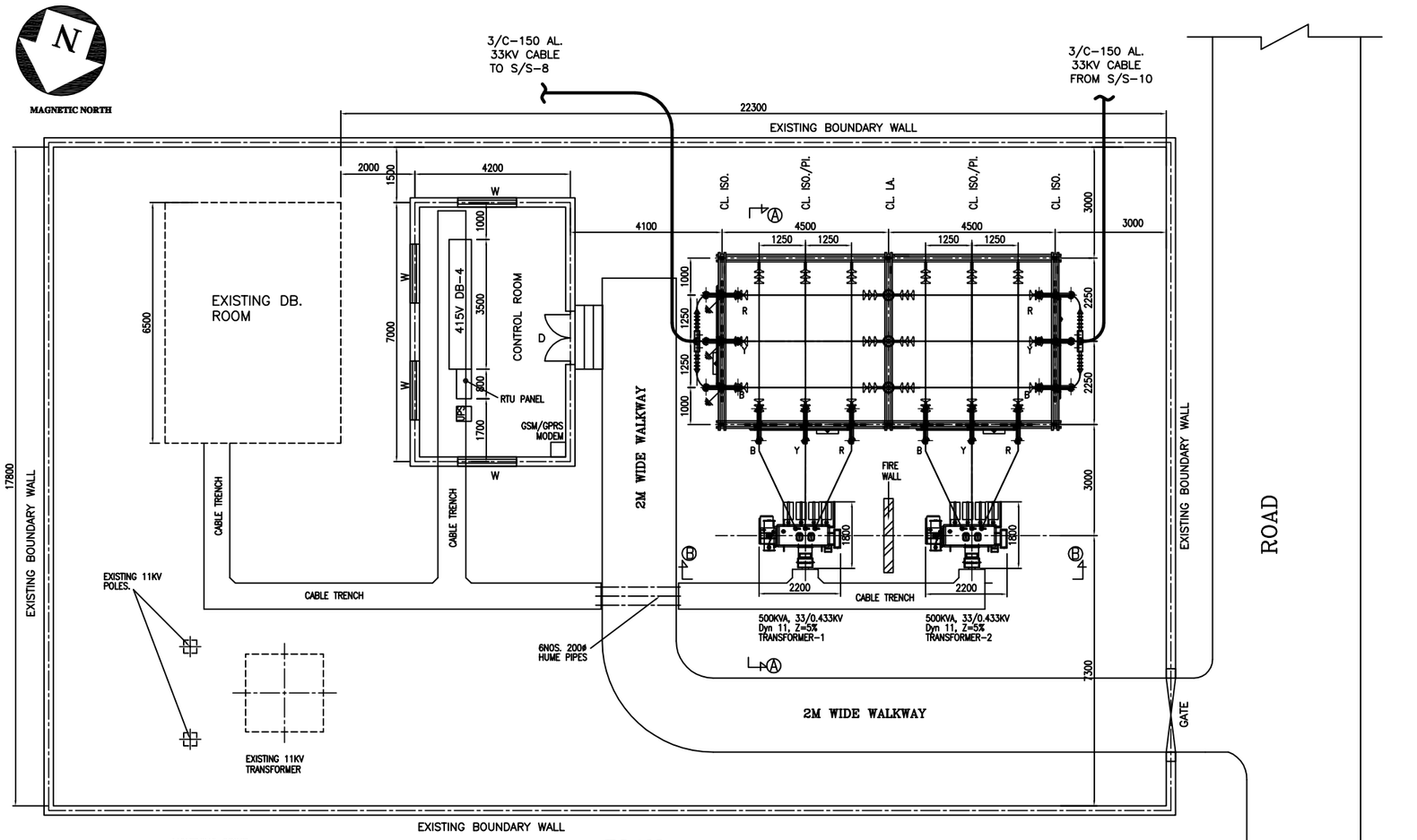
	NAME	DATE
DRWN.	UP	13.01.10
CHKD.	SKD	13.01.10
APPD.	SM	15.01.10
SCALE	1:100	
JOB.NO.	XXXXX	

TITLE:- ELECTRICAL LAYOUT OF SUBSTATION-2 (FOR COLONY & PUMP HOUSE)

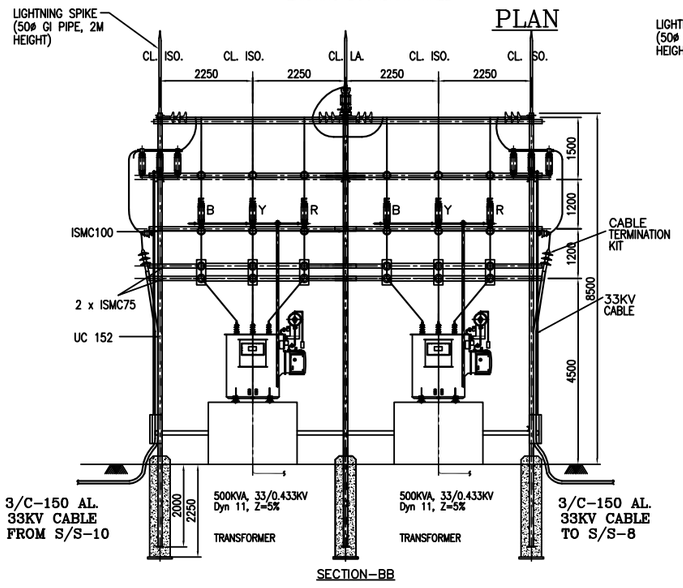
DRG.NO:- NIT-RKL-E-LAY-004 | SHT. 01 OF 01 | REV. 1

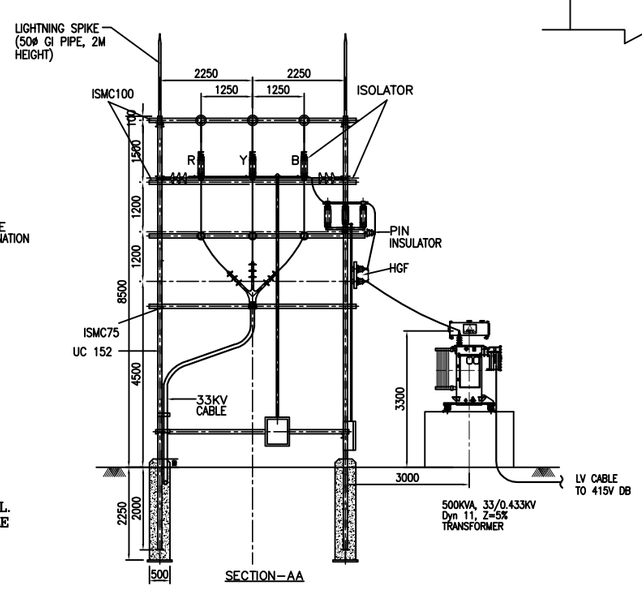
SHT. SIZE-A3

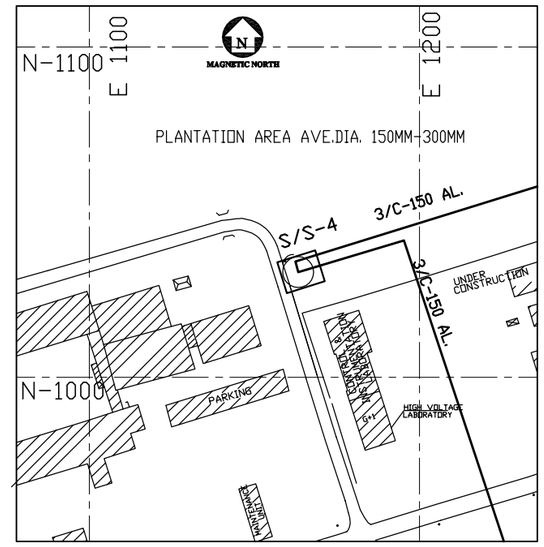
FILE NAME : XXXXXXX



PLAN







KEY PLAN

BOQ OF MATERIALS:-

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
1..	33KV, 400A DOUBLE BREAK ISOLATOR	4 SETS.
2..	33KV, 20A, HORN GAP FUSE	2 SETS.
3..	33KV, 10KA. L.A., 1ø	3 NOS.
4..	33KV, TENSION INSULATOR STRING WITH TENSION CLAMP.	24 NOS.
5..	33KV, PIN INSULATOR.	12 NOS.
6..	33KV, CABLE TERMINATION KIT FOR 3/C-150 sq.mm AL. XLPE CABLE.	2 NOS.
7..	33KV, 4 POLE STRUCTURE	2 NOS.
8..	500KVA, 33/0.433KV TRANSFORMER.	2 NOS.
9..	3.5C x 240sq.mm AL. XLPE L.T. POWER CABLE	150 M
10..	415V DB.	1 NO.
11..	ACSR RABBIT	90 M
12..	LIGHTNING SPIKE (50ø GI PIPE, 2M HEIGHT)	6 NOS.
13..	RTU FOR DAS	1 NO.
14..	UPS FOR RTU	1 NO.
15..	GSM/GPRS MODEM FOR DAS	1 NO.

NOTE:

1. ALL DIMENSION ARE IN mm.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION NO. NITRKL-33KVRM-TD-01.
3. EXISTING 11KV POLES AND TRANSFORMER SHALL BE DISMANTLED AND HANDED OVER TO NIT, RKL AFTER COMMISSIONING OF THE 33KV SYSTEM.
4. EXISTING EQUIPMENT/POLES/CABLE TRENCH/ROOM ARE SHOWN BY DOTTED LINE.
5. HEIGHT OF NEW DB ROOM SHALL BE 3.5M CLEAR.

REF. DRAWINGS:

1. NIT-RKL-E-LAY-002 : OVERALL LAYOUT OF 33KV RING MAIN.
2. NIT-RKL-E-SLD-002 : SLD OF SUBSTATION-1 SHT. 5 OF 10.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	02.6.10

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CLIENT:- NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:- 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

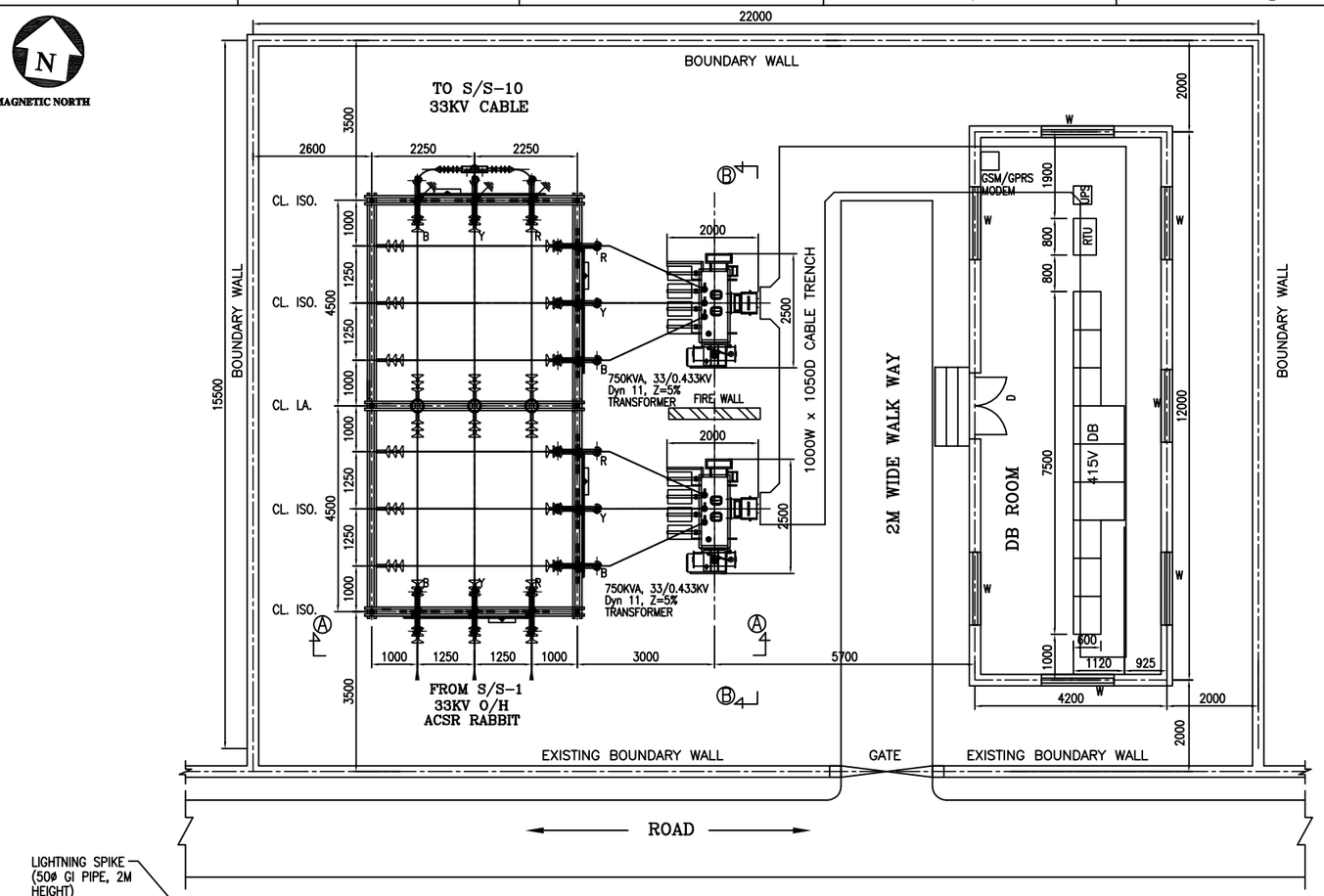
	NAME	DATE
DRWN.	UP	13.01.10
CHKD.	SKD	13.01.10
APPD.	SM	15.01.10
SCALE	1:100	
JOB.NO.	XXXXX	

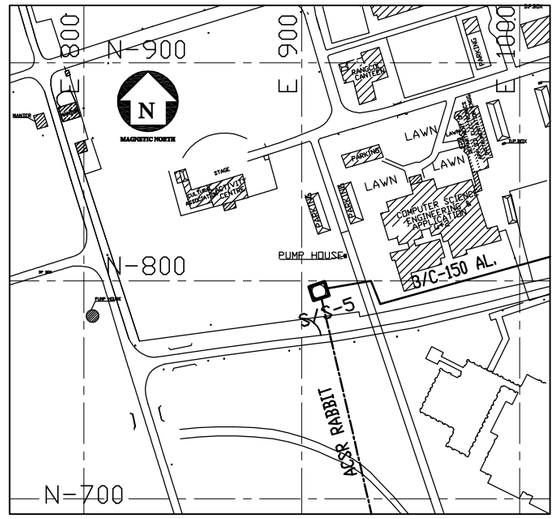
TITLE:- ELECTRICAL LAYOUT OF SUBSTATION-4 (FOR HV LAB & HALL-6 EXT.)

DRG.NO:- NIT-RKL-E-LAY-005 | SHT. 01 OF 01 | REV. 1

SHT. SIZE-A2

FILE NAME : XXXXXXX

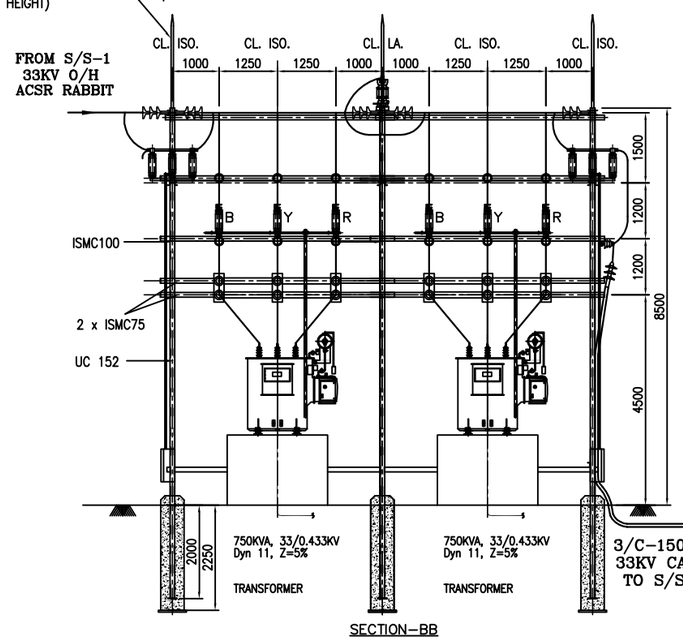




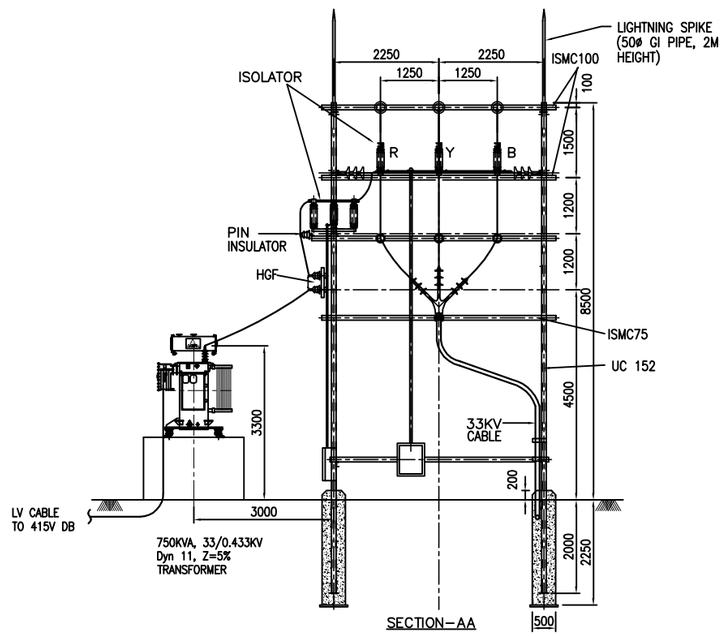
KEY PLAN

BOQ OF MATERIALS:-

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
1..	33KV, 400A DOUBLE BREAK ISOLATOR W/O E/S	3 NOS.
2..	33KV, 400A DOUBLE BREAK ISOLATOR WITH E/S	1 NO.
3..	33KV, 32A, HORN GAP FUSE	2 SET.
4..	33KV, 10KA. L.A., 1ø	3 NOS.
5..	33KV, TENSION INSULATOR STRING WITH TENSION CLAMP.	27 NOS.
6..	33KV, PIN INSULATOR.	9 NOS.
7..	33KV, CABLE TERMINATION KIT FOR 3/C-150 sq.mm AL. XLPE CABLE.	1 NO.
8..	33KV, 4 POLE STRUCTURE	2 NOS.
9..	750KVA, 33/0.433KV TRANSFORMER.	2 NOS.
10..	3.5C x 240sq.mm AL. XLPE L.T. POWER CABLE	200 M
11..	415V DB.	1 NO.
12..	ACSR RABBIT	90 M
13..	LIGHTNING SPIKE (50ø GI PIPE, 2M HEIGHT)	6 NOS.
14..	RTU FOR DAS	1 NO.
15..	UPS FOR RTU	1 NO.
16..	GSM/GPRS MODEM FOR DAS	1 NO.



SECTION-BB



SECTION-AA

NOTE:

1. ALL DIMENSION ARE IN mm.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION NO. NITRKL-33KVRM-TD-01.
3. HEIGHT OF NEW DB ROOM SHALL BE 3.5M CLEAR.

REF. DRAWINGS:

1. NIT-RKL-E-LAY-002 : OVERALL LAYOUT OF 33KV RING MAIN.
2. NIT-RKL-E-SLD-002 : SLD OF SUBSTATION-5 SHT. 7 OF 10.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
2	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	02.6.10
1	REVISED AS PER DISCUSSION DT. 27.03.10	UP	SM	SM	29.03.10

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CLIENT:- NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:- 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

	NAME	DATE
DRWN.	UP	13.01.10
CHKD.	SKD	13.01.10
APPD.	SM	15.01.10
SCALE	1:125	
JOB.NO.	XXXXX	

TITLE:- ELECTRICAL LAYOUT OF SUBSTATION-5

DRG.NO:- NIT-RKL-E-LAY-006 | SHT. 01 OF 01 | REV. 2

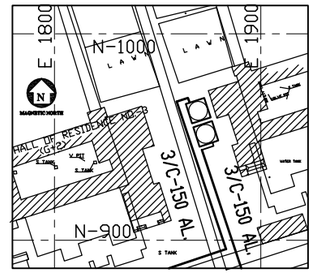
SHT. SIZE-A3

FILE NAME : XXXXXXX

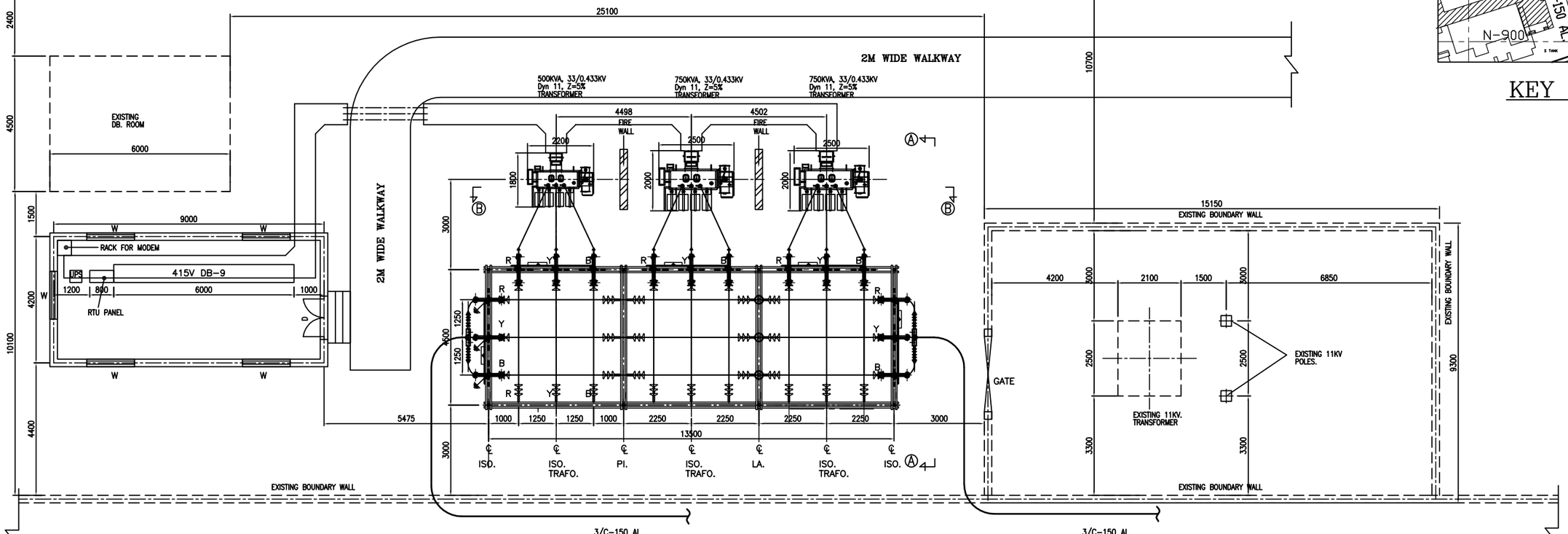
HALL-4

HALL-4

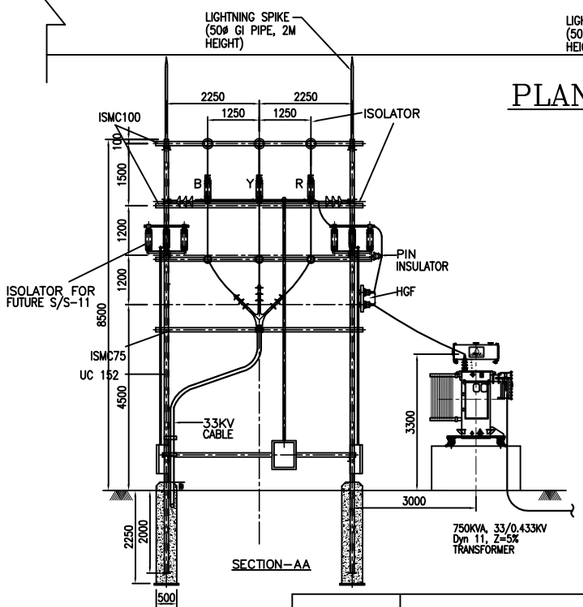
MAGNETIC NORTH

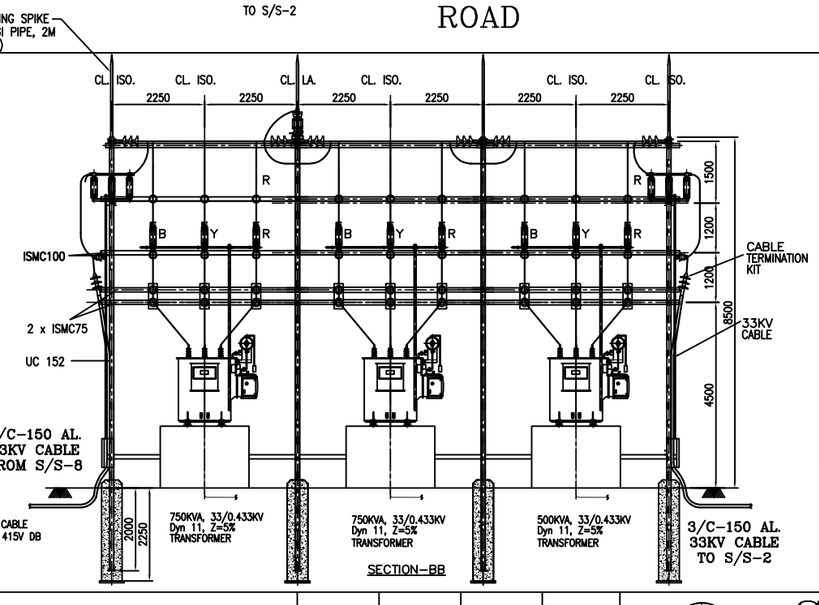


KEY PLAN



PLAN





BOQ OF MATERIALS:-

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
1..	33KV, 400A DOUBLE BREAK ISOLATOR	6 SETS.
2..	33KV, 20A, HORN GAP FUSE	1 SET.
3..	33KV, 32A, HORN GAP FUSE	2 SETS.
4..	33KV, 10KA. L.A., 1ø	3 NOS.
5..	33KV, TENSION INSULATOR STRING WITH TENSION CLAMP.	36 NOS.
6..	33KV, PIN INSULATOR.	15 NOS.
7..	33KV, CABLE TERMINATION KIT FOR 3/C-150 sq.mm AL. XLPE CABLE.	2 NOS.
8..	33KV, 4 POLE STRUCTURE	3 NOS.
9..	750KVA, 33/0.433KV TRANSFORMER.	2 NOS.
10..	500KVA, 33/0.433KV TRANSFORMER.	1 NO.
11..	3.5C x 240sq.mm AL. XLPE L.T. POWER CABLE	225 M
12..	415V DB.	1 NO.
13..	ACSR RABBIT	130 M
14..	LIGHTNING SPIKE (50ø GI PIPE, 2M HEIGHT)	6 NOS.
12..	RTU FOR DAS	1 NO.
13..	UPS FOR RTU	1 NO.
14..	GSM/GPRS MODEM FOR DAS	1 NO.

NOTE:

1. ALL DIMENSIONS ARE IN mm.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION NO. NITRKL-33KVRM-TD-01.
3. EXISTING 11KV POLES AND TRANSFORMER SHALL BE DISMANTLED AND HANDED OVER TO NIT, RKL AFTER COMMISSIONING OF THE 33KV SYSTEM.
4. EXISTING EQUIPMENT/POLES/CABLE TRENCH ARE SHOWN BY DOTTED LINE.
5. HEIGHT OF NEW DB ROOM SHALL BE 3.5M CLEAR.

REF. DRAWINGS:

1. NIT-RKL-E-LAY-002 : OVERALL LAYOUT OF 33KV RING MAIN.
2. NIT-RKL-E-SLD-002 : SLD OF SUBSTATION-6 & 9 SHT. 8 OF 10.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	02.6.10

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CLIENT:- NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:- 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

	NAME	DATE
DRWN.	UP	13.01.10
CHKD.	SKD	13.01.10
APPD.	SM	15.01.10
SCALE	1:100	
JOB.NO.	XXXXX	

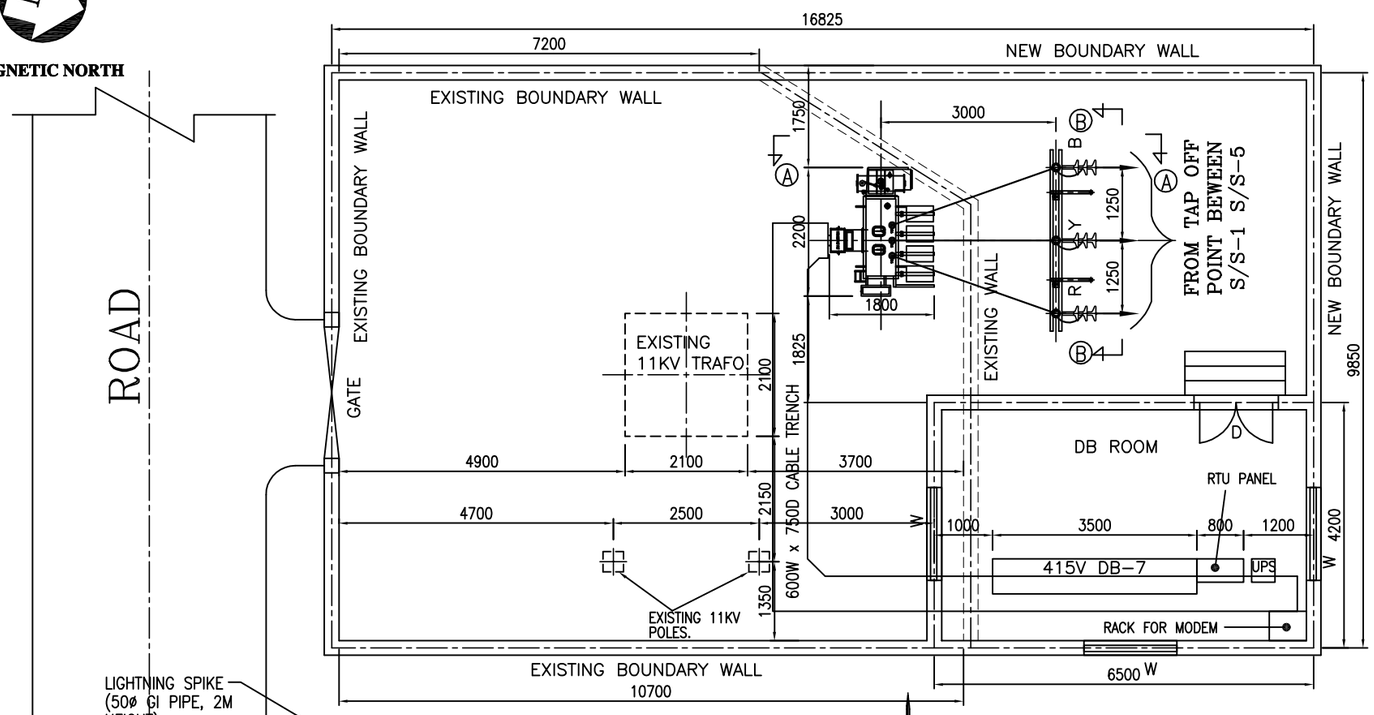
TITLE:- ELECTRICAL LAYOUT OF SUBSTATION-6 & 9 (FOR HALL-4)

DRG.NO:- NIT-RKL-E-LAY-007 | SHT. 01 OF 01 | REV. 1

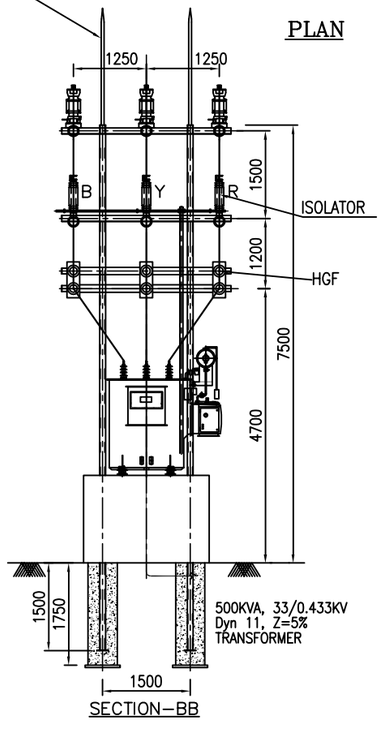
SHT. SIZE:-A2

FILE NAME : XXXXXXX

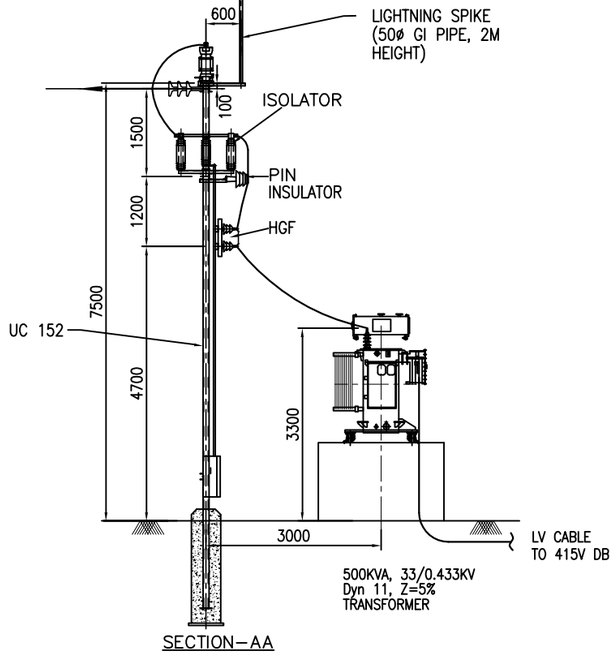
MAGNETIC NORTH



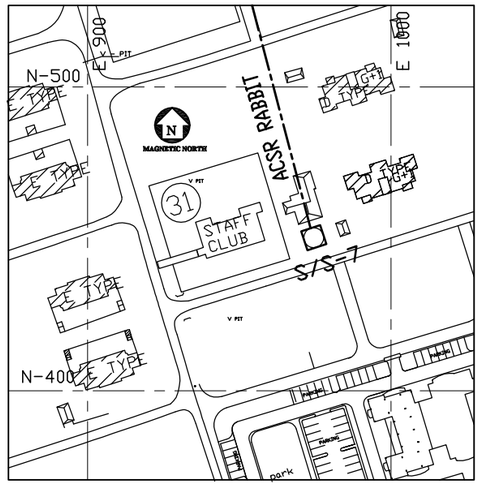
PLAN



SECTION–BB



SECTION–AA



KEY PLAN

BOQ OF MATERIALS:–

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
1..	33KV, 400A DOUBLE BREAK ISOLATOR	1 SET.
2..	33KV, 20A, HORN GAP FUSE	1 SET.
3..	33KV, 10KA. L.A., 1ø	3 NOS.
4..	33KV, TENSION INSULATOR STRING WITH TENSION CLAMP.	NIL
5..	33KV, PIN INSULATOR.	3 NOS.
7..	33KV, 2 POLE STRUCTURE	1 NO.
8..	500KVA, 33/0.433KV TRANSFORMER.	1 NO.
9..	3.5C x 240sq.mm AL. XLPE L.T. POWER CABLE	45 M
10..	415V DB.	1 NO.
11..	ACSR RABBIT	20 M
12..	LIGHTNING SPIKE (50ø GI PIPE, 2M HEIGHT)	2 NOS.
13..	RTU FOR DAS	1 NO.
14..	UPS FOR RTU	1 NO.
15..	GSM/GPRS MODEM FOR DAS	1 NO.

NOTE:

1. ALL DIMENSIONS ARE IN mm.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION NO. NITRKL–33KVRM–TD–01.
3. EXISTING 11KV POLES AND TRANSFORMER SHALL BE DISMANTLED AND HANDED OVER TO NIT, RKL AFTER COMMISSIONING OF THE 33KV SYSTEM.
4. EXISTING EQUIPMENT/POLES/CABLE TRENCH ARE SHOWN BY DOTTED LINE.
5. HEIGHT OF NEW DB ROOM SHALL BE 3.5M CLEAR.

REF. DRAWINGS:

1. NIT–RKL–E–LAY–002 : OVERALL LAYOUT OF 33KV RING MAIN.
2. NIT–RKL–E–SLD–002 : SLD OF SUBSTATION–7 SHT. 6 OF 10.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE MARKED AS UC 152	UP	SKD	SM	02.6.10

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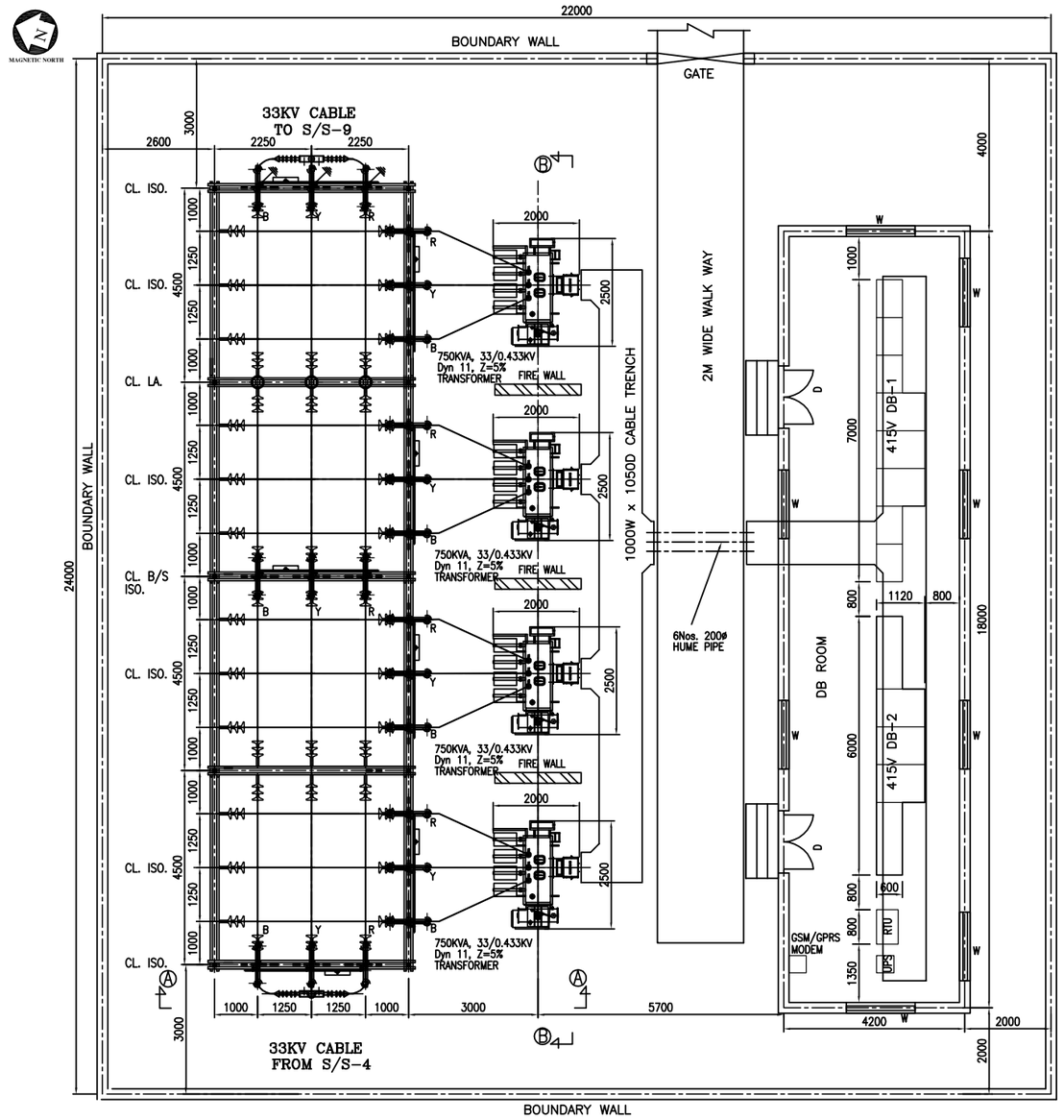
PROJECT:– 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

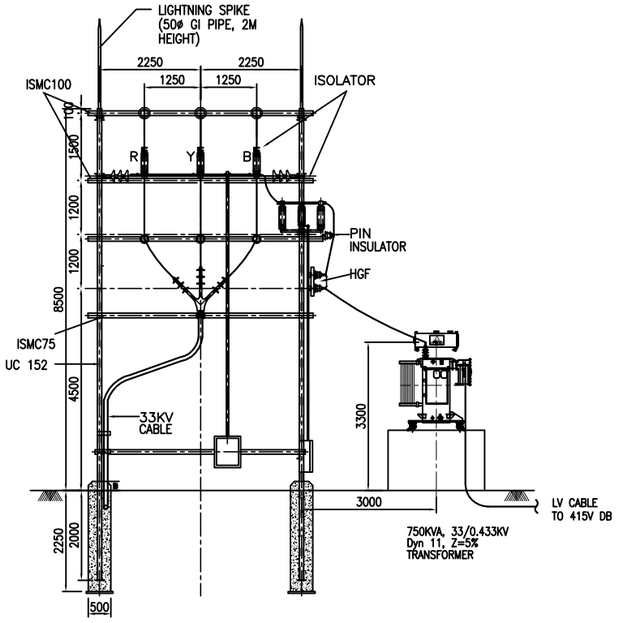
	NAME	DATE
DRWN.	UP	13.01.10
CHKD.	SKD	13.01.10
APPD.	SM	15.01.10
SCALE	1:100	

TITLE:– ELECTRICAL LAYOUT OF SUBSTATION–7 (FOR COLONY, D–FLAT)

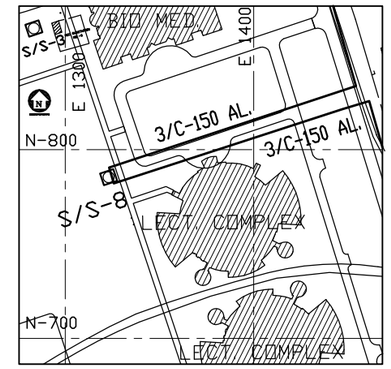
JOB.NO. XXXXX | DRG.NO:– NIT–RKL–E–LAY–008 | SHT. 01 OF 01 | REV. 1

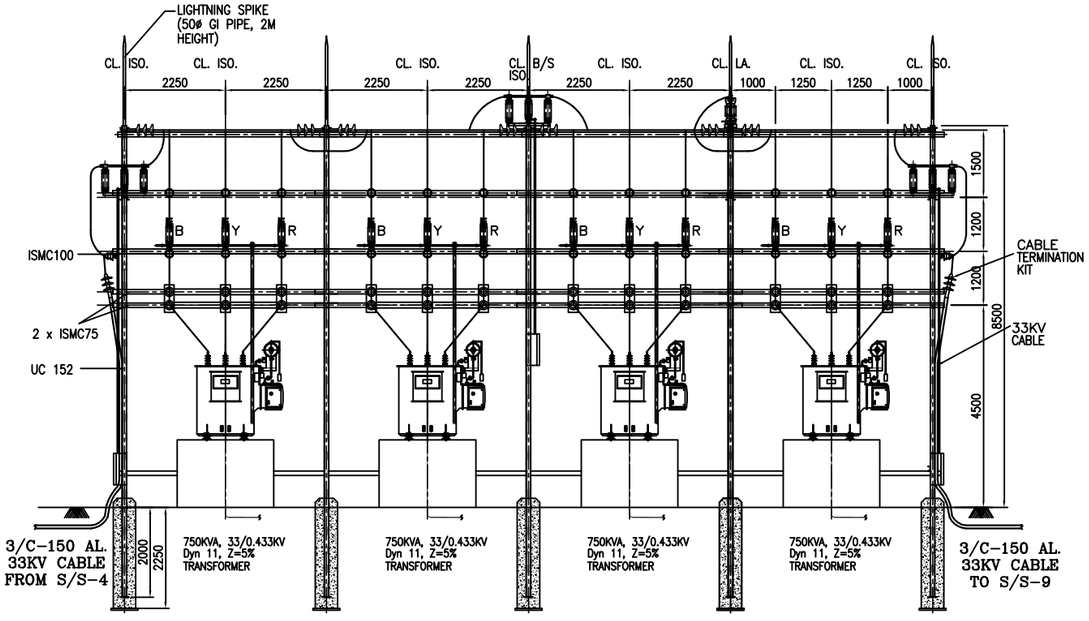
SHT. SIZE:–A3





SECTION–AA





SECTION–BB

BOQ OF MATERIALS:–

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
1..	33KV, 400A DOUBLE BREAK ISOLATOR W/O E/S	6 SETS.
2..	33KV, 400A DOUBLE BREAK ISOLATOR WITH E/S	1 SET.
3..	33KV, 32A, HORN GAP FUSE, 3ø	4 SET.
4..	33KV, 10KA. L.A., 1ø	3 NOS.
5..	33KV, TENSION INSULATOR STRING WITH TENSION CLAMP.	48 NOS.
6..	33KV, PIN INSULATOR.	18 NOS.
7..	33KV, CABLE TERMINATION KIT FOR 3/C–150 sq.mm AL. XLPE CABLE.	2 NOS.
8..	33KV, 4 POLE STRUCTURE	4 NOS.
9..	750KVA, 33/0.433KV TRANSFORMER.	4 NOS.
10..	3.5C x 240sq.mm AL. XLPE L.T. POWER CABLE	400 M
11..	415V DB.	2 NOS.
12..	ACSR RABBIT	180 M

ITEM No.	ITEM DESCRIPTION	QTY. (NOS.)
13..	LIGHTNING SPIKE (50ø GI PIPE, 2M HEIGHT)	10 NOS.
14..	RTU FOR DAS	1 NO.
15..	UPS FOR RTU	1 NO.
16..	GSM/GPRS MODEM FOR DAS	1 NO.

NOTE:

1. ALL DIMENSION ARE IN mm.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION NO. NITRKL–33KVRM–TD–01.
3. HEIGHT OF NEW DB ROOM SHALL BE 3.5M CLEAR.

REF. DRAWINGS:

1. NIT–RKL–E–LAY–002 : OVERALL LAYOUT OF 33KV RING MAIN.
2. NIT–RKL–E–SLD–002 : SLD OF SUBSTATION–8 SHT. 9 OF 10.

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
2	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	02.6.10
1	REVISED AS PER DISCUSSION DT. 27.03.10	UP	SM	SM	29.03.10

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KOLKATA – 700 064
www.satcon.in

CLIENT:– NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:– 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

	NAME	DATE
DRWN.	UP	13.01.10
CHKD.	SKD	13.01.10
APPD.	SM	15.01.10
SCALE	1:125	
JOB.NO.	XXXXX	

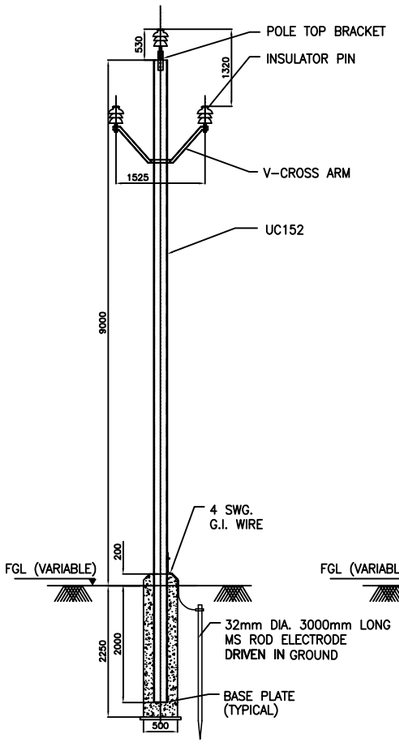
TITLE:– ELECTRICAL LAYOUT OF SUBSTATION–8 (FOR BM, LC, MSE, GOLDEN JUBILEE BLDG.)

DRG.NO:– NIT–RKL–E–LAY–009 | SHT. 01 OF 01 | REV. 2

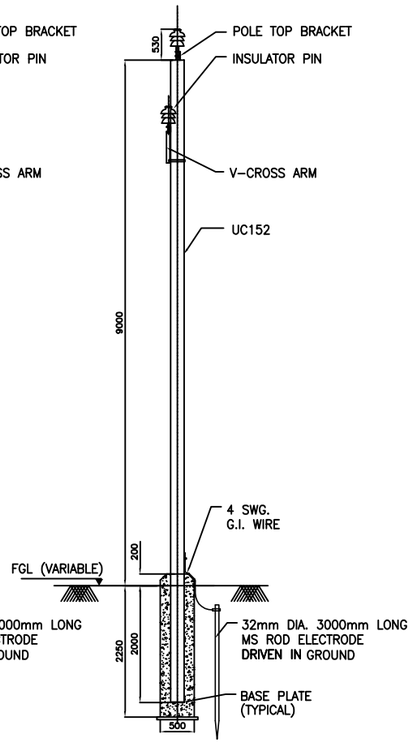
SHT. SIZE:–A3

FILE NAME :- XXXXXXX

FILE NAME : XXXXXXX

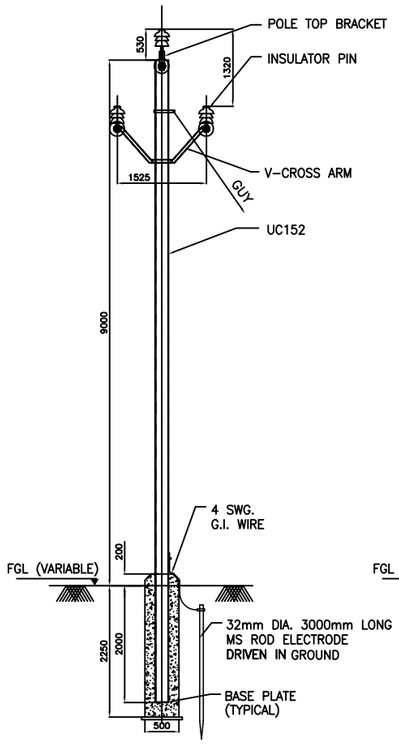


FRONT VIEW



SIDE VIEW

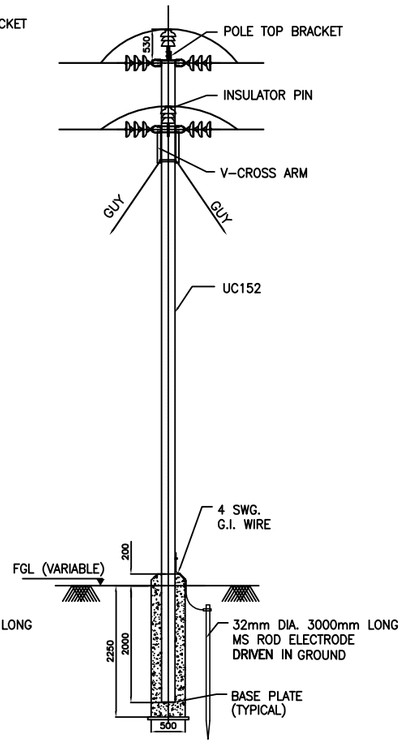
TYPICAL ARRANGEMENT FOR SINGLE POLE STRUCTURE (FOR ANGLE UP TO 5°)



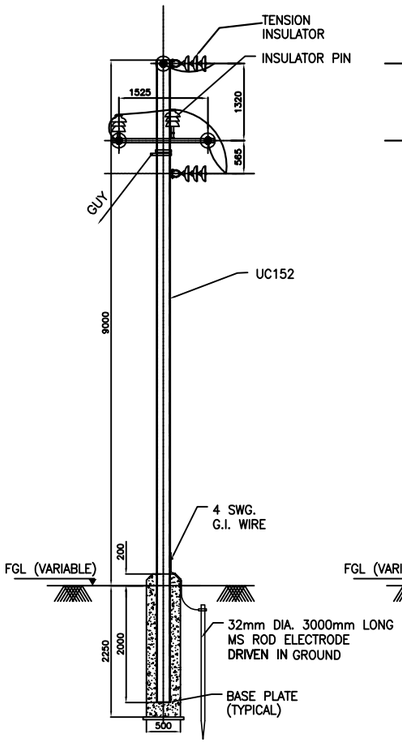
FRONT VIEW

PLAN

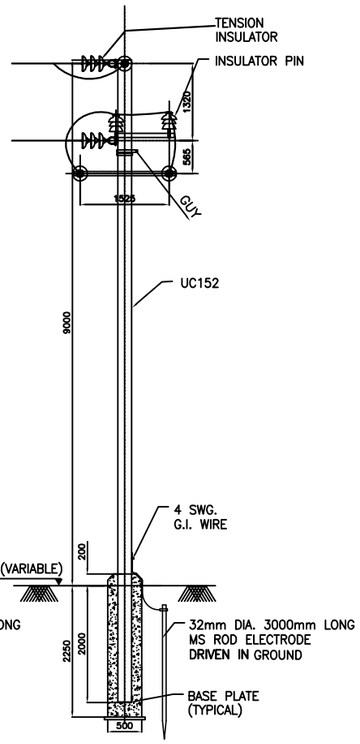
TYPICAL ARRANGEMENT FOR SINGLE POLE STRUCTURE (FOR ANGLE ABOVE 5° UP TO 60°)



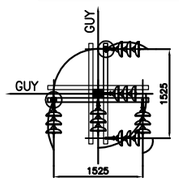
SIDE VIEW



FRONT VIEW



SIDE VIEW



PLAN

TYPICAL ARRANGEMENT FOR SINGLE POLE STRUCTURE (FOR ANGLE ABOVE 60° UP TO 90°)

BILL OF MATERIALS FOR SINGLE POLE STRUCTURE 0° TO 5°

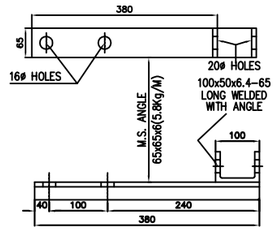
ITEM	QTY.
SUPPORT 11M (UB152)	1 NO.
POLE TOP BRACKET	1 NO.
V-CROSS ARM (M.S. CHANNEL-100X50X6.4)	1 NO.
33KV PIN INSULATOR	3 NOS.
EARTHING MATERIAL	AS REQD.
NUTS, BOLTS, POLE CLAMPS ETC.	AS REQD.

BILL OF MATERIALS FOR SINGLE POLE STRUCTURE 6° TO 60°

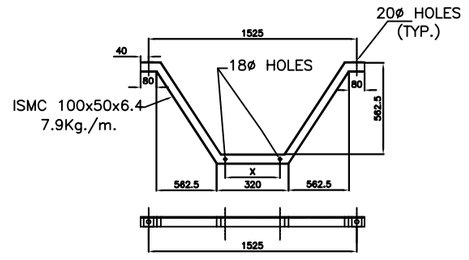
ITEM	QTY.
SUPPORT 11M (UB152)	1 NO.
POLE TOP BRACKET	1 NO.
V-CROSS ARM (M.S. CHANNEL-100X50X6.4)	2 NOS.
33KV PIN INSULATOR	3 NOS.
33KV DISC INSULATOR	6 SETS.
GUY SET	AS REQD.
EARTHING MATERIAL	AS REQD.
NUTS, BOLTS, POLE CLAMPS ETC.	AS REQD.

BILL OF MATERIALS FOR SINGLE POLE STRUCTURE 61° TO 90°

ITEM	QTY.
SUPPORT 11M (UB152)	1 NO.
CROSS ARM (M.S. CHANNEL-100X50X6.4)	4 NOS.
33KV PIN INSULATOR	2 NOS.
33KV DISC INSULATOR	6 SETS.
GUY SET	AS REQD.
EARTHING MATERIAL	AS REQD.
NUTS, BOLTS, POLE CLAMPS ETC.	AS REQD.



POLE TOP BRACKET



V-CROSS ARM

NOTE:

1. ALL DIMENSIONS ARE IN mm.
2. X=TO SUIT THE POLE
3. NO. OF GUY SET WILL BE GUIDED BY REC CONSTRUCTION STANDARD

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	03.6.10

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CLIENT:- NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

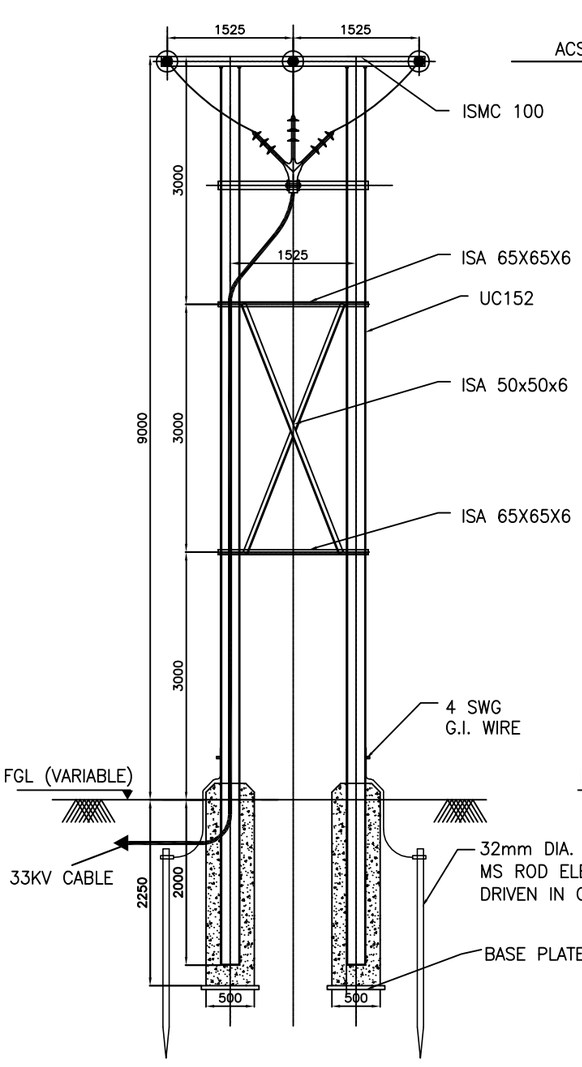
PROJECT:- 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

	NAME	DATE
DRWN.	UP	10.01.10
CHKD.	SKD	10.02.10
APPD.	SM	11.02.10
SCALE	1:100	
JOB.NO.	XXXXX	

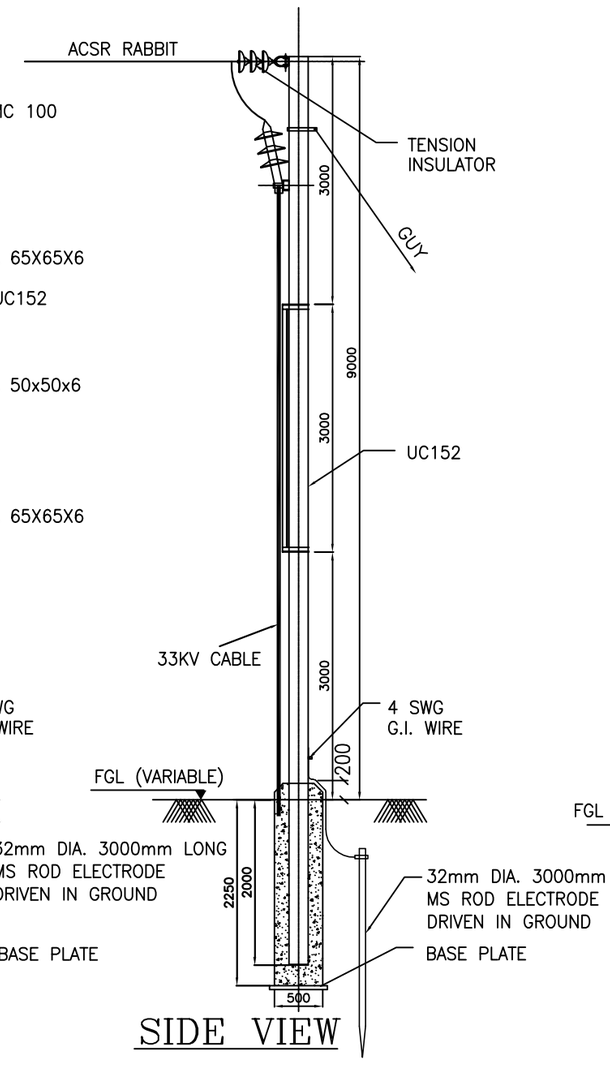
TITLE:- GA OF 33KV SINGLE POLE STRUCTURE FOR 33KV RING MAIN OVERHEAD LINE

DRG.NO:- NIT-RKL-E-GA-001 | SHT. 01 OF 01 | REV. 1

SHT. SIZE:-A3



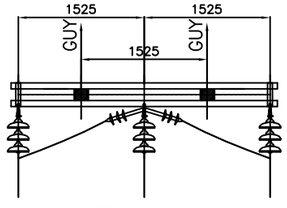
FRONT VIEW



SIDE VIEW

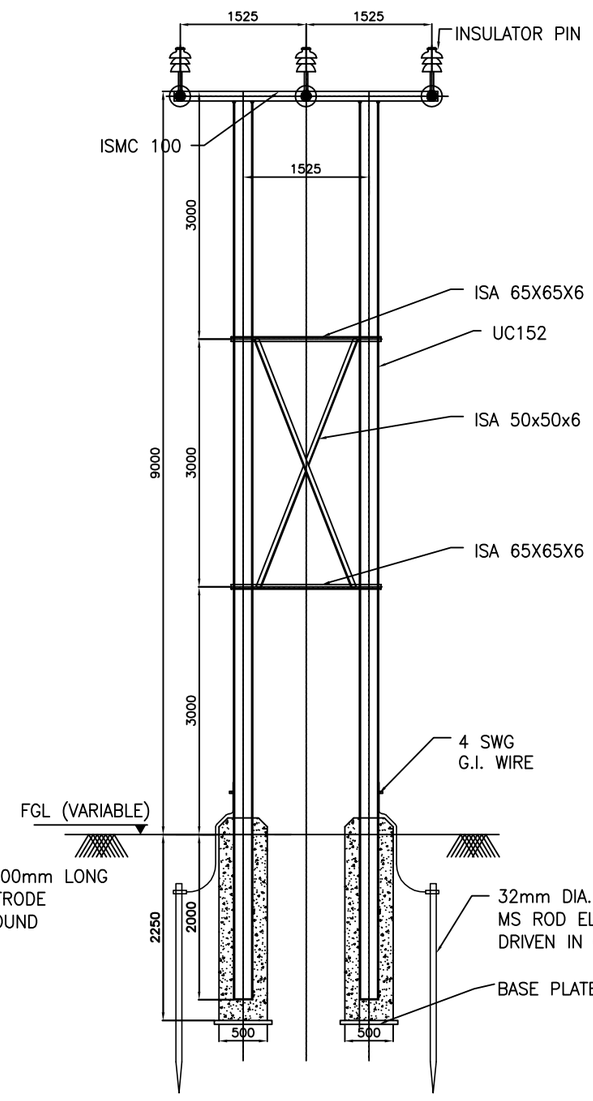
BILL OF MATERIALS OF DOUBLE POLE

ITEM	QTY.(TYPE–A)	QTY.(TYPE–B)
SUPPORT 11M (UB152)	2 NOS.	2 NOS.
M.S. CHANNEL–100X50X6 (3050mm)	2 NOS.	2 NOS.
33KV PIN INSULATOR	–	3 NOS.
33KV DISC INSULATOR	3 SETS.	6 SETS.
GUY SET	AS REQD.	AS REQD.
65X65X6 BELT	3 NOS.	3 NOS.
50X50X6 BRACING	2 NOS.	2 NOS.
EARTHING MATERIAL	AS REQD.	AS REQD.
NUTS, BOLTS, POLE CLAMPS ETC.	AS REQD.	AS REQD.

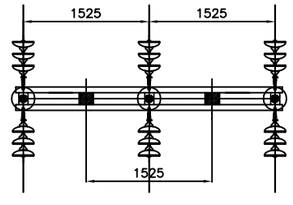


PLAN

TYPICAL ARRANGEMENT FOR
TWO POLE STRUCTURE
(FOR TRANSITION POINTS FROM
OHL TO UG CABLE)
TYPE–A



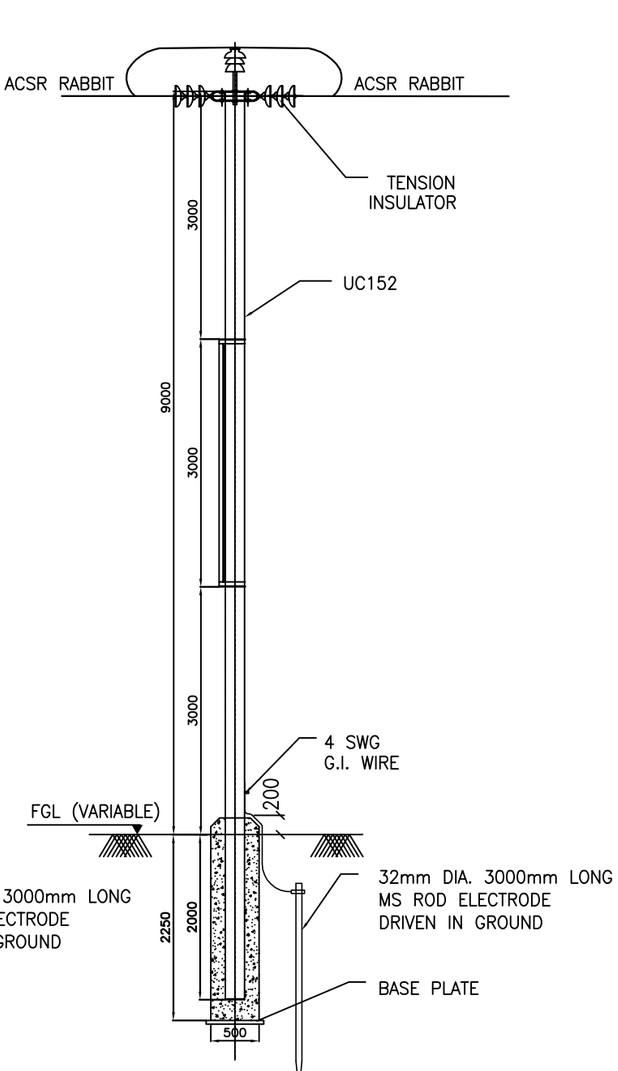
FRONT VIEW



PLAN

NOTE:

1. NO. OF GUY SET WILL BE GUIDED BY REC CONSTRUCTION STANDARD



SIDE VIEW

TYPICAL ARRANGEMENT FOR
TWO POLE STRUCTURE
(FOR STRAIGHT RUN BUT DIFFERENCE
OF GRADIENT IN LINE ALINGMENT)
TYPE–B

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	02.6.10

SATCON
(CONSULTANTS AND ENGINEERS)
DB–90, SALT LAKE CITY,
KOLKATA – 700 064
www.satcon.in

CLIENT:– NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA.

PROJECT:– 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

	NAME	DATE
DRWN.	UP	10.02.10
CHKD.	SKD	10.02.10
APPD.	SM	11.02.10
SCALE	1:100	
JOB.NO.	XXXXX	

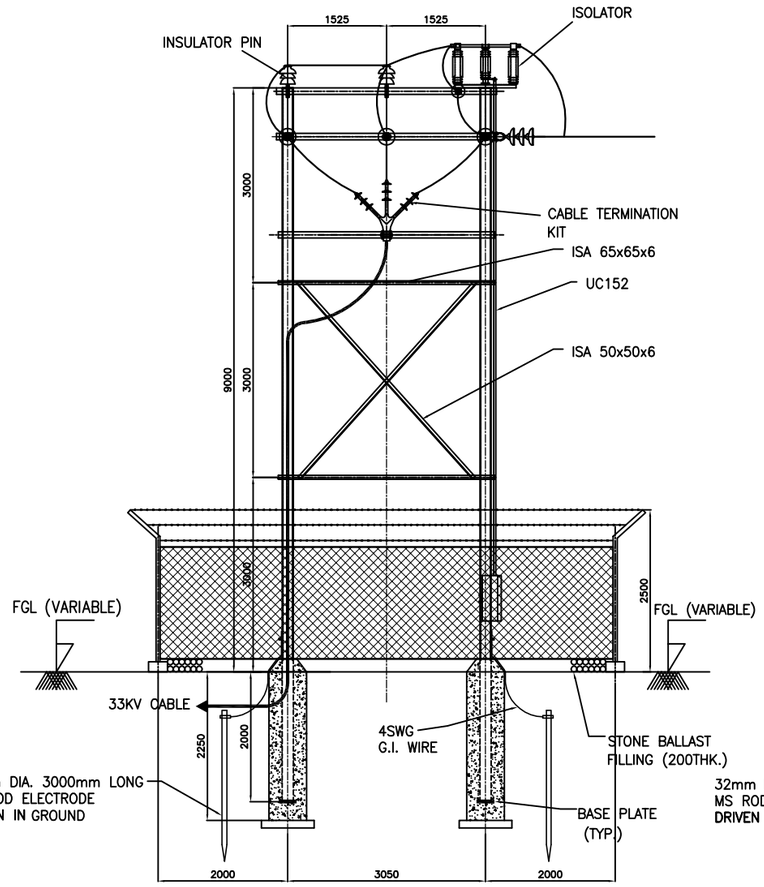
TITLE:– GA OF TWO POLE STRUCTURE FOR 33KV RING MAIN OVERHEAD LINE

DRG.NO:– NIT–RKL–E–GA–002 | SHT. 01 OF 01 | REV. 1

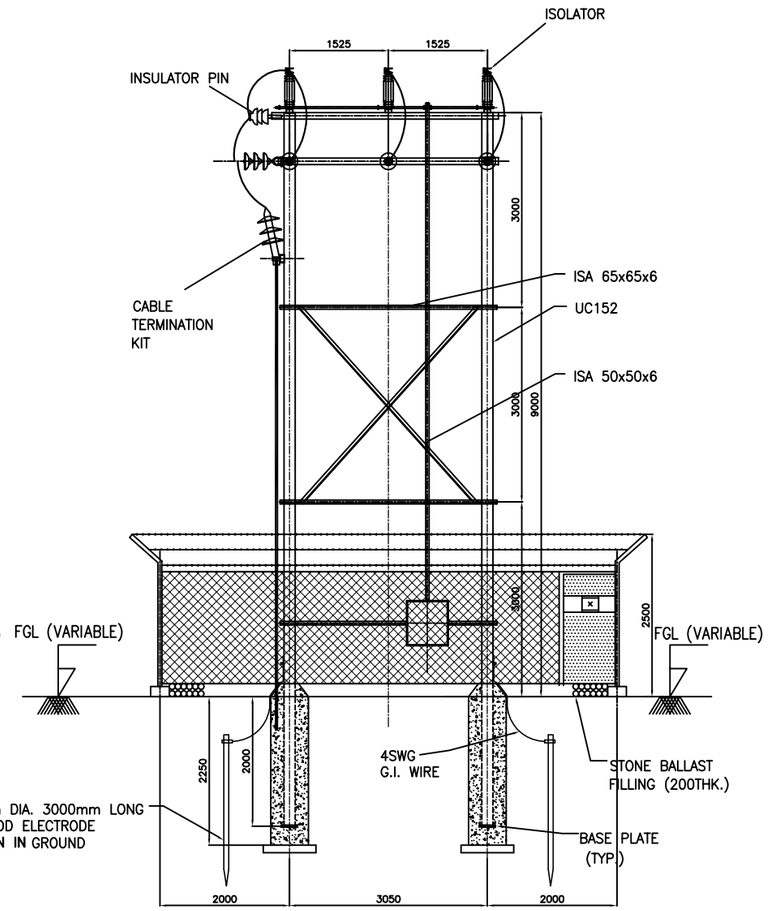
SHT. SIZE:–A4

FILE NAME :- XXXXXXX

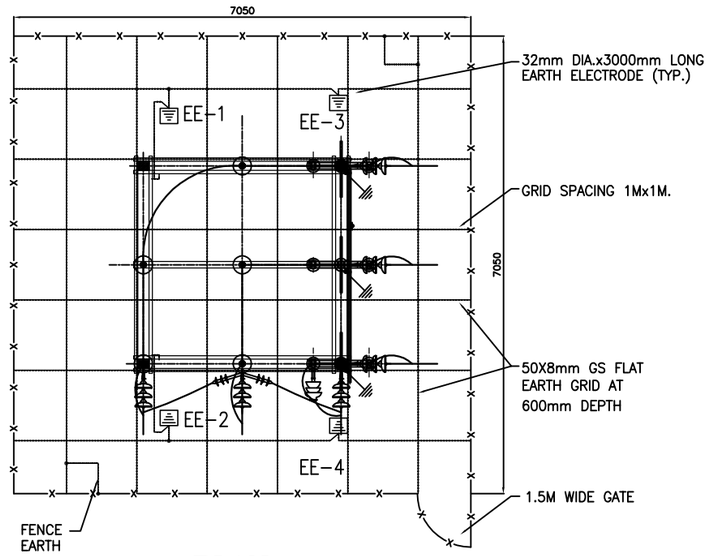
FILE NAME : XXXXXXX



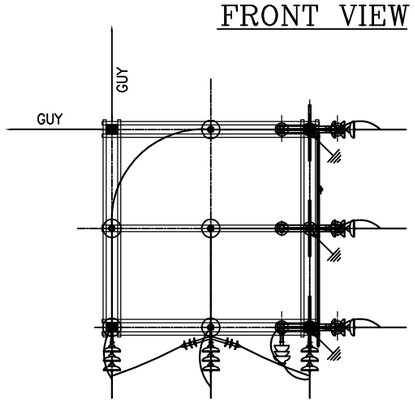
FRONT VIEW



SIDE VIEW



PLAN



PLAN

BILL OF MATERIALS OF FOUR POLE FOR TRANSITION POINTS FROM OHL TO UC CABLE)

ITEM	QTY.
SUPPORT 11M (UC152)	4 NOS.
M.S. CHANNEL–100X50X6–3050mm	8 NOS.
33KV PIN INSULATOR	6 NOS.
33KV DISC INSULATOR	6 SETS.
GUY SET	AS REQD.
65X65X6 BELT	9 NOS.
50X50X6 BRACING	8 NOS.
EARTHING MATERIAL	AS REQD.
NUTS, BOLTS, POLE CLAMPS ETC.	AS REQD.
BASE PLATE	4 NOS.
33KV, 400A DB ISOLATOR	1 SET.

NOTE:

1. NO. OF GUY SET WILL BE GUIDED BY REC CONSTRUCTION STANDARD

REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	03.6.10

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PROJECT:– 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

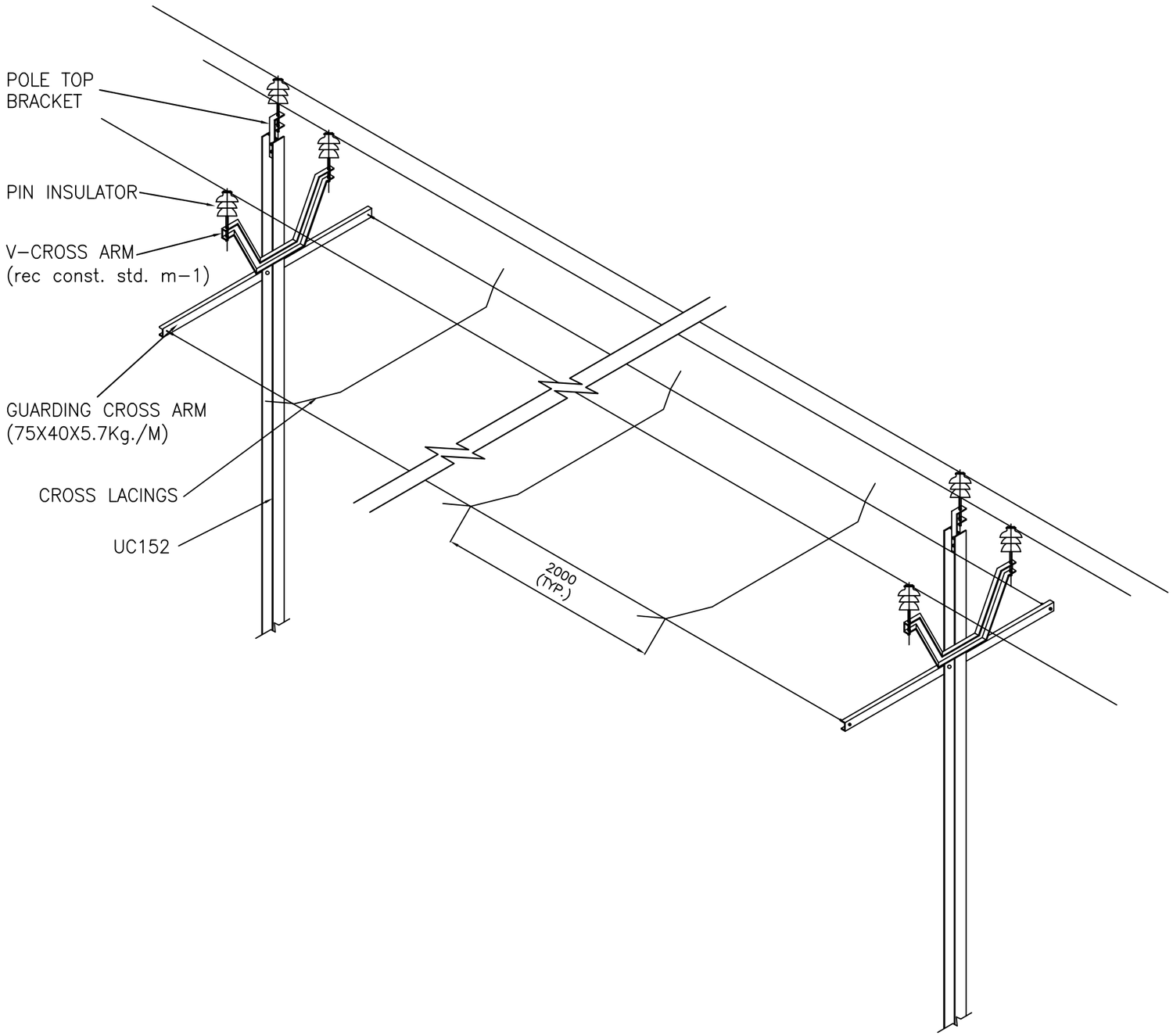
	NAME	DATE
DRWN.	UP	10.02.10
CHKD.	SKD	10.02.10
APPD.	SM	11.02.10
SCALE	1:100	
JOB.NO.	XXXXX	

TITLE:– GA OF 33KV FOUR POLE STRUCTURE FOR LINE TAPPING.

DRG.NO:– NIT–RKL–E–GA–003 | SHT. 01 OF 01 | REV. 1

SHT. SIZE:–A3

FILE NAME : XXXXXXX



REV. NO.	DESCRIPTION	BY	CHKD.	APPD.	DATE
01	POLE TYPE CHANGED TO UC 152	UP	SKD	SM	03.6.10

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PROJECT:– 33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS

	NAME	DATE
DRWN.	UP	10.02.10
CHKD.	SKD	10.02.10
APPD.	SM	11.02.10
SCALE	1:75	
JOB.NO.	XXXXX	

TITLE:– TYPICAL DETAIL OF CRADDLE GUARD

DRG.NO:– NIT–RKL–E–GA–004 | SHT. 01 OF 01 | REV. 1

SHT. SIZE:–A4