SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED
HYDERABAD
(Govt of Telangana Undertaking)

Through e-procurement mode only-https://tender.telangana.gov.in

RFP / BID No. Chief Engineer/Projects/TGSPDCL/RURAL SCADA : 05/2025-26

NAME OF THE WORK: Providing SCADA system in 116 Nos. 33/11KV Substations located at District Headquarters and key towns of Rural Circles in TGSPDCL

Online tenders are invited by the Chief Engineer (Projects) for Supply, Installation Testing, Commissioning (SITC) and Maintenance of SCADA System for 116 Nos. 33/11KV substations located at District Headquarters and key towns of Rural Circles in TGSPDCL in Telangana state.

PART-I
(TECHNICAL BID)
&
PART-II
(PRICE BID)

Chief Engineer
Projects, TGSPDCL,
4th Floor, Corporate office,
Mint Compound, Hyderabad - 500063.

Phone: 040-23431321
Email: cgmproj99@gmail.com

SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LTD.
(A Govt. of Telangana Undertaking)
(Formerly Central Power Distribution Company of Andhra Pradesh Ltd.)
Corporate Office, 6-1-50, Mint Compound :: Hyderabad-63(Telangana State, India)
CIN U40109TG2000SGC034116

e-Procurement Tender Notice

TGSPDCL intends to float tenders for SCADA automation of 116 Nos 33/11KV Substations located at District Headquarters and key towns of Rural Circles in TGSPDCL on e-procurement platform. The details are `as tabulated below.

Sl. No.	Name of the work	Specification No.	Date & time of downloading tender document	Closing Date & time for submission of bid
1.	**Supply, Installation, Testing, Commissioning (SITC) and Maintenance (for a period of five years) of SCADA System for 116 Nos 33/11KV Substations located at District Headquarters and key towns of Rural Circles in TGSPDCL in Telangana state.**	**CE(Projects)/ TGSPDCL/ RURAL SCADA : 05/2025-26**	**27.09.2025 from 17:30 hrs**	**23.10.2025 upto 12:00 Hrs**

For further details regarding detailed tender notification, specifications and digital certificate please visit https://tgsouthernpower.org/ and tender.telangana.gov.in or contact the helpdesk of the site.
Phone: 040-23431321

CHIEF ENGINEER/ PROJECTS

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NOTE:

1. "Payment terms, Delivery period, Performance Bank Guarantee, Taxes and Duties" should be in line with the terms and conditions of the specification. If any bidder does not meet any one of the conditions, such tender will not be considered. Please note that the conditional offers are also not considered. Hence the bidder shall submit the tender in line with the terms and conditions of the specification.
2. The bidders shall check the website https://tgsouthernpower.org/ and www.tender.telangana.gov.in for amendments, if any, up to one day prior to the date of tender opening. The amendments shall be binding on the bidders.
3. The Employer will not be responsible for any damage that may be caused to the samples at any time.
4. The bidder shall furnish required Bid Security amount and validity as per specification. If the bidder fails to furnish bid security amount and bid validity as stipulated in the specification, such tender bid will not be considered for further evaluation.
5. The bid evaluation will be carried out based on the documents uploaded through www.tender.telangana.gov.in against this tender.
6. The Bids received with any details pertaining to prices in the offline mode will be liable for rejection.
7. EMD Exemption is considered only for Government Firms.

Ph : 040 – 23431321.

CHIEF ENGINEER / PROJECTS
TGSPDCL

SECTION – I

NOTICE INVITING BIDS

Notice for Inviting the Bid:

The Southern Power Distribution Company of Telangana Ltd is seeking Supply, Installation, Testing, Commissioning (SITC) and Maintenance (for a period of five years) of SCADA System for 116Nos. 33/11KV substations located at District Headquarters and key towns of Rural Circles of TGSPDCL in Telangana state. The scope of work includes the bidder, SPA (System Providing Agency) in coordination with utility as per the requirement to be given in this detailed RFP/Bid shall carry out field survey, design, engineering, supply, installation, testing & commissioning of SCADA hardware at substations (including PCs, Routers, Switches, UPS, RTU, Hybrid WTI & OTI sensors with panel, IED, Multi function Transducers (MFTs), Communication equipment, Auxiliary power supply etc), Hardware at Control room (including Firewalls, LAN Switches, RVDUs, Laser based VDUs, SAN Storage), software (including operating system, LDMS Software), network (LAN, WAN), etc. and integrate the 116 Nos rural area substations to the existing SCADA system.

- Facilities management services for maintaining infrastructure, post successful completion of acceptance tests for a period of five years from the date of completion of acceptance.
- SPA should ensure that legacy systems and the new solutions lined up by them are tightly integrated and do not remain stand-alone and perform on real time basis as envisaged in specifications. All required external systems shall be integrated using an integration middleware layer. The scope of integration of external systems includes IT systems already existing and functional in the TGSPDCL, but outside the present scope of work. The integration is expected to be on-line, real time or offline where appropriate and shall operate in an automated fashion without manual intervention.
- SPA shall make necessary provisions/software linkages in the proposed solution so that the existing SCADA system may be integrated seamlessly.
- The bidder shall be responsible for the overall management and supervision of works, including the implementation of risk management as well as change management initiatives. He shall provide experienced, skilled, knowledgeable and competent personnel for all phases of the project, so as to provide the TGSPDCL with a high quality system.
- Any item though not specifically mentioned, but is required to complete the project works in all respects for its safe, reliable, efficient and trouble free operation shall also be taken to be included, and the same shall be supplied and installed by the SPA without any extra cost unless it is explicitly excluded.

Details of Notice Inviting the Bid

BID No. Chief Engineer/Projects/TGSPDCL/RURAL SCADA : 05/2025-26		
S.No	**Description**	
1	Department Name	TGSPDCL
2	Office	O/o. Chief Engineer (Projects), Corporate Office, TGSPDCL
3	Tender Number	BID No. Chief Engineer/Projects/TGSPDCL/ RURAL SCADA: 05/2025-26
4	Mode of work Execution	EPC (Engineering, Procurement and Construction) Model. Service providing agency shall procure, erect, commission, provide communication and integrate in co-ordination with existing SCADA system integrator. FMS for 5 years shall be carried by the EPC service providing agency from the date of Go-live.
5	Project completion Schedule	6 months from the date of LoA (letter of award)
6	Warranty Period	Five years for the related hardware supplied under the project from the date of Go-live as certified by the SE/SCADA
7	Tender Type	e-tender
8	Tender Category	Open
9	Bid Validity	180 days
10	Bid Amount	Rs.51.01 Crores (Ex-Works)
11	Bid Security (INR)	Rs.1.20 Crores (2% of the Bid Amount plus GST @18%)
12	Bid Security Payable to	In the form of DD in favour of Pay Officer/ TGSPDCL/ Hyderabad from Nationalized/Scheduled Bank or Bank Guarantee in favour of Chief Engineer/ Projects/ TGSPDCL/ Hyderabad (Receipt Bank account name: Pay Officer TGSPDCL, Acc no: 52086558583, Branch: Panjagutta, Hyd, IFSC: SBIN0020072) from Nationalized/Scheduled Bank as per format 3(a). The validity of the BG issued against Bid security will remain valid up to +45 (forty five) days after the period of Bid validity.
13	Transaction Fee	Transaction fee: All the participating bidders who submit the bids have to pay an amount @ 0.03% of their final bid value online with a cap of Rs.10000/- for quoted value of purchase up to Rs.50 crores and Rs.25000/- if the purchase value is above Rs.50 crores & service tax applicable as per GST as levied by Govt. of India on transaction fee through online in favour of M/s. TSTS. The amount payable to M/s. TSTS is non refundable. Corpus Fund: Successful bidder has to pay an amount of 0.04% on quoted value through demand draft in favour of Managing Director, TSTS, Hyderabad towards corpus fund at the time of concluding agreement.
14	Transaction Fee Payable to	TSTS, Hyderabad
15	Schedule downloading opening date online	**27-09-2025 from 17:30 Hrs**

16	Date & time of pre-bid meeting	**13-10-2025 at 11:00 Hrs**
17	Schedule downloading Closing Date online	**-**
18	Bid Submission Closing Date & time	**23-10-2025 Upto 12:00 Hrs**
19	Bid submission	On Line
20	Pre-Qualification & Technical Bid Opening Date (Qualification and Eligibility Stage and Technical Bid Stage)	**23-10-2025 at 15:00 Hrs.**
21	Price Bid Opening Date (tentative) (Financial Bid Stage)	**01-11-2025 at 12:00 Hrs**
22	Place of Tender Opening	O/o Chief Engineer/Projects, TGSPDCL, 4th Floor, Corporate Office, Mint Compound, Hyderabad – 500 063.
23	Officer Inviting Bids/ Contact Person	Chief Engineer/ Projects/ TGSPDCL/ Hyderabad.
24	Address/E-mail id	O/o. Chief Engineer/Projects, TGSPDCL, 4th Floor, Corporate Office, Mint Compound, Hyderabad – 500 063 Mail id : cgmproj99@gmail.com
25	Contact Details/Telephone	Ph. No. 040-23431321.
26	Procedure for Bid Submission	1. Bids shall be submitted online on www.tender.telangana.gov.in platform. 2. The participating bidders in the tender should register themselves free of cost on e-procurement platform in the website www.tender.telangana.gov.in. 3. Bidders can log-in to e-procurement platform in secure mode only by signing with the Digital certificates. 4. The bidders who are desirous of participating in e-procurement shall submit their technical bids, price bids as per the standard formats available at the e-market place. 5. The Bidders should scan and upload the following documents in support of technical bids and any other documents as specified in the ITB. The bidders shall sign on all the statements, documents, certificates uploaded by him, owning responsibility for their correctness/authenticity. a. Bid Security i) In the form of DD in favour of Pay Officer/ TGSPDCL / Hyderabad (or) Alternatively Bank Guarantee from Nationalized / Scheduled bank in favour of Chief Engineer/ Projects/ TGSPDCL/ Hyderabad as per format-3(a) enclosed (or) ii) If exempted give details of Bid Security Exemption (in case of Govt. Organization) b. Documents in proof of technical and financial eligibility as per Section-VI. c. Technical details of offered equipment/systems and other relevant documents in full shape attached to the bid.

		d. Financial Turnover certified by CA for last 5 years e. Duly filled and signed proforma as per Format A f. A detailed project implementation plan and schedule manpower resources proposed to be deployed by the Contractor during the execution phase, shall be clearly indicated. g. Transaction fee payable to TSTS h. Performance Certificates issued by Head of Purchasing Authority (as per spec) 6. The rates should be quoted **in online** only 7. The Bidder should quote for 100% quantity indicated in the bid Specification. In any case, if the Bidder quotes for partial quantity, the Bidder will be disqualified.
		8. After uploading the documents the copies of the uploaded statement, certificates, documents, **original Demand Drafts/ Bank Guarantee** in respect of Bid Security (except the Price bid/offer/break-up of taxes) are to be submitted by the bidder to the Chief Engineer/ Projects/ TGSPDCL so as to reach before the date and time of opening of the technical bid. Failure to furnish Original BG/DD before the date and time of opening of technical bid will entail in rejection of the bid. The Department shall not hold any risk on account of postal delay. Similarly, if any of the certificates, documents, etc. furnished by the tenderer are found to be false/ fabricated/ bogus, the bidder will be disqualified, blacklisted, action will be initiated as deemed fit and the Bid Security will be forfeited. 9. The department will not hold any risk and responsibility regulating non-visibility of the scanned and uploaded documents. 10. The Documents that are uploaded online on e-market place will only be considered for Technical Bid Evaluation. 11. Important Notice to Contractors, Suppliers and Department users (i) In the endeavor to bring total automation of processes in e-Procurement, the Govt. has issued orders vide G.O.Ms.No. 13 dated. 5.7.2006 permitting integration of electronic Payment Gateway of ICICI/HDFC Banks with eProcurement platform, which provides a facility to participating suppliers/ contractors to electronically pay the transaction fee online using their credit cards.
27	Rights reserved with the Department	TGSPDCL reserves the right to accept or reject any or all of the tenders received without assigning any reasons. The TGSPDCL also reserves the right to split the tender and place orders on more than one tenderer at its discretion.

SECTION - II

SALIENT FEATURES OF THE BID

SALIENT FEATURES OF THE BID

SUPERSCRIPTION ON THE TENDER COVER

Specification No. Tender specification No.CE (Projects)/TGSPDCL/RURAL SCADA 05/2025-26

Work : Supply, Installation, Testing, Commissioning (SITC) and Maintenance (for a period of five years) of SCADA System for 116 Nos. 33/11KV Substations located at District Headquarters and key towns of Rural Circles in TGSPDCL in Telangana state.

Officer to whom the bid will be addressed: CE/Projects, Corporate Office/TGSPDCL

Superscription on the bid cover and the outer envelope

a. Specification No. : RURAL SCADA : 05/2025-26
b. Due date and time for online submission: 23.10.2025 upto 12:00 Hrs
c. Date and time of online opening : 23.10.2025 upto 15:00 Hrs
d. Payment of bid security
   i) If paid give details: DD/BG No._____Dt.___ for Rs._____
   ii) If exempted give details
e. Whether 180 days validity offered ……(yes/no).
f. Whether bid is made accepting payment terms Clause….(yes/no).
g. Whether delivery is as per delivery schedule indicated….(yes/no)
h Whether the samples has been enclosed/sent…(yes/no)
i. Whether the quotation is in two parts …. (Yes/no)

Content of Bidding Documents:

The materials/equipment required, bidding procedures, and contract terms are prescribed in the bidding documents as listed below:

i. Notice Inviting Bids.
ii. Salient feature of the contract.
iii. Instructions to Bidders.
iv. Technical Requirements.
v. Schedule of quantities & prices
vi. Qualification Requirements.
vii. Sample Forms.
   - Bid Form
   - Qualification information
   - Security Forms (Bid security & performance security)
   - Contract Form
   - Details to be furnished by the Manufacturer **(Format-A)**
   - Schedule of Deviations (Technical & Commercial)
   - Declaration Form
viii. Contract Data
ix. General terms and conditions of contract.

The Bidder is expected to examine all instructions, forms, terms and technical specifications in the bidding documents. Failure to furnish all information required by the bidding documents or to submit a bid not substantially responsive to the bidding documents in every respect will be at Bidder's risk and may result in the rejection of its bid.

CHIEF ENGINEER
(PROJECTS)
TGSPDCL

SECTION - III

INSTRUCTIONS TO BIDDERS (ITB)

INSTRUCTIONS TO BIDDERS (ITB)

Table of Clauses

A. INTRODUCTION

1. DEFINITIONS

The following terms will be interpreted as indicated:

a) **"The Contract"** means the agreement entered into between the Purchaser and the Supplier, as recorded in the contract Form signed by the Parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

b) **"The Contract Price"** means the price payable to the Supplier under the Contract for the full and proper performance of its contractual obligations.

c) **"The Materials / equipment"** means all of the equipment, machinery, and/or other materials which the Supplier is required to supply to the Purchaser under the Contract.

d) **"The Services"** means those services ancillary to the supply of the Materials/ equipment, such as transportation and insurance, and any other incidental Services, such as installation, commissioning, provision of technical assistance, training, maintenance and other such obligations of the Supplier covered under the Contract.

e) **"GCC"** means the General Terms and Conditions of Contract contained in the section.

f) **"The Purchaser"** means the organization purchasing the Materials / equipment.

g) **"Vendor"** is a supplier who has registered with the purchaser for supply of materials/equipment.

h) **"The Supplier"** means the firm supplying the Materials/equipment and Services under this Contract.

i) **"A defect"** is any part of the Works/Services not completed in accordance with the Contract.

j) **"Bill of Quantities/schedule of quantities"**: Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.

k) **"SCADA System"**: Supervisory Control and Data Acquisition system enables to monitor and control the field substation equipment from remote area (control center) through installation of automation equipment (the main scope of this project).

l) **"Inbuilt IED"** : SCADA compatible Breaker IED (Intelligent electronic device) relay which support IEC 61850 protocol. This project envisages to integrate those relays to SCADA Control center by connecting them in the substation Fiber optic (FO) loop and configuring the ICD/CID files in the RTU.

"Defects Liability Period": The Defects Liability Period shall be in force and effect up to the end of the Contract period for the Agreement Quantity.

m) **"The contractor"** is a person or corporate body whose bid to carry out the works has been accepted by the employer.

n) **"The Contract Data"** defines the documents and other information which comprise the bid accepted by the Employer.

o) **"The Contractor's Bid"** is the completed Bidding document submitted by the Contractor to the Employer consisting of a) Technical bid and b) Price bid.

p) **"Days**" are calendar days; months are calendar months.

q) **"The Employer"** is the party who will employ the Contractor to carry out the works. The Employer/ Utility/ Purchaser/ Discom/ TGSPDCL convey the same meaning.

r) **"The Intended Completion Date"** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Employer by issuing an extension of time.

s) **"Plant"** is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

t) **"Site Investigation Reports"** are those which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site.

u) **"Specification"** means the Specification of the Works included in the Contract and any modification or addition made or approved by Chief Engineer (Projects)

v) **"Temporary Works"** are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

w) **"The Works"** are what the Contract requires the Contractor to Construct, install, and turn over to the Employer, as defined in the Contract Data.

x) **"Operational Go-Live"** : The Operational Go-Live is the date of completion of the Works as certified by the Superintending Engineer/SCADA along with integration and communication to the CC.

y) **"SCADA Control Centre (CC)"** is a center stationed at TGSPDCL SCADA Circle office for providing information and support on 33/11KV SCADA system as per the periodicity defined.

z) **"Data Center":** Data center is same as SCADA Control center.

aa) "The Contractor / Bidder/ Supplier/SSIA" convey the same meaning.

2. APPLICABILITY

These General Conditions of contract will apply to the extent that they are not superseded by provisions of Salient features of the Bid.

3(a). STANDARDS

The Materials/ equipment supplied under this Contract will conform to the Standards mentioned in the Technical specifications, and, when no applicable standard is mentioned, the authoritative standards appropriate to the Materials / equipment i.e., BIS, such standards will be the latest. All material will be of the best class and will be capable of satisfactory operation under tropical conditions without distortion or deterioration.

3(b). INTERCHANGEABILITY

All similar materials and removable parts of similar equipment will be interchangeable with each other. A specific confirmation of this should be furnished in the bid.

4. SCOPE OF WORK

Supply, Installation, Testing, Commissioning (SITC) and Maintenance (for a period of five years) of SCADA System for 116 Nos. 33/11KV Substations located at District Headquarters and key towns of Rural Circles in TGSPDCL in Telangana State.

The bidders may submit bids for all the works detailed in the "Instructions to Bidders".

The successful bidder will be expected to complete the works by the intended completion date as per milestones specified in the contract data.

5. ELIGIBLE BIDDERS

a. This Invitation for Bids is open to all eligible bidders. Any materials, equipment, and services to be used in the performance of the Contract shall have their origin in India.

b. Bidders who meet qualifying requirement as specified in Section VI and supply the material and execute the work as stated in Section IV&V, of Bid specification only need quote. Bids which are not meeting the above criteria will not be considered.

c. All bidders shall provide in Section VII, Forms of Bid and Qualification Information, a Statement that the Bidder is not associated, nor has been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Borrower to provide consulting services for the preparation or supervision of the works, and any of its affiliates shall not be eligible to bid.

d. Government-owned enterprises in the Employer's country may only participate if they are legally and financially autonomous, operate under commercial law and are not a dependent agency of the Employer.

e. Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices in accordance with Clause 41.

6. QUALIFICATION OF THE BIDDER

Qualification of the Bidder shall be in accordance with the Section VI

7. SITE VISIT

The Bidder, at the Bidder's own responsibility and risk is encouraged to visit, examine the Site conditions and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for the works of the SCADA project. The costs of visiting the Site shall be at the Bidder's own expense.

B. BIDDING DOCUMENTS

8. CONTENT OF BIDDING DOCUMENTS

8.1 The set of bidding documents comprises the documents listed in the table below and addenda issued in accordance with Clause 10:

i. Notice Inviting Bids.
ii. Salient feature of the Bid.
iii. Instructions to Bidders.
iv. Technical Specifications.
v. Schedule of Requirements,Quantities
vi. Bid form and Price Schedules(**prices in online only**)
vii. Qualification Requirements.
viii. Bid Security
ix. Performance Security Form
x. Schedule of Deviations
xi. Sample Forms.
xii. Contract Data
xiii. General Terms and Conditions of Contract.

8.2 One set of schedule as original and other set (Xerox copy) as copy should be completed and submitted along with the Bid.

8.3 The Bidder is expected to examine all instructions, forms, terms and Technical specifications in the bidding documents. Failure to furnish all information required by the bidding documents or to submit a bid not responsive to the bidding documents in every respect will be at Bidder's risk and may result in the rejection of its bid.

9. CLARIFICATION OF BIDDING DOCUMENTS

A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing at the Employer's address indicated in the invitation to bid or by mail. The Employer will respond to any request for clarification of the bidding documents, which are received earlier than 15 days prior to the deadline for submission of bids. Copies of the Employer's response will be forwarded to all purchasers of the bidding documents, including a description of the enquiry but without identifying its source will be put on website of the employer or intimated by mail.

10. AMENDEMENT TO BIDDING DOCUMENTS

10.1 At any time prior to the deadline for submission of bids, the Purchaser, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, may modify the bidding documents by amendment.

10.2 All such amendments also would be made available on the website of TGSPDCL and e-procurement website and such amendments will be binding on the respective Bidders Any addendum thus issued shall be part & parcel of the Bidding document.

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

C. PREPARATION OF BIDS

11. LANGUAGE OF THE BID

The bid prepared by the Bidder including all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser, will be in English

12. COST ASSOCIATED WITH BIDDING

The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Purchaser, will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

13. DOCUMENTS CONSTITUTING THE BID

The Bid submitted by the Bidder shall comprise the following in sealed covers super scribing **Specification No., Bid security details, validity**

(a) Bid Form in accordance with clause 14
(b) Bid Security in accordance with clause 21
(c) Price schedule (**only for online submission**) in accordance with clause 15
(d) Technical Bid information
(e) Qualification Information Form with documentary evidence establishing in accordance with Clause 20 that the Bidder is eligible to bid and is qualified to perform the contract if its bid is accepted.
(f) Documentary evidence establishing that the Materials / equipment and ancillary services to be supplied by the Bidder are as per the Technical specification of the bidding documents; and
(g) Tax clearance certificate
(h) Schedule of Deviations
    (a) Commercial
    (b) Technical

And any other materials required to be completed and submitted by bidders in accordance with these instructions. The documents listed under Sections V & VII shall be filled in without exception.

All the Schedules will be duly filled but not necessary in the sheets attached to the specification unless full details required in the schedules are furnished the Bids will be liable for rejection.

14. BID FORM

The Bidder will complete the Bid form and the appropriate Price Schedule **(in online only)** furnished in the bidding documents, indicating the Materials / equipment to be supplied, a brief description of the Materials/ equipment, quantity and prices.

15. BID PRICES

15.1 The contract shall be for whole works as described in Clause 4, based on the Priced Bill of Quantities (**in online only**) submitted by the Bidder.

15.2 The prices quoted shall be **FIRM**. Bids will be called for with prices FADS inclusive of packing and forwarding, GST and other legally permissible duties and levies wherever applicable, handling charges to cover the transport by road from destination railway station to site/stores and insurance.

15.3 It is the responsibility of the Bidder to inform himself of the correct rates of duties and taxes leviable on the materials at the time of bidding.

15.4 The Bidder shall indicate on the appropriate Price Schedule (**in online submission only**) the unit prices (where applicable) and total bid price of the Materials / equipment it proposes to supply under the contract.

15.5 Prices indicated on the price schedule (**in online only**) shall be separately quoted i.e., ex- works, GST and other taxes payable on the finished Materials / equipment with individual breakup for Taxes and Duties, etc.

15.6 Items for which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.

15.7 All duties, taxes, and other levies payable by the contractor under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder.

15.8 The rates and prices quoted by the bidder shall be fixed.

16. TAXES AND DUTIES

16.1 All duties, taxes and other levies payable by the Contractor under the Contract, prevailing as on the date of deadline for submission of bids are included in the rates, prices and total bid price submitted by the bidder. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law. The bidder shall be familiar with the tax laws of the country, unless otherwise specified in the contract.

16.2 If the rates of statutory levies assumed by the Bidder are less than the actual rates prevailing at the time of bidding, the Purchaser will not be responsible for such errors. If the rates of statutory levies assumed by the Bidder are later proved to be higher than the actual/correct rates prevailing at the time of bidding, the difference will be passed on to the credit of the Employer.

16.3 Notwithstanding anything above or elsewhere in the Contract, in the event that the input tax credit of the GST charged by the bidder is denied by the tax authorities to the Utility for reasons attributable to the bidder, the Utility shall be entitled to recover such amount from the bidder by way of adjustment from any of the subsequent invoices submitted by the bidder to the Utility.

17. STATUTORY VARIATIONS

Any increase in statutory levies shall be to the account of bidder. However any decrease in statutory levies shall be taken in to consideration to the advantage of the Employer (TGSPDCL) only.

18. BID CURRENCIES

The unit rates and the prices shall be quoted entirely in Indian Rupees; and will be paid in Indian Rupees Only.

19. QUANTITY TO QUOTE

The Bidder should quote for 100% quantity indicated in the bid Specification. In any case, if the Bidder quotes for partial quantity, the Bidder will be disqualified.

20. DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATIONS

The Bidder shall furnish, as part of its bid, documents establishing the Bidder's eligibility to bid and its qualifications to perform the contract if its bid is accepted.

The documentary evidence of the Bidder's qualifications to perform the contract if its bid is accepted will establish to the Purchaser's satisfaction:

(a) that the Bidder has the financial, technical, and production capability necessary to perform the contract;

(b) that the Bidder meets the qualification criteria listed in Section VI. In addition the Bidder may furnish full particulars regarding supply of the material in question made so far to TGSPDCL during the last 5 years and other reputed utilities.

20.1 Documents Establishing Materials/ equipment Conformity to Bidding Documents.

The Bidder shall furnish as part of its bid, documents establishing conformity to the bidding documents of all Materials / equipment and services, which the Bidder proposes to supply under the Contract.

The documentary evidence of conformity of the Materials / equipment and the services to bidding documents may be in the form of literature, drawings, and data, and will consist of:

(a) a detailed description of the essential technical and performance characteristics of the Materials / equipment;

(b) the bidder should specifically mention about furnishing the test certificates and a specimen form of test certificate should be furnished along with the bid.

(c) a list giving full particulars, including available sources and current prices of spare parts, special tools etc., necessary for the proper and continuing functioning of the Materials / equipment following commencement of the use of the Materials / equipment by the Purchaser; and

(d) an item-by-item commentary on the Purchaser's Technical Specifications demonstrating substantial responsive-ness of the Materials / equipment and services to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications.

For purposes of the commentary to be furnished pursuant to above, the Bidder will note that standards for workmanship, material, and equipment, as well as references to brand names or catalogue numbers designated by the Purchaser in its Technical Specifications, are intended to be descriptive only and not restrictive.

21. BID SECURITY

21.1 The Bidder shall furnish, as part of its bid, a Bid Security amount of Rs.1.20 Crores (2% of the Bid Amount plus GST @18%). This amount should be paid by way of a crossed demand draft drawn on any nationalized/ scheduled bank in favor of the Pay Officer, TGSPDCL and payable at headquarters of the Purchaser. The crossed DD should invariably be furnished along with the bids. Alternatively the bidders may furnish a B.G. from any nationalized/scheduled bank in favor of CE/ Projects/ TGSPDCL (Receipt Bank account name: Pay Officer TGSPDCL, Acc no: 52086558583, Branch: Panjagutta, Hyd, IFSC: SBIN0020072) in original in lieu of DD as per the proforma attached. Photocopies of the bid security will not be accepted and will be rejected**.**

21.2 The fact of having enclosed bid security by **DD/BG** along with the bid should be clearly super scribed on the bid envelope.

21.3 Submission of bid security by way of cheque, cash, money order, call deposit will not be accepted and will be considered as disqualification.

21.4 Payment of bid security will be waived at the discretion of the TGSPDCL in the case of fully owned Government undertaking of the Central or State Government. Such undertakings should immediately apply and obtain exemption before submitting their Bids. They need only refer to the details of such exemption in their Bids. Exemption accorded by any organization other than TGSPDCL will not be considered.

21.5 Requests for exemption from payment of bid security will not be entertained in any other case.

21.6 Any bid not secured as above will be rejected by the purchaser.

21.7 Unsuccessful Bidders' Bid Security will be discharged or returned as promptly as possible but not later than thirty (30) days after the expiry of the period of bid validity prescribed by the Purchaser.

21.8 The successful Bidder's Bid Security will be discharged upon the Bidder signing the contract.

21.9 **The Bid Security may be forfeited:**

(a) If a Bidder:

i. Withdraws its bid or alters its prices during the period of bid validity specified by the Bidder on the Bid Form, or

ii. Does not accept the correction of errors pursuant to Clause No.32.2; or

iii. Offers post Bid rebates, revisions or deviations in quoted prices and/ or conditions or any such offers which will give a benefit to the Bidder over others will not only be rejected outright but the original Bid itself will get disqualified on this account and the Bidder’s bid security will be forfeited.

(b) in the case of a successful Bidder, if the Bidder fails:

i. To sign the contract in accordance with Clause No.39.

ii. To furnish performance security in accordance with Clause No.40.

21.10 In cases where the Bid Cover Contains superscription of having furnished Bid Security by way of **DD/BG** but if the same is not found within, such Bids will be rejected and bidder will run the risk of being banned.

Note : The bidder shall furnish required Bid Security amount and validity (The validity of the bank guarantee shall be upto bid validity +45 days from the date of tender opening) as per specification. If the bidder fails to furnish bid security amount and bid validity as stipulated in the specification, such tender bid will not be considered for further evaluation.

22. BID VALIDITY

22.1 Bids shall remain valid for a period not less than 180 days after the deadline date of bid submission specified in Clause 28. A bid valid for a shorter period shall be rejected by the Employer as non-responsive.

22.2 The bidders should clearly super scribe on the sealed envelopes of the bids about the validity. Bids not containing superscription of validity will be rejected and returned unopened.

22.3 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified additional period. The request and the bidder's responses shall be made in writing or by **e-mail**. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his bid security for a period of the extension, and in compliance with Clause 21 in all respects.

23. ALTERNATIVE PROPOSALS BY BIDDERS

Bidder shall submit offers that comply exactly with the requirements of the bidding documents, including the basic technical design as indicated in the drawings and specifications. **Alternative offers with any conditions will not be considered**.

24. TAX CLEARANCE CERTIFICATES

Copies of Income Tax, Sales Tax and Turnover Tax certificates for the latest period from the appropriate authority will invariably be enclosed to the bid. In the case of proprietary or partnership firm it will be necessary to produce the certificate / certificates for the proprietor or proprietors and for each of the partners as the case may be. If the Bidder has already produced the certificate during the calendar year in which the bid is made, it will be sufficient, if particulars are given.

25. SERVICE CONDITIONS

25.1 The equipment/materials offered will be entirely satisfactory for operation under the climatic conditions indicated below:

(a)	Maximum ambient air temperature (in shade)	45^0 C
(b)	Maximum ambient air temperature (under sun)	50^0 C
(c)	Maximum daily average ambient air temperature	35^0 C
(d)	Maximum yearly average ambient air temperature	30^0 C
(e)	Maximum humidity	100%
(f)	Altitude above M.S.L.	Up to 1000M
(g)	Average No. of thunder storm days per annum	50
(h)	Average No. of dust storm days per annum	Occasional
(i)	Average No. of rainy days / annum	90
(j)	Average Annual Rain fall	925mm
(k)	Normal tropical monsoon period	4 months
(l)	Maximum wind pressure	150 kg/Sq.M.

25.2 Due consideration will be given to any special devices or attachments put forward by the Bidder which are calculated to enhance the general utility and the safe and efficient operation of the equipment / materials.

26 FORMAT AND SIGNING OF BID

26.1 The Bidder shall prepare one original and one copy of the documents comprising the bid as described in Clause 13 of these Instructions to Bidders, bound with the volume containing the Form of Bid, and clearly marked "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail. The person or persons signing the bid will initial all pages of the bid, except for printed literature.

26.2 The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.

26.3 The Bid shall contain no alterations or additions, except those to comply with instructions, issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

D. <u>SUBMISSION OF BIDS</u>

27. SUBMISSION, SEALING AND MARKING OF BIDS

27.1 The Bidders are required to submit their bids in two parts as under:

(i) Part-I : Bid Security, Technical Bid & Qualification Requirements
Technical Bid shall contain full technical particulars and commercial terms and conditions but without prices. This should not contain any cost information whatsoever.

Part-II : Price Bid – containing Prices (**shall be on-line only)**

** It is requested to quote the price i.e. total of Table **in on-line only** duly signed by the authorized representative as per the proforma mentioned in Section V.

(ii) The Part-I of the tender should be furnished in a sealed cover super scribing tender enquiry number, technical bid, name of the bidder and date of tender opening.

(iii) Part-I of the bid will be opened on the due date of tender opening. In case the bidders have been granted Bid Security exemption , documentary evidence for the same must be furnished. The firms whose Bid Security, Testing charges and Transaction Fee are not received as specified in the tender document, the price bids will not be opened and their bids will be rejected summarily.

(iv) The price bids of only those bidders whose technical bids, on examination, are determined to be technically and commercially acceptable and meeting the specified Qualification Criteria will be opened at a later date.

SEALING AND MARKING OF BIDS

27.2 The Bidder shall seal the Technical bid in envelope.

27.3 The envelope shall be addressed to the Purchaser

Chief Engineer (Projects),
4th floor, Corporate office, TGSPDCL
Mint Compound, Hyderabad 500063

The sealed cover as well as the outer envelope should be super scribed as follows:

(a) Bid Enquiry No.
(b) Due date and time for online submission.
(c) Date and time for online opening

(d) Payment of Bid Security
  (i) If paid, give details: D.D. No./BG No. Date:
  (ii) If not paid or exempted, give details.
(e) Whether 180 days validity offered…….YES / NO
(f) Whether the quotation is made accepting Payment clause …. YES/NO
(g) Whether the delivery is as per delivery schedule indicated…. YES/NO
(h) Whether the samples (if specified) has been enclosed/ sent…YES/NO
(i) Whether the bid is quoted in two parts…. (YES/NO)

27.4 Bids not super scribed as above are liable to be rejected.

27.5 The Bidder shall invariably complete the Bid in full. Details to be furnished by the bidder and Schedule of Prices (On-line only) attached to the specification and enclose the same to the bid without fail.

27.6 The bids shall be in bound volumes (With the documents in the volume not detachable). All pages of the bid except in-amended printed literature shall be initialed by the person/persons signing the bid. The page number shall be referred in Index. All pages including literature, type test reports of the bid shall be numbered and the page numbers shall be continuous. Soft copy of the technical and designs with drawings shall be given in Pen drive/ CD also. Summary sheet in the given format on the top of the bid duly signed and sealed by the bidder.

27.7 The time of actual receipt in the office only will count for the acceptance of the bid and either the date of bid, date stamp of post office or date stamp of any other office will not count. The TGSPDCL will not be responsible for any postal or any other transit delays.

27.8 Telegraphic quotations will not be entertained under any circumstances. Clarification, amplifications, and/ or any other correspondence from the Bidder subsequent to the opening of bid will not be entertained. The Bidders are advised to ensure that their bids are sent in complete shape at the first instance itself.

27.9 The inner envelope shall also indicate the name and address of the Bidder to enable the bid to be returned unopened in case it is declared "late".

27.10 If the outer envelope is not sealed and marked as required above, the Purchaser will assume no responsibility for the bid's misplacement or premature opening.

28. DEADLINE FOR SUBMISSION OF THE BIDS

28.1 Bids together with modifications if any, or other withdrawals must be received by the Purchaser not later than the deadline for submission of bids specified in the Salient features of the Bid**.**

28.2 The employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all rights and obligations of the Employer and the bidder previously subject to the original deadline will then be subject to the new deadline.

29. LATE BIDS

29.1 Any bid received by the Purchaser after the deadline for submission of bids prescribed by the Purchaser will be rejected and returned unopened to the Bidder.

MODIFICATION AND WITHDRAWAL OF BIDS

29.2 The Bidder may modify or withdraw its bid after the bid's submission, provided that written notice of the modification, including substitution or withdrawal of the bids, is received by the Purchaser prior to the deadline prescribed for submission of bids.

29.3 The Bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with clauses 26 & 27, with the outer and inner envelopes additionally marked "**MODIFICATION"** or **"WITHDRAWAL"** as appropriate.

29.4 No bid may be modified after the deadline for submission of Bids.

29.5 Withdrawal or modification of a Bid between the deadline for submission of bids and the expiration of the original period of bid validity specified in Clause 22.1 above or as extended pursuant to Clause 22.3 may result in the forfeiture of the Bid security pursuant to Clause 21.

E. <u>OPENING AND EVALUATING OF BIDS</u>

30. BID OPENING

30.1 The Employer will open all the Technical Bids received in time (except those received late), in the presence of the Bidders or their authorized representatives who choose to attend at the time on the date and the place specified. In the event of the specified date of Bid opening being declared a holiday for the Employer, the Technical Bids will be opened at the appointed time and location on the next working day.

30.2 **Evaluation of the Technical bid:** As per the documents submitted online in technical stage.

30.3 Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 29 shall not be opened.

30.4 The Bidders' names, bid modifications or withdrawals, discounts and the presence or absence of requisite Bid Security and such other details as the Purchaser, at its discretion, may consider appropriate, will be announced at the opening. Bids that are not opened at bid opening will not be considered further for evaluation, irrespective of the circumstances.

31. CLARIFICTION OF BIDS

31.1 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of unit rates. The request for clarification and the responses shall be in writing or by cable, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Sub-Clause 32.2.

31.2 Any effort by the Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bid.

32. PRELIMINARY EXAMINATION

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

32.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price will prevail, and the total price will be corrected. If the Supplier does not accept the correction of the errors, its bid will be rejected, and its Bid Security may be forfeited. If there is a discrepancy between words and figures, the amount in words will prevail. If the supplier does not accept the correction of the errors, its bid will be rejected and its Bid Security may be forfeited.

32.3 The Purchaser may waive any minor informality, nonconformity, or irregularity in bid which does not constitute a material deviation, provided such waiver doesn't prejudice or affect the relative ranking of any Bidder.

32.4 Prior to the detailed evaluation, the Purchaser will determine the substantial responsiveness of each bid to the bidding documents. For purposes of these Clauses, a substantially responsive bid is one, which conforms to all the terms and conditions of the bidding documents without material deviations. Deviations from, or objections or reservations to critical provisions, such as those concerning Bid Security, and Taxes and Duties will be deemed to be a material deviation. The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.

32.5 If a bid is not substantially responsive, it will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the nonconformity.

Note : Payment terms, Delivery period, Performance Bank Guarantee, Taxes and Duties" should be in line with the terms and conditions of the specification. If any bidder does not meet any one of the conditions, such tender will not be considered. Please note that the conditional offers are also not considered. Hence the bidder shall submit the tender in line with the terms and conditions of the specification.

33. Evaluation and Comparison of Bids

33.1 The Purchaser will evaluate and compare the bids, which have been determined to be Substantially responsive.

33.2 The Purchaser's evaluation of a bid will take into consideration one or more of the following factors

All the bids, which are opened, read out and considered for evaluation will be checked for qualification requirements in respect of technical and commercial aspects. Such of the bids, which do not meet the qualification requirements, will not be evaluated further. The bid is to be checked for its conformity to the

technical specification. If it does not meet the technical specification, the Bid will not be evaluated further. However, if in the opinion of the purchaser the bidder has offered equipment / material better than the technical specification the same may be considered. The bid may be rejected for the following reasons:

1. Not in the prescribed form
2. Insufficient bid security or bid not accompanied by the required bid security or proof of bid security exemption.
3. Bids not properly signed
4. The bidder is a vendor who is banned from further business transactions and the period of ban is still in force.
5. Bid received after the due date and time
6. The bid is through telegram, e-mail or fax

- Further, the purchaser may enquire from the bidder in writing for any clarification of the bid. The response of the bidder will also be in writing. However no change in the prices or substance of the bid will be sought, offered or permitted.
- Bids will be examined for completeness and for any computational errors.
- Arithmetical errors will be rectified on the following basis.
  - Where there is a discrepancy between the unit price and total price, the unit price will prevail and the total price will be corrected accordingly.
  - Where there is a discrepancy between words and figures, the amount in words will prevail.
  - Failure on the part of the bidder to agree to the above corrections will result in rejection of his offer and forfeiture of his bid security.
- It will be ensured that the required sureties have been furnished and that the documents have been properly signed.
- The purchaser's evaluation of a bid will take into consideration one or more of the following factors

(a) Delivery schedule offered in the bid;

(b) Deviations in payment schedule from that specified in the general terms and conditions of the contract and technical deviations.

(c) The cost of components, mandatory spare parts, and service;

(d) The availability of spare parts and after-sales services for the equipment offered in the bid.

(e) The projected operating and maintenance costs during the life of the equipment;

(f) The performance and productivity of the equipment offered;

(g) Other specific criteria indicated in the Bidding documents.

In addition the Purchaser’s evaluation of a bid will take into account the net landed cost of the material at the final destination. For the purpose of evaluation net landed cost is arrived at by adding all elements of the basic price, allowable discount & any other levies, packing & forwarding, freight charges, insurance

(transit & storage) as quoted by the bidder, interest on advance if any, erection, servicing and other charges inclusive of GST as called for.

The following criteria may be adopted for taxes and duties for evaluation

a. **It is the responsibility of the bidder to quote all taxes and duties correctly without leaving any column unfilled. Where taxes and duties are not applicable the bidder should enter "NA". If no duty / tax are leviable the same may be entered as "NIL". If any column is left blank or filled vaguely like "as applicable", the same will be loaded with the maximum of the other eligible Bids.**

b. **Where there is an exemption of GST, the documentary evidence to that effect will be enclosed by the supplier.**

c. The bidders for supply and works shall invariably possess the GSTIN number and PAN Number for the bids above Rs. 5.00 lakhs and this must be verified before entering into contract.

- Prior to detailed evaluation, the responsiveness of each bid will be determined. A substantially responsive bid is one that conforms to all the terms and conditions of the bidding documents without material deviations. For this purpose superscription, qualification requirement, bid security, validity, delivery, payment term, price schedule, taxes and duties will be deemed to be the critical provisions and deviations in any one of these items will be deemed to be a material deviation.

  The purchaser may waive any minor informality, non-conformity or irregularity in the bid which does not constitute a material deviation, provided such waiver does not affect the relative ranking of any bidder. The purchaser will clearly indicate in the bid specification the methodology for evaluation of bids.

(a) Bid price, which will include all, costs of manufacture and services at manufacturing place as well as, Transportation to destination stores, packing and forwarding, insurance and all Taxes & other legally permissible duties & levies payable.

(b) Delivery schedule offered in the bid.

(c) Deviations in payment schedule from that specified in the general terms and conditions of the contract.

(d) The cost of components, mandatory spare parts, and service

(e) The availability of spare parts and after-sales services for the equipment offered in the Bid;

(f) The projected operating and maintenance costs during the life of the equipment;

(g) The performance and productivity of the equipment offered; and/or

(h) Other specific criteria indicated in the Bid Specification.

33.3 **(a)** The Purchaser's evaluation of a bid will take into account the Net Landed Cost of the Material at destination locations/stores inclusive of all taxes and duties and inclusive of GST quoted by the Bidder. It is the responsibility of the bidder to quote all Taxes and Duties correctly without leaving any column unfilled. Where not applicable the column may be filled as "NA". If no duty / tax are leviable the same may be filled as "NIL". If any column is left blank the same is loaded with maximum of other eligible Bids.

(b) Any increase in statutory levies shall be to the account of bidder. However any decrease in statutory levies shall be taken in to consideration to the advantage of the Employer (TGSPDCL) only.

34. CONTACTING THE PURCHASER

34.1 From the time of the bid opening to the time of contract award, if any Bidder wishes to contact the Purchaser on any matter related to the bid, it should do so in writing.

34.2 Any effort by a Bidder to influence the Purchaser in its decisions on bid evaluation, bid comparison, or contract award will result in the rejection of the Bidder's bid.

F. AWARD OF CONTRACT

35. AWARD CRITERIA

35.1 Post Qualification

In the absence of pre-qualification, the Purchaser will determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated responsive bid is qualified to perform the contract satisfactorily.

The determination will take into account the Bidder's financial, and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualification submitted by the Bidder, as well as such other information as the Purchaser deems necessary and appropriate.

35.2 Award Criteria

The Purchaser will award the contract to the successful Bidder / Bidders whose bid has/ have been determined to be substantially responsive.

35.3 However it is not binding on TGSPDCL to accept the lowest or any other Bid. It reserves the right to place orders on different Bidders.

35.4 **Service Level Agreement (SLA)**:

1) In case of a delay in the integration of all 33/11kv substations and 11kV feeders within the scheduled time, TGSPDCL, without prejudice to its rights under the law, including the right to cancel the contract, forfeit the bank guarantee, and/or recover damages for breach of contract, reserves the right to take appropriate action.

2) Service Level Agreement defines the terms of the implementation agencies' responsibility in ensuring the timely delivery and the compliance to the performance. SLAs during the Operations and Maintenance phase to be measured against the following categories:

a) Application Availability

b) End-to-End Communication Availability

c) The indicative SLAs in each category to be measured are as below:

A) Minor issues – Loose connections of any cable, SIM Communication issue, System hang and any related issues etc., to be attended and rectified within 24 hrs.

B) Major issues – Server failure, Application Crash, Malware attack, Ramsonware attack and any related issues etc., to be attended and rectified within 12 hrs.

C) Critical Issues – Super Cyclone, floods, Earthquake any force majeure to be attended immediately.

3) If the time lines for the above issues are not complied, the following penalties will be imposed.

Minor issues – 5% of FMS Charges
Major issues – 10% of FMS Charges
Critical issues –15% of FMS Charges

Description	**Penalty during Maintenance (AMC/FMS)**
Availability of system for Greater than 95% in a month	Nil
Availability of system for Greater than 90% but less than or equal to 95% in a month	2% of monthly FMS charges
Availability of system for Greater than or equal to 85% but less than or equal to 90% in a month	5% of monthly FMS charges
Availability of system for Below 85% in a month	Deduction of 5 % of the Apportioned price of the apportioned quarterly AMC for every 1% are part thereof decrease in availability under 85%.

Availability: The overall SCADA System shall be considered available if

a) All SCADA equipments are functional and data transmission is seamless at the end terminals of 4G Routers and display is available at LDMS. The SCADA equipments are 1) RTU 2) Auxiliary Power Supply 3) LDMS 4) 4G Router 5) IEDs and TMUs.
b) All the above SCADA equipments shall be made available within 12 Hrs in case of any defects.

The computation of availably/non-availability would be rounded up to 2 decimal places at each contract coordination site on quarterly basis and any deduction in the maintenance charges thereof would be calculated as stated above on pro-rata basis

Breach of SLA

In case the Agency does not meet the service level mentioned above, the Employer will treat it as a breach of Service Level Agreement. The following steps will be taken in such a case:

1. Employer issues a show cause notice to Agency.
2. Agency should reply to notice within 3 working days
3. If the TGSPDCL authority is not satisfied with the reply, the TGSPDCL will either deduct penalty or initiate the termination process at described in the GCC.
   The SLAs may change as per TGSPDCL's business needs evolve over the course of business period which will be mutually discussed and agreed upon.

36. EMPLOYER'S RIGHT TO VARY QUANTITIES AT TIME OF AWARD

36.1 The Purchaser reserves the right at the time of contract award to increase or decrease up to 20% the quantity of Materials / equipment and services originally specified in the Schedule of Materials without any change in unit price or other terms and conditions.

36.2 The purchaser reserves the right to vary the ordered quantity +/- 20% during the execution of the contract.

37. EMPLOYER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected bidder or bidders.

38. NOTIFICATION OF AWARD

38.1 Prior to the expiration of the period of bid validity, the Purchaser will notify the Successful Bidder in writing by registered letter or by cable, to be confirmed in writing by registered letter, that its bid has been accepted.

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

38.3 Upon the successful Bidder's furnishing of the performance security, the Purchaser enters into contract with successful Bidder / Bidders. The Purchaser will notify each unsuccessful Bidder and will discharge its Bid Security.

39. SIGNING OF CONTRACT

The Purchaser notifies the successful Bidder that its bid has been accepted.Within 30 (thirty days) of receipt of notification of award of Contract, the successful Bidder will sign and date the contract. Failure to comply with this stipulation will entail cancellation of the contract besides forfeiture of the bid security.

40. PERFORMANCE SECURITY

40.1 Within 21 days of receipt of the Letter of Intent/Letter of Award, the Successful Bidder shall deliver to the employer a Performance Security in any of the forms given below for an amount equivalent to 10% of the Contract price for proper fulfillment of the contract, which will include the Supply, Installation, Operation Testing, Commissioning (SITC) and Maintenance, warranty period and completion of performance obligations. The Performance Security will cover 6months beyond the Contract Period or extended thereafter. However, in case of delay in Installation Milestone, the validity of the initial Performance Security shall be extended by the period of such delay.

40.2 The proceeds of the performance security will be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

40.3 The performance security will be…

(a) A bank guarantee issued by a nationalized bank acceptable to the Purchaser, in the form provided in the bidding documents.

(b) A banker's cheque or crossed DD or Pay Order payable in favour of Pay Officer/TGSPDCL drawn on any scheduled bank.

Any payments shall be made to the Successful Bidder only after receipt of the Performance Security by Utility.

40.3.1 Upon Termination of the Contract due to Successful Bidder Event of default, the Performance Security shall be forfeited by Utility.

40.4 The performance security will be discharged by the Purchaser and returned to the supplier not later than sixty (60) days after the validity period.

40.5 **Failure of the successful Bidder to comply with the above requirement will entail cancellation of the award and forfeiture of the Bid Security and the balance to make up the performance security deposit will be deducted from pending payments if any due to the tenderer form TGSPDCL on other orders in addition the company will also become liable for being black listed by TGSPDCL.**

41. CORRUPT OR FRAUDULENT PRACTICES

41.1 TGSPDCL expects that Bidders/Suppliers/Contractors observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the TGSPDCL.

Defines, for the purposes of this provision, the terms set forth as follows:

i. "Corrupt Practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the work awarding process or in contract execution, and

ii. "Fraudulent Practice" means a misrepresentation of facts in order to influence work awarding process or the execution of a contract to the detriment of the Employer and includes collusive practice among Bidders (prior to or after Bid submission) designed to establish Bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.

Will reject a proposal for award if it is determined that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.

Will declare a firm ineligible, either indefinitely or for a stated period of time, if Employer at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing TGSPDCL contract.

41.2 Furthermore, Bidders shall be aware of the provision stated in sub-clause 23.2 and sub clause 55 of the General Conditions of Contract.

42. USE OF CONTRACT DOCUMENTS AND INFORMATION

42.1 The Supplier will not, without the Purchaser's prior written consent, disclose the Contract, or any provision thereof, of any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Purchaser in connection therewith, to any person other than a person employed by the Supplier in the performance of the Contract. Disclosure to any such employed person will be made in confidence and will extend only so far as may be necessary for purposes of such performance.

42.2 The Supplier will not, without the Purchaser's prior written consent, make use of any document or information except for purposes of performing the Contract.

42.3 Any document, other than the Contract itself, will remain the property of the Purchaser and will be returned (in all copies) to the Purchaser on completion of the supplier's performance under the Contract if so required by the Purchaser.

42.4 The Supplier will permit the Purchaser or his authorized representative to inspect the Supplier's accounts and records relating to the performance of the Supplier and to have them audited by auditors appointed by the Supplier.

43. PATENT RIGHTS

The Supplier will indemnify the Purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Materials/ equipment or any part thereof.

44. PAYMENT TERMS (ON "PRO-RATA" BASIS)

44.1 Payments shall be adjusted for deductions for advance payments, retention and other recoveries in terms of the contract and deduction at source of taxes as applicable under the law. The Employer shall pay the Contractor the amounts certified by the Engineer on or after 30 days of the date of each certificate. The supplier will have to predefine the Bank details while entering into contract for electronic transfer of payments.

The Following shall be ascertained before release of payment:

1. Supply of total materials in stores of TGSPDCL.
2. Submission performance Bank Guarantee (10% of Award value)
3. Submission of agreed project implementation schedule.

Progressive / Mile stone based payment for project will be regulated as under, however each mile stone to be agreed based on the proposal and TGSPDCL requirement, if any.

S.No	Payment Milestones	% Payment against each item
1	SCADA Equipment	
a	Delivery, Installation of all materials mentioned as per bill of quantities in all Sub Stations.	50
b	Testing and Commissioning, Configuration all equipments	10
2	After successful completion of end-to end integration of all substations and feeders	10
3	After successful Site acceptance test with availability of 95% above	10
4	After Successful completion of training	5
5	After Successful submission of reports	5
6	Final Payment after acceptance and proof of submission of the required number of reproducible, O&M manual, user manual and Softwares etc,.	10
7	FMS Charges for 1st year	Quarterly
8	FMS Charges for 2nd year	Quarterly
9	FMS Charges for 3rd year	Quarterly
10	FMS Charges for 4th year	Quarterly
11	FMS Charges for 5th year	Quarterly

Charges will be paid as per payment terms after due certification by the DE/M&P and DE/SCADA/TGSPDCL and counter signed by SE/Operation Concerned along

with SE/SCADA after analyzing the achieved milestone and communication percentage.

The CGM (Finance) at TGSPDCL Corporate office shall arrange payment of bills.

Note:

i) The date of delivery would be the date on which the stores officer certifies the receipt of materials at stores in good condition 103 entry in SAP module in respective of the date of check measurement.

ii) Form 13 shall be issued subject to material taken into stock in good condition (i.e. 105 entry in SAP module)

iii) The supplier should invariably submit test certificates as soon as dispatch is made so that the test certificates can be checked up and approved well before it becomes due for payment. Routine Test Certificates of the entire lot shall be submitted to the Consignee.

iv) The performance guarantee to be executed in accordance with this specification shall be furnished on a stamp value of Rs.100/- The performance guarantee shall be from any Nationalized/Scheduled Bank. Performance Guarantee to the extent of 10% value of Contract price valid up to 6 months over and above the warranty period to draw 100% payment.

The performance guarantee has to be extended suitably by you in accordance with the guarantee clause, so that the last consignment against the order is covered by the guarantee.

44.2 The 100% payment mentioned above is subject to on submission of performance security.

44.3 The supplier should invariably submit test certificates and other documents, the purchaser specifies as soon as dispatch is made so that they can be checked and approved well in advance.

44.4 The performance guarantee to be executed in accordance with this specification will be furnished on a stamp paper of value Rs.100/-. The Bank Guarantee will be extended if required suitably.

44.5 If the supplier has received any over payments by mistake or if any amounts are due to the TGSPDCL due to any other reason, when it is not possible to recover such amounts under the contract resulting out of this specification, the TGSPDCL reserves the right to collect the same from any other amount and / or Bank Guarantees given by the company due to or with the TGSPDCL.

44.6 When the supplier does not at any time, fulfill his obligations in replacing/rectifying etc., of the damaged/defective materials in part or whole promptly to the satisfaction of the TGSPDCL Officers, the TGSPDCL reserves the right not to accept the bills against subsequent dispatches made by the supplier and

only the supplier will be responsible for any demurrages, wharfages or damage occurring to the consignments so dispatched.

B) Penalty Clause:

The delivery of materials/works as per the agreed schedule of delivery is the essence of the contract and no extension of the time for delivery would be allowed except under recognized force majeure conditions.

For supplies (hardware & software) and works made beyond the agreed delivery schedule, penalty shall be levied for an amount of equivalent to ½ % of the value of the material/works not delivered within the prescribed time limit for every week of delay or part thereof subject to a maximum of 5% of cost of the undelivered portion within scheduled time.

The date of certified receipt of material at destination stores in good condition will be taken as the date of delivery. For calculation of penalty, the date of receipt (i.e.,103 entry in SAP module) of material at destination stores is the "Date of Delivery" subject to the condition that, the materials is received in good condition. For penalty, the number of days would be rounded off to the nearest week and penalty calculated accordingly.

In case the supplier do not adhere to the delivery schedule the TGSPDCL reserves the right to purchase the balance quantity from the open market and recover expenditure incurred from the supplier. This is in addition to the right of the TGSPDCL mentioned in first para of this clause and under law.

The agency is responsible for attending, rectification/replacement of defective /burnt SCADA Equipment even in the event of high voltages if any within 24 hrs. In case of major failure such as total failure of Server, the agency has to rectify the same within 12 hours. The penalties are applicable as defined in service level agreement. The agency is liable to the purchaser (TGSPDCL) for payment penalty as specified in the SLA.

In case of a delay in the integration of all 33/11kv substations and 11kV feeders within the scheduled time, TGSPDCL, without prejudice to its rights under the law, including the right to cancel the contract, forfeit the bank guarantee, and/or recover damages for breach of contract, reserves the right to take appropriate action

C) Contract Termination:

I) The responsibility of the End to End communication & data availability shall lie wholly with the Agency. If the End to End communication & data availability is below the prescribed level of 85% for a continuous period of three months, the agreement is liable to be terminated and the Performance Bank Guarantee will be forfeited. Responsibility wholly lies with the bidder to

communicate and coordinate with Existing system integrator (SIA) for seamless integration of all SS without hampering timelines specified in schedule.

II) If the goods and related services supplied do not meet the minimum specifications as per the contract or the goods that under perform or not compatible to the requirements and the same are not replaced/modified by the supplier to meet the requirements within 07 days of being informed by the utility, the utility (TGSPDCL) shall be free to impose any penality as deemed fit. In addition, the utility shall reserve the right to terminate the contract and recover liquidated damages by forfeiting the performance guarantee submitted.

II. PAYMENT PROCEDURE

(a) The payment shall be made in Indian Rupees (INR) only.

(b) The payments shall be made on or after thirty (30) days of receipt of contractor's invoice complete in all respects and supported by the requisite documents and fulfillment of stipulated conditions, if any. All the payment shall be released to the contractor through the Banks by crediting to his account.

(c) Payments shall be adjusted for deductions for any applicable liquidated damages and/or penalty due to noncompliance of SLAs by the Successful Bidder, advance payments, retention, and other recoveries in terms of the contract and deduction at source of taxes as applicable under the law.

45. SETTLEMENT OF DISPUTES

If any dispute or difference of any kind whatsoever will arise between the Purchaser and the Supplier in connection with or arising out of the Contract, the parties will make every effort to resolve amicably such dispute or difference by mutual consultation.

If, after thirty (30) days the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

Any dispute of difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause will be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Materials / equipment under the Contract.

Arbitration proceedings will be conducted in accordance with the following rules of procedure. The dispute resolution mechanism will be as follows:

(a) In the case of a dispute or difference arising between the Purchaser and a Supplier relating to any matter arising out of or connected with this agreement, such dispute or difference will be settled in accordance with the Arbitration and Conciliation Act. 1996. The Arbitral Tribunal will consist of three Arbitrators one each to be appointed by the Purchaser and the supplier the Third Arbitrator will be chosen by the two Arbitrators so

appointed by the parties and will acts as Presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within period of 30 days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator will be appointed by The Institution of Engineers (India).

(b) If one of the Parties fails to appoint its Arbitrator in pursuance of Sub-Clause (a) within 30 days after receipt of the notice of the appointment of its Arbitrator by The Institution of Engineers (India), will appoint the Arbitrator. A certified copy of the order of the Institution of Engineers (India), making such an appointment will be furnished to each to the parties.

(c) Arbitration Proceedings will be held at Purchaser's Headquarters, and the language of the Arbitration Proceedings and that of all documents and communication between the parties will be English.

(d) The decision of the majority of Arbitrators will be final and binding upon both parties. The cost and expenses of Arbitration Proceedings will be paid as determined by the Arbitral Tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc., of its proceedings as also the fees and expenses paid to the Arbitrator appointed by such party or on its behalf will be borne by each party itself.

(e) Where the value of the Contract is Rs. One Crore and below, the disputes or differences arising will be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority namely The Institution of Engineers (India).

Notwithstanding any reference to arbitration herein,

(a) The parties will continue to perform their respective obligations under the Contract unless they otherwise agree; and

(b) The Purchaser will pay the Supplier any monies due the Supplier.

The arbitration if any in the disputes arising out of bidding process or in the execution of the contract, payments, penalties etc. shall be conducted in accordance with the arbitration procedure as laid down in Indian arbitration and conciliation Act. 1996. All disputes are subject to courts situated at HYDERABAD only.

46. **Places/Locations:**

Particulars of site location and nearest rail heads to which the equipments / material have to be supplied will be given to successful Bidders.

47. Delivery:

Delivery period will be reckoned from the date of notice to proceed. The delivery quoted will be firm, definite, unconditional and on the basis of receipt of materials at destination in good condition without any bearing on the procurement of raw materials or any similar prerequisites. The commencement date and date of delivery will be indicted. The preferred delivery time, which is the essence of this

specification, is indicated in the schedule. Final deliveries are however, subject to confirmation at the time of Contract. Delay in delivery of materials FADS – (Free At Destination store) due to non-availability of railway booking, non-allotment of wagons and any such reasons will not be considered. It is the responsibility of the supplier to make alternative arrangements for transporting the materials by road or rail so as to see that the material reaches the destination within the stipulated period. The Purchaser reserves its right to defer the delivery date at any time after orders are placed without any change in the conclusion of contract other conditions supply. The delivery period, which will be reckoned from the date of the Contract, will be guaranteed under penalty as in Clause 60.

48. Inspections and Tests

(i) The supplier will keep the Purchaser informed in advance of the time of the starting and the progress of manufacture of equipment in its various stages so that arrangement could be made for inspection. The accredited representative of the TGSPDCL will have access to the supplier's or his subcontractor's work at any time during working hours for the purpose of inspecting the materials during manufacturing of the materials/equipment and testing and may select test samples from the materials going into plant and equipment. The supplier will provide the facilities for testing such samples at any time including access to drawings and production data at no charge to Purchaser. As soon as the materials are ready the supplier will duly send intimation to TGSPDCL by Regd. Post and carry out the tests in the presence of representative of the TGSPDCL.

(ii) The TGSPDCL may at its option get the materials inspected by the third party if it feels necessary and all inspection charges in this connection will be borne by the TGSPDCL. In case of material, not of acceptable quality or not conforming to the specification, the materials will be rejected. The material has to be re-offered for inspection. In such a case the 2nd inspection charges are to suppliers account. In case the materials are rejected in the 2nd inspection also, the TGSPDCL reserves the right to cancel the order.

(iii) The dispatches will be affected only if the test results comply with the specification. The dispatches will be made only after the inspection by the TGSPDCL Officer is completed to the TGSPDCL satisfaction or such inspection is waived by the competent authority.

(iv) The acceptance of any quantity of materials will in no way relieve the supplier of its responsibility for meeting all the requirements of this specification and will not prevent subsequent rejection if such materials are later found to be defective.

(v) The supplier will give 15 days advance intimation to enable the Purchaser to depute his representative for witnessing the acceptance and routine tests.

(vi) Should any inspected or tested materials/equipment fail to conform to the specification, the Purchaser may reject the materials and supplier will either replace the rejected materials or make alterations necessary to meet specifications requirements free of costs to the Purchaser.

(vii) Inspection not carried out due to non-readiness of the material even after contacting / confirmed over phone from the supplier about availability of material and physical verification at the supplier premises, the charges @ 0.3% of Ex-works price of material offered for inspection (inclusive of service tax and all other taxes & duties, travelling expenses, boarding and lodging charges at the place of inspection and all incidental charges) shall be paid by supplier subject to a maximum of Rs. 10,000.00 .

49. Name Plate:

Equipment should be provided with name plate giving full details of manufacture, capacities and other details as specified in the relevant ISS or other specification stipulated. The contract No. and date and year of supply and the words **"TGSPDCL"** must be etched on the name plate.

50. Packing

50.1 The Supplier will provide such packing of the Materials / equipment as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. The packing will be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing case size and weights will take into consideration, where appropriate, the remoteness of the Materials / equipment' final destination and the absence of heavy handling facilities at all points in transit.

50.2 The packing, marking, and documentation and outside the packages will comply strictly with such special requirements as will be expressly provided for in the Contract and in any subsequent instructions ordered by the Purchaser. The supplier will be required to make separate packages for each consignee, each package will be marked on three sides with proper paint / indelible ink with the following;

1. Contract Number
2 Supplier's name
3 Packing list reference number

50.3 The supplier, whenever dispatches material to a destination should prepare the following information in the form of packing slip in quadruplicate and send the same to the consignee and obtain his acknowledgement. The consignee will return to the supplier one copy of the packing slip with his remarks. The proforma of packing slip will be as follows:
PACKING SLIP

1. Contract No.& Date.
2. Quantity allotted to the stores and rate applicable.
3. Quantity so far supplied to the stores and the rate applied.
4. Quantity now supplied and the rate applied.
5. Total quantity supplied under the Contract with rates applied.
6. Programme for supplying the balance quantity to the Stores.

51. Delivery Documents

51.1 Delivery of the Materials/equipment will be made by the Supplier in accordance with the terms specified in the contract.

The latest test certificates containing the result of the tests as per the relevant ISS or other specification stipulated must be submitted to the Chief General Manager (Projects) and got approved by him.

51.2 Documents to be submitted by the Supplier are specified as under…

(i) Insurance certificate;
(ii) Supplier's certificate certifying that the defects if any pointed out during inspection have been rectified (3 copies).
(iii) Manuals in Six sets and one set of reproducible drawings.

The Purchaser will receive the above documents soon after the dispatch of materials and if not received, the supplier will be responsible for any consequent expenses.

52. Insurance

52.1.1 The Materials/ equipment supplied under the Contract will be fully insured against loss or damage incidental to manufacture or acquisition, transportation and delivery and also storage for **45 days** at destination location/stores.

52.1.2 The bidder shall a) Initiate and pursue insurance claim till settlement, and b) Promptly arrange for repair and/or replacement of any damaged items in full irrespective of settlement of insurance claim by the under Writers. c) All costs because of insurance liabilities covered under the contract will be to supplier's account. The supplier shall provide the Purchaser with a copy of all insurance policies and documents taken out by him in pursuance of the 'Contract'. Such copies of documents shall be submitted to the purchaser immediately after such insurance coverage. The supplier shall also inform the Purchaser in writing at least sixty (60) days in advance, regarding the expiry, cancellation and/or change in any of such documents and ensure revalidation/renewal etc., as may be necessary well in time.

The risks that are to be covered under the insurance shall be comprehensive and shall include but not limited to, the loss or damage in transit, storage, due to theft, pilferage, riot, civil commotion, weather conditions, accident of all kinds, fire, flood, war risk(during ocean transportation) bad or rough handling etc. The scope of such insurance shall cover the entire contract value.

The insurance will be in an amount equal to 100% FADS value of Materials / equipment on all risks basis. The policy will have a provision for extension to cover further storage if necessary at destination stores / site at TGSPDCL cost. **The insurance beneficiary shall be of TGSPDCL.**

53. Transportation

The Supplier is required under the Contract to transport the Materials / equipment to a specified place of destination defined as normally the district stores, transport to such place of destination, including insurance and storage, will be arranged by the Supplier, and the related costs will be included in the Contract Price only.

54. Incidental Services

The Supplier may be required to provide any or all of the following services, including additional services, if any.

a) Performance or supervision of on-site assembly and/or start-up of the supplied Materials / equipment;

b) Furnishing of tools required for assembly and/or maintenance of the supplied Materials / equipment;

c) Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Materials / equipment;

d) Performance or supervision or maintenance and/or repair of the supplied Materials/ equipment, during warranty period, provided that this service will not relieve the Supplier of any warranty obligations under this contract; and

e) Training of the Purchaser's personnel, at the Suppliers' plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Materials/ equipment.

55. Spare Parts

The Supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier.

(a) Such spare parts as the Purchaser may choose to purchase from the Supplier, provided that this election will not relieve the supplier of any warranty obligations under the contract; and

(b) In the event of termination of production of the spare parts:

(c) Advance notification to the Purchaser of the impending termination.

(d) Time to permit the Purchase to procure needed requirement; and following such termination, furnishing at no cost to the Purchaser, the blueprints, drawings, and specifications of the spare parts, if requested.

(e) Bidder shall quote unit rate for 10% of mandatory spares separately for maintaining of RT DAS system.

56. Warranty

56.1 This would include five years warranty for the related hardware supplied under the project from the date of Go-Live as certified by the SE/SCADA. The five year warranty shall include comprehensive OEM on-site warranty for all components (all Hardware in field & control center) supplied including reloading and reconfiguration of all Software and device drivers/patches etc. if required. Bidder should provide perpetual licence for all the software supplied under the project.

56.2 The Supplier warrants that the Materials/equipment supplied under the Contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The supplier further warrants that all Materials/equipment supplied under this Contract will have no defect, arising from a design and /or materials as required by the Purchaser's specifications or from any act of omission of the Supplier that may develop under normal use of the supplied Materials/equipment.

56.3 All the material will be of the best class and will be capable of satisfactory operation in the tropics under service conditions indicated in clause 25 without distortion or deterioration. No welding filling or plugging of defective parts will be permitted, unless otherwise specified, they will conform to the requirements of the appropriate Indian, British or American Standards. (Where a standard specification covering the

material in question has not been published, the standards of the American Society for testing of Materials should be followed).

56.4 The entire designs and construction will be capable of withstanding the severest stresses likely to occur in actual service and of resisting rough handling during transport.

56.5 Unless otherwise specified the warranty period will be 5 years from the date of Go-Live as certified by the SE/SCADA. The Supplier will, in addition, comply with the performance guarantees specified under the contract. If, for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the supplier will at its discretion either, Make such changes, modifications, and/or additions to the Materials / equipment or any part thereof as may be necessary in order to attain the contractual guarantees specified in the contract at its own cost and expense and to carry out further performance tests as per the relevant standards.

56.6 The Purchaser will promptly notify the supplier in writing of any claims arising under this warranty.

56.7 "Upon receipt of such notice, the Supplier will within 30 days repair or replace the defective Materials/equipment or parts thereof, free of cost at the ultimate destination. The supplier will take over the replaced parts/Materials/equipment at the time of their replacement. No claim whatsoever will lie on the Purchaser for the replaced parts/Materials/equipment thereafter". In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected/replaced material will be extended to a further period of 12 months.

56.8 If the Supplier, having been notified, fails to remedy the defect(s) within the above period, the Purchaser may proceed to take such remedial action as may be necessary, at the Supplier's risk and expense duly deducting the expenditure from subsequent bills / bank guarantee and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

56.9 **Works:**

IDENTIFYING DEFECTS

56.9.1 The Engineer shall check the Contractor’s work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor’s responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

56.9.2 The Engineer concerned of the department shall counter check the quality of work before taking over the works prior to charging.

TESTS

56.9.3 If the Engineer instructs the contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test 6shall be a Compensation Event.

CORRECTION OF DEFECTS

56.9.4 The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined under Clause 1"Definitions". The Defects Liability period shall be extended for as long as Defects remain to be corrected.

56.9.5 Every time notice of a Defect is given, the Contractor shall correct the notified defect within the length of time specified by the Engineer's notice.

UNCORRECTED DEFECTS

56.9.6 If the Contractor has not corrected a Defect within the time specified in the Engineer's, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount and it will be recovered from his future bills.

57. Prices

Prices charged by the Supplier for Materials / equipment delivered and Services performed under the Contract will not vary from the prices quoted by the supplier in its bid, with the exception of any price adjustment authorized in the contract.

58. Change Orders

The Purchaser may at any time, by a written order given to the Supplier make changes within the general scope of the Contract in any one or more of the following:

(a) Drawings, designs, or specifications, where Materials / equipment to be furnished under the Contract are to be specifically manufactured for the Purchaser;
(b) The method of shipment or packing;
(c) The place of delivery; and/or
(d) The Services to be provided by the Supplier.

59. Contract Amendments

No variation in or modification of the terms of the Contract will be made except by written amendment by the Purchaser and accepted by the supplier.

60. Assignment

The Supplier will not assign, in whole or in part, its obligations to perform under this Contract, except with the Purchaser's prior written consent.

61. Delays in Supplier's Performance

61.1 Delivery of the Materials / equipment will be made by the Supplier in accordance with the time schedule prescribed by the Purchaser in the Schedule of materials.

61.2 If at any time during performance of the Contract, the Supplier should encounter conditions impeding timely delivery of the Materials / equipment, the Supplier will promptly notify the Purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Supplier's notice, the Purchaser will evaluate the situation and may at its discretion extend the Supplier's time for performance, with or without liquidated damages, in which case the extension will be ratified by the parties by amendment of the Contract.

61.3 Except as provided under force measure clause a delay by the Supplier in the performance of its delivery obligations will render the Supplier liable to the imposition of liquidated damages unless an extension of time is agreed upon without the application of liquidated damages.

62. Penalty for delay in supplies

The delivery of materials/works as per the agreed schedule of delivery is the essence of the contract and no extension of the time for delivery would be allowed except under recognized force majeure conditions.

For supplies (hardware & software) and works made beyond the agreed delivery schedule, penalty shall be levied for an amount of equivalent to ½ % of the value of the material/works not delivered within the prescribed time limit for every week of delay or part thereof subject to a maximum of 5% of cost of the undelivered portion within scheduled time.

The date of certified receipt of material at destination stores in good condition will be taken as the date of delivery. For calculation of penalty, the date of receipt (i.e.,103 entry in SAP module) of material at destination stores is the "Date of Delivery" subject to the condition that, the materials is received in good condition. For penalty, the number of days would be rounded off to the nearest week and penalty calculated accordingly.

In case you do not adhere to the delivery schedule the TGSPDCL reserves the right to purchase the balance quantity from the open market and recover expenditure incurred from you. This is in addition to the right of the TGSPDCL mentioned in first para of this clause and under law.

63. Risk Purchase

Incase of supplier who has not adhered to the delivery schedule, the TGSPDCL reserves the right to purchase the balance quantity from the open market/floating another tender and recover the extra expenditure thus incurred from the supplier.

64 Termination for Default

64.1 The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate this Contract in whole or in part:

i. If the Supplier fails to deliver any or all of the Materials / equipment within the period(s) specified in the Contract, or within any extension thereof granted by the Purchaser.

ii. If the Supplier fails to perform any other obligation(s) under the Contract.

iii. If the Supplier, in the judgment of the Purchaser has engaged incorrupt or fraudulent practices in competing for or in executing the Contract.

64.2 In the event the Purchaser terminates the Contract in whole or in part, the Purchaser may procure, upon such terms and in such manner, as it deems appropriate, Materials / equipment or services similar to those undelivered, and the Supplier will be liable to the Purchaser for any excess costs for such similar Materials / equipment or Services. However, the Supplier will continue performance of the Contract to the extent not terminated.

65. Termination for Insolvency

The Purchaser may at any time terminate the Contract by giving written notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In this event,

termination will be without compensation to the supplier, provided that such termination will not prejudice or not affect any right of action or remedy, which has accrued or will accrue thereafter to the Purchaser.

66. Termination for Convenience

66.1 The Purchaser, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination will specify the termination is for the Purchaser's convenience, the extent to which performance of the supplier under the Contract is terminated, and date upon which termination becomes effective.

66.2 However the Materials / equipment that are complete and ready for shipment within thirty (30) days after the supplier's receipt of notice of termination will be accepted by the Purchaser at the Contract terms and prices.

67. Force Majeure

67.1 The Supplier will not be liable for forfeiture of its performance security, penalty for late delivery, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contact is the result of an event of Force Majeure.

67.2 For purposes of this clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not restricted to, wars or revolutions fires, floods, epidemics, quarantine restrictions, and freight embargoes.

67.3 If a Force Majeure situation arises, the supplier will promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier will continue to perform its obligations under the Contract as far as is reasonably practice, and will seek all reasonable alternative means for performance not prevented by the Force Majeure event.

68. Jurisdiction

All and any disputes or differences arising out of or touching this contract will be decided by the Courts or Tribunals situated in Purchaser’s Headquarters only. No suit or other legal proceedings will be instituted elsewhere.

69. Notices

69.1 Any notice given by one party to the other pursuant to this Contract will be sent to the other party in writing or by cable, telex, or facsimile and confirmed in writing to the other party’s address.

69.2 A notice will be effective when delivered or on the notice's effective date, whichever is later.

70. Foreign Exchange

No Foreign Exchange is available or expected for this purchase. Where some of the components are to be imported the manufacturer will have to make their own arrangements for import license etc., and should not look for any assistance from TGSPDCL.

71. Delivery/Implementation Schedule:

SECTION - IV

TECHNICAL SPECIFICATIONS

Table of Contents

1. REMOTE TERMINAL UNIT (RTU)

1.1. General Overview

1.1.1. Purpose and Scope

This specification defines the requirements for a Supervisory Control and Data Acquisition (SCADA) Remote Terminal Unit (RTU) and its associated control panel designed to support a 33/11 kV substation. The system shall monitor, control, and acquire data from substation equipment, including 32 protection relays and 30 Multifunction Transducers (MFTs). The RTU shall interface with substation automation systems to ensure reliable operation, fault detection, and remote management. Scope includes hardware, software, integration, testing, and commissioning for a single substation site.

The Remote Terminal Unit (RTU) shall be installed at primary substation to acquire data from IED (Intelligent Electronic Device) relays. The RTU shall also contain transducer, MFT, HDRs for monitoring station supply, DC voltage of auxiliary supplies and to control the substation general signals. The RTUs used for control of Substation devices from Master station(s). The supplied RTUs shall be interfaced with the substation equipment, communication equipment, power supply distribution boards for which all the interface cables, TBs, wires, lugs, glands etc. shall be supplied, installed & terminated by the Contractor.

1.1.2. System Description

The SCADA RTU shall serve as the field interface unit, collecting data from 32 relays (e.g., feeder protection, differential) and 30 MFTs (providing metering for voltage, current, power, and energy). The system supports a 33 kV incoming feeder stepping down to 11 kV distribution feeders, with typical bay configurations for transformers, busbars, and feeders. The RTU panel shall house the RTU, I/O modules, power supplies, and communication interfaces in a compact, rugged enclosure suitable for outdoor substation installation.

1.1.3. Applicable Standards and Codes

a. IEC 61850: Communication networks and systems for power utility automation
b. IEC 60870-5-101/104: Telecontrol equipment and systems
c. IEEE C37.90: Relays and relay systems associated with electric power apparatus
d. NEMA ICS 6: Enclosures for industrial control and systems

e. IEC 60529: Degrees of protection provided by enclosures (IP rating)
f. EMC: IEC 61000 series for electromagnetic compatibility
g. Safety: IEC 61508 (SIL 2 for functional safety where applicable)

1.1.4. Definitions and Acronyms

a. RTU: Remote Terminal Unit
b. MFT: Multifunction Transducer
c. DI: Digital Input
d. DO: Digital Output
e. AI: Analog Input
f. AO: Analog Output
g. HMI: Human-Machine Interface
h. MTBF: Mean Time Between Failures

1.2. Functional requirements

1.2.1. RTU Functions

All functional capability described herein shall be provided by the Contractor even if a function is not initially implemented.

As a minimum, the RTU shall be capable of performing the following functions:

a. Acquiring analog values from IED relays (61850) protocol. Capability to acquire analog inputs from analog input cards receiving standard signals viz current loops 4-20ma standard signals such as 0-5v dc etc for RTD, transducer etc.
b. Receiving and processing digital commands from the master station(s)
c. Data transmission rates – 300 to 19200 bps for Serial ports for MODBUS. And 10/100 mbps for TCP/IP Ethernet port.
d. IEC 60870-5-104 protocolto communicate with the Master station(s), IEC 60870-5-101 for slave devices & MODBUS protocol over RS485 interface, to communicate with the MFTs.
e. RTU shall have the capability of automatic start-up and initialisation following restoration of power after an outage without need of manual intervention. All restarts shall be reported to the connected master stations.
f. Remote database downloading of RTU from master station/SCADA/DMS control centre
g. Act as data concentrator on IEC60870-5-101/104/MODBUS protocols
h. Internal battery backup to hold data in SOE buffer memory & also maintaining the time & date.
i. As the SCADA/DMS system will use public domain such as GPRS etc, therefore it is mandatory to guard the data/equipment from intrusion/damage/breach of security & shall have SSL/VPN based security.
j. Shall have SNMP(Simple network management protocol) & SNTP(Simple network time protocol).

k. RTU shall have glands for all opening and spare Opening also required in RTU.

1.2.2. System Functionality

The RTU shall support real-time data acquisition, event logging, alarm generation, and control commands for substation protection and metering. It shall handle up to 32 relays for status monitoring (e.g., trip signals, breaker positions) and 30 MFTs/Trivector meters for analog metering (e.g., 3-phase voltage/current, active/reactive power).

I. Analog Inputs

The real time values like, Active power, Reactive Power, Apparent power three phase Current & Voltage and frequency, power factor & accumulated values of import /export energy values will be acquired. The RTU analog-to-digital (A/D) converters shall have a digital resolution of at least twelve (12) bits plus sign. The overall accuracy of the analog input system shall be at least 0.2 % (i.e. 99.8%) at 25 ºC of full scale. Mean accuracy shall not drift more than 0.002% per degree C within the temperature range of –5 to +55 degree Linearity shall be better than 0.05%. The RTU shall be designed to reject common mode voltages up to 150 Vac (50 Hz). For dc inputs, normal mode noise voltages up to 5 Vac shall be rejected while maintaining the specified accuracy.

Each input shall have suitable protection and filtering to provide protection against voltage spikes and residual current at 50 Hz, 0.1 ma (peak-to-peak) and overload. Loading upto 150% of the input value shall not sustain any failures to the RTU input.

The ability of the RTU to accommodate dc inputs shall include the following signal ranges:

Unipolar Voltage: 0-0.5V, 0-1V, 0-5V, 0-10V,

Uni polar Curent : 0-1mA, 0-10mA, 0-20mA, 4-20Ma,

Bipolar Voltage: 0.5V, 2.5V, 5V, -20-0-20mA (- to +)

I. Status input

RTU shall be capable of accepting isolated dry (potential free) contact status inputs. The RTU shall provide necessary sensing voltage, current, optical isolation and de-bounce filtering independently for each status input. The sensing voltage shall not exceed 48Vdc.The RTU shall be set to capture contact operations of 20 ms or more duration.

Operations of less than 20 ms duration shall be considered no change (contact bounce condition). The RTU shall accept two types of status inputs i.e. Single point Status inputs and Double point status inputs.

To take care of status contact chattering, a time period for each point and the allowable number of operations per time period shall be defined. If the allowable number of operations exceed within this time period, the status change shall not be accepted as valid

Single point status input will be from a normally-open (NO) or normally-closed (NC) contact which is represented by 1-bit in the protocol message.

The Double point status input will be from two complementary contacts (one NO and one NC) which is represented by 2-bits in the protocol message. A switching device status is valid only when one contact is closed and the other contact is open. Invalid states shall be reported when both contacts are open or both contacts are closed. All status inputs shall be scanned by the RTU from the field at 1 millisecond periodicity.

I. Sequence of Events (SOE) feature

To analyse the chronology or sequence of events occurring in the power system, time tagging of data is required which shall be achieved through SOE feature of RTU. The RTU shall have an internal clock with the stability of 10 ppm or better. The RTU time shall be set from time synchronization messages received from master station using IEC 60870-5- 104 protocol. In addition, the message can be transmitted using NTP/SNTP. SOE time resolution shall be 1ms or better

The RTU shall maintain a clock and shall time-stamp the digital status data. Any digital status input data point in the RTU shall be assignable as an SOE point. Each time a SOE status indication point changes the state, the RTU shall time-tag the change and store in SOE buffer within the RTU. A minimum of 1000 events can be stored in the SOE buffer. SOE shall be transferred to Master Station as per IEC 60870-5-104 protocol. SOE buffer & time shall be maintained by RTU on power supply interruption.

I. IED pass through

The Master Station user shall be able to perform a virtual connection with any IED connected to the RTU/DC, provided the communication protocol functionality, to support the information transfer from and to the IEDs. For example, the Master Station shall gather on-demand IED data, visualize IED configuration parameters, and IED source code depending upon the IED capabilities. The Master Station shall be able to upload & download (full read & write) data with IEDs connected to the RTUs, configure parameters, code changes, etc. depending upon the IED capabilities.

This feature is a support function considering in future SMART GRID implementation. The capability can be demonstrated with the upload & download (full read & write) of data from master station with IEDs connected to the RTUs using the support of protocols specified in this chapter. Numerical relays Analog data viz voltage, current, sag swell instantaneous, momentary, temporary, over voltage, under voltage, over current, phasor measurement, THD, current TDD & current unbalance ratio etc at numerical relays if installed at bay of S/S

I. PLC capability

The RTU shall be provided with programmable logic capabilities supported by easy to use editor facilities. The programmable logic capability shall enable the RTU to perform control functions using ladder logic language conforming IEC 1131.

I. Control Outputs

The RTU shall provide the capability for a master station to select and change the state of digital output points. These control outputs shall be used to control power system devices such as Circuit breakers relay disable/enable and other two-state devices, which shall be supported by the RTU.

A set of control outputs shall be provided for each controllable device. On receipt of command from a master station using the select check-before-execute operate (SCBO) sequence, the appropriate control output shall be operated for a preset time period which is adjustable for each point from 0.1 to 2 seconds.

Each control output shall consist of one set of potential free NO contact. The output contacts shall be rated for at least 0.2 amp at 48 Vdc. These output contact shall be used to drive heavy duty relays. In case Control output module of RTU does not provide

potential free control output contact of this rating, then separate control output relays shall be provided by the contractor. These relay coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils & shall conform to the relevant IEC requirements.

I. Heavy duty control output relays

The control output contact from the RTU shall be used for initiating heavy duty relays for trip/close of switching devices and energising relays of OLTC raise lower. The contractor shall provide heavy duty relays (HDR). Each control output relays shall consist of atleast 2 NO contacts. The output contacts shall be rated for at least 5 Amps Continuous at 240V AC and shall provide arc suppression to permit interruptions of an inductive load. Relay coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils. The relays shall conform to the IEC255-1-00 and IEC 255-5 requirements.

A set of two HDRs to be provided for each PTR existing in the substation and an extra set also to be provided for future expansions. The necessary cable to be layed for Lower and Raising of Tap.

I. Transducers

The analog input contact from the RTU shall be used for reading the resistance of the power transformer(PTR) to scale the TAP position of the PTR. The contractor shall provide transducers. A transducer to be provided for each PTR existing in the substation and an extra transducer also to be provided for future expansions.

I. Ethernet switch

An ethernet switch with minimum 5 fast ethernet ports has to be provided in the RTU panel to connect RTU, LDMS, Router, Laptop and a spare.

I. Control Security and Safety Requirements

The RTU shall include the following security and safety features as a minimum for control outputs:

a. Select- check-before-operate operate (SCBO) sequence for control output.

b. No more than one control point shall be select ed/executed at any given time.

c. The control selection shall be automatically cancelled if after receiving the “control selection” message, the “control execute” command is not received within the set time period.

d. No control command shall be generated during power up or power down of RTU.

I. Data Acquisition Capabilities

a. Scan cycle: <1 second for critical points
b. Data types: Binary status, analog values, accumulated values (e.g., energy)
c. The RTU shall have minimum of 20000 data points feature.

I. Control Capabilities

a. Binary control: Breaker open/close commands with select-before-execute
b. Analog setpoints: For transformer tap changers or capacitor banks
c. Interlocks: Software/hardware to prevent unsafe operations

1.2.3. Communication Requirements

I. Communication ports

The RTUs shall have following communication ports to communicate with master station, IEDs, MFTs, Transducers, HDRs and configuration & maintenance terminal.

a. RTU shall have 61850 compatible two FO ports (transmission &Receive) for communication with IED relays.
b. RTU shall have two TCP/IP Ethernet ports for communication with 4 Master station(s) using IEC 60870-5-104 along with Ethernet switch with minimum 4 ports.
c. RTU shall have required number of RS 485 ports for communication with MFTs to be connected in daisy chain using MODBUS protocol. Which can receive the digital and analog parameters from minimum 30numbers MFT devices . Further, bidder to demonstrate during testing that all analog values updated within 2 sec. The updating time shall be demonstrated during SAT testing.
d. In addition, if weather transducer & DC transducers are also having RS485 MODBUS port., the same can be also added in the daisy. However, total devices including MFTs connected on one port shall not exceed.
e. RTU shall have one port for connecting the portable configuration and maintenance tool for RTU.
f. RTU shall have 2 numbers Fibre Optic ports to establish 2-way communication loop in & loop out method to transmit the Analog and Digital Signals from IEDs and to execute the commands given from Control Center/LDMS

g. RTU as a data concentrator, then RTU shall have additional communication ports Ethernet or serial for IEC60870-5-104/101.

h. It shall be possible to increase the number of communication ports in the RTU by addition of cards, if required in future. The RTU shall support the use of a different communication data exchange rate (bits per second) and scanning cycle on each port & different database for each master station.

i. Local: Modbus RTU/TCP for relay/MFT integration

j. Remote: IEC 61850 GOOSE for fast peer-to-peer messaging

I. Communication protocols

The RTU shall acquire data from the IEDs in 61850 protocol with FO ports & MFTs using the MODBUS protocol. In addition, usage of IEC 60870-5-101/104 protocols is also permitted. The IEDs & MFT will act as slave to the RTU. The RTU shall transmit these values to the master station in the frame of IEC 60870-5-104/101 protocol. As an alternate approach the utility/contractor may use RTU as a data concentrator & acquire all the required analog data from DCU installed & connected to energy meters using MODBUS protocol. However, performance, functional, availability & update time requirement shall be met in this case also. It is the responsibility of utility /contractor to assess this option & only opt in case it is found feasible.

1.2.4. Time facility

The internal RTU time base shall have a stability of 10 ppm. The RTU shall be synchronised through synchronisation message from master station at every 15 minutes (configurable from 15 minutes to 24hrs) over IEC 60870-5-104/101/NTP/SNTP. The RTU shall also carry out time stamping of the events which are not received as time stamped from connected IEDs/ FPIs etc.

1.2.5. RTU Capability

The RTU must have the capability to handle the data of minimum 32 IEDs and 30MFTs/tri vector meters in a substation

1.2.6. Diagnostic Software

Diagnostic Software shall be provided to continuously monitor operation of the RTU and report RTU hardware errors to the connected master stations. The software shall check for memory, processor, and input/output ports errors and failures of other functional areas defined in the specification of the RTU.

1.2.7. SCADA language based on IEC61131-3

RTU shall have capability to write various programs-based IEC 61131-3 SCADA language. It will facilitate user to write various programs using points defined in the database.

1.2.8. Scalability and Expandability

a. Modular I/O slots for future addition of 20% more points
b. Firmware upgradable without downtime

1.2.9. Cyber Security

a. The RTU shall comply with Cyber Security Standard as per IEC 62443-4-2:2019 and certificate from the approved national/international recognised laboratory shall be enclosed part of bid documents.
b. Firewall/VPN support, audit logging per IEC 62351
c. Firmware signing and secure boot

1.3. Hardware requirements& installation

1.3.1. Design Standards

The RTUs shall be designed in accordance with applicable International Electro-technical Commission (IEC), Institute of Electrical and Electronics Engineer (IEEE), American National Standards Institute (ANSI), and National Equipment Manufacturers association (NEMA) standards, unless otherwise specified in this technical specification. In all cases the provisions of the latest edition or revision of the applicable standards in effect shall apply.

The RTU shall be designed around microprocessor technology. For easy maintenance the architecture shall support pluggable modules on backplane. The field wiring shall be terminated such that these are easily detachable from the I/O module.

The RTU shall comply to IEC62351- 3/ IEC62443-4-2 standard for cyber security including testing requirement as per MoP order no 12/34/2020-T&R dated:08.06.21 & CEA /PLG/R&D/MII/2021 dtd 11.6.21 and any amendment from time to time.

1.3.2. RTU Architecture

Bidder has the option to offer RTUs having following architectural design.

a. Centralized RTU design where all I/O modules are housed in RTU panels and communicating with master station through communication port.

b. Distributed RTU design where distributed I/O modules/processor with I/O modules are housed in respective bay panels/RTU panel. All these distributed I/O modules / I/O modules with processor shall be connected to a central processor for further communication with master station. The bidder shall asses the requirement of RTU panels for such design and supply panels accordingly.

In both cases the RTU requirements as envisaged in this specification shall be followed. And Firmware upgradable without downtime.

1.3.3. RTU earthing

A separate dedicated earthing to the RTU and its auxiliary supplies has to be done, Ensure earth resistance < 1 ohm to facilitate affective earthing. Route earthing cables separately from power cables to minimize electromagnetic interference. Install surge arrestors to protect through RTU and periodically inspect and maintaining earthing system to ensure its integrity.

1.3.4. Local/Remote selector switch

A manual Local/Remote selector switch shall be provided for each RTU to disable all control outputs by breaking the power supply connection to the control output s. When in the “Local” position, the Local/Remote switch shall allow testing of all the control outputs of RTU without activating the control outputs to field devices. A status input indication shall be provided for the Local/Remote switch to allow the SCADA system to monitor the position of the switch.

1.3.5. Dummy breaker latching relay

The Contractor shall provide a latching relay to be used to simulate and test supervisory control from the Master station. The latching relay shall accept the control signals from the RTU to open and close, and shall provide the correct indication response through a single point status input.

1.3.6. Input DC Power Supply

The RTU will be powered from a 48 V DC power supply system. The RTU shall not place additional ground on the input power source. The characteristics of the input DC power supply shall be

a. Nominal voltage of 48 Vdc with variation between 40.8 and 57.6 Vdc (i.e. 48(+20%/-15%)
b. Maximum AC component of frequency equal to or greater than 100 Hz and 0.012 times the rated voltage peak-to-peak.
c. The RTU shall have adequate protection against reversed polarity, over current and under voltage conditions, to prevent the RTU internal logic from being damaged and becoming unstable causing mal-operation. The specification for DCPS is given in respective section of MTS.

1.3.7. Environmental Requirements

The RTU will be installed in control room buildings with no temperature or humidity control. The RTUs shall be capable of operating in ambient temperature from 0 to +55 degree C with rate of temperature change of 20 degree C/ hour and relative humidity less than 95%, non-condensing.

1.3.8. RTU Size and Expandability

RTU shall be equipped for the point counts defined in the BOQ +20% spare (wired & hardware). It shall be possible to expand the RTU capability for additional 100 % of the basic point counts by way of addition of hardware such as modules, racks, panels, however, RTU software and database shall be sized to accommodate such growth without requiring software or database regeneration.

1.3.9. RTU Panels

At least 50% of the space inside each enclosure shall be unused (spare) space that shall be reserved for future use. The Contractor shall provide required panels conforming to IEC 529 for housing the RTU modules/racks, relays etc. and other required hardware. The panels shall meet the following requirements:

a. Shall be free-standing, floor mounted and height shall not exceed 2200 mm. All doors and removable panels shall be fitted with long life rubber beading. All non-load bearing panels/doors shall be fabricated from minimum 1.6 mm thickness steel sheet and all load bearing panels, frames, top & bottom panels shall be fabricated from minimum 2.0 mm thickness steel sheet

b. Shall have maintenance access to the hardware and wiring through lockable full height doors.

c. Shall have the provisions for bottom cable entry

d. The safety ground shall be isolated from the signal ground and shall be connected to the ground network. Safety ground shall be a copper bus bar. The contractor shall connect the panel's safety ground to the earthing provided by contractor (seperate from the owner's grounding network). Signal ground shall be connected to the communication equipment signal ground.

e. All panels shall be supplied with 230 Vac, 50 Hz, single-phase switch and 15/5A duplex socket arrangement for maintenance.

f. All panels shall be provided with an internal maintenance lamp, space heaters and gaskets.

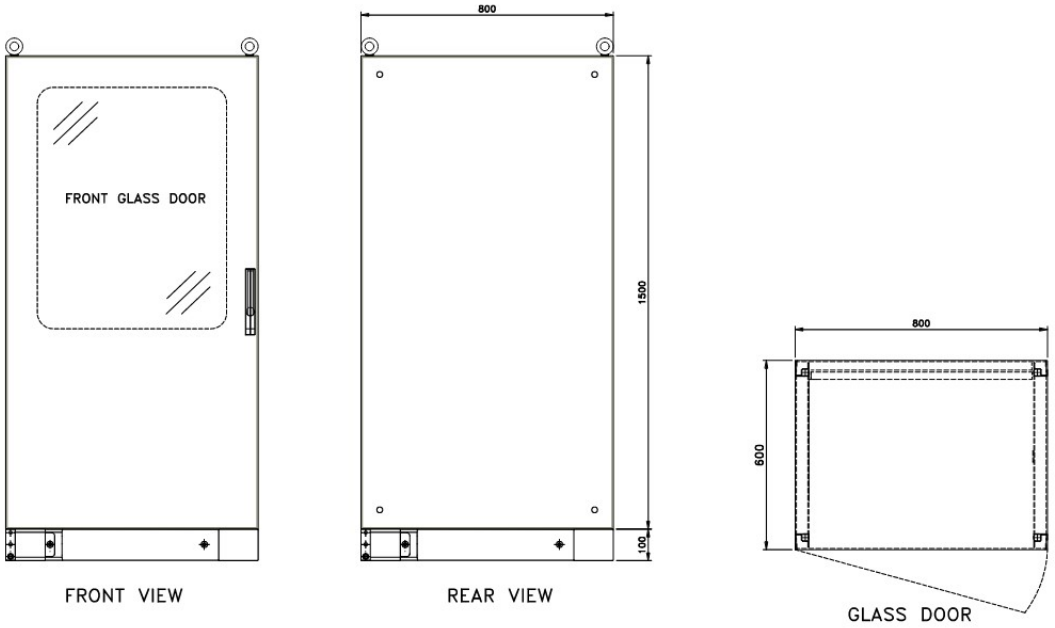
g. All panels shall be indoor, dust-proof with rodent protection, and meet IP41 class of protection.

h. There shall be no sharp corners or edges. All edges shall be rounded to prevent injury.

i. Document Holder shall be provided inside the cabinet to keep test report, drawing, maintenance register etc.

j. All materials used in the enclosures including cable insulation or sheathing, wire troughs, terminal blocks, and enclosure trim shall be made of flame-retardant material and shall not produce toxic gasses under fire conditions.

k. RTU cabinet with front glass door and rear close (1500H X 800W X 600D) in mm, Plinth (100H X 800W X 600D) in mm with suitable standoff 500mm height to mount RTUs cabinet. As given in the below drawings



1.3.10. Wiring/Cabling requirements

The RTU panels shall gather all signals from and to the devices located in Control & Relay panels in the substation control room. All wires that carry low-level signals shall be adequately protected and separated as far as possible from power wiring. All wires shall be identified either by using ferrules or by colour coding. In addition, cables shall be provided with cable numbers at both ends, attached to the cable itself at the floor plate where it enters the cubicles.

Separate 4-pole 16Amp MCB along with MCB Box shall be provided with proper earthing for AC input for all SCADA equipment like 1kva UPS, DCPS and RTU.

Shielded cables shall be used for external Cabling from the RTU panels. The external cables (except communication cables) shall have the following characteristics:

a. All cables shall have stranded copper conductor.
b. Minimum core cross-section of 2.5 mm2 for PT cables, 4 mm2 for CT cables, if applicable and 2.5 mm2 for Control outputs and 1.5mm2 for Status inputs.
c. Rated voltage Uo/U of 0.6/1.1KV
d. External sheathing of cable shall have oxygen index not less than 29 &

temperature index not less than 250. Cable sheath shall meet fire resistance test as per IS 1554 Part- I.

e. Shielding, longitudinally laid with overlap.
f. Dielectric withstand 2.5 kV at 50 Hz for 5 minutes
g. External marking with manufacture's name, type, core quantity, cross-section, and year of manufacture.
h. Armoured Cables shall be used in the area where cable will pass through open area which may experience loading.

The Communication cable shall be of shielded twisted pairs and of minimum 0.22sq mm size.

1.3.11. Terminal Blocks (TBs)

Terminal blocks shall be having provision for disconnection (isolation), with full-depth insulating barriers made from moulded self-extinguishing material. Terminal blocks shall be appropriately sized and rated for the electrical capacity of the circuit and wire used. No more than two wires shall be connected to any terminal. Required number of TBs shall be provided for common shield termination for each cable.

All terminal blocks shall be suitably arranged for easy identification of its usages such as CT circuits, PT circuits, analog inputs, status inputs, control outputs, auxiliary power supply circuits, communication signals etc. TBs for CT circuits shall have feature for CT shorting (on CT side) & disconnection (from load side) to facilitate testing by current injection. Similarly, TBs for PT circuit shall have feature for disconnection to facilitate voltage injection for testing.

1.3.12. Test Reports

a. **TBs :** Continuity test for all the TBS provided inside RTU panel must be morethan 2.5MΩ
b. **Panel :** High Voltage withstand test of panel must be morethan 2kV

1.3.13. Spare Parts and Support

a. The contractor shall provide full support for maintaing sufficient spares and shall ensure the availability of spare parts for atleast 10-years.

1.4. TESTING, TRAINING & DOCUMENTATION

This chapter describes testing, training & documentation requirement for RTU

1.4.1. Type Testing

RTU including Transducers shall conform to the type tests listed in the relevant table. Type test reports of tests conducted in NABL accredited Labs or internationally accredited labs within last 5years from the date of bid opening may be submitted. In case, the submitted reports are not as per specification, the type tests shall be conducted without any cost implication to employer. A complete integrated unit shall be tested to assure full compliance with the functional and technical requirements of the Specification including functional requirement. The testing sample shall be one of each type of cards/modules and devices. The list of Type tests to be performed on the RTU is mentioned in Table-1 & type test requirements are mentioned in Table-2 of this chapter. For other items also such as MFT, sensor etc the requirements are mentioned in the respective sub sections of specification. However, the type tests shall be only be limited to the specification of that item only & not as specified for RTU.

1.4.2. Site Acceptance Test (SAT)

I. Field Tests

After RTU panel installation, interface cabling with C&R panels/Termination boxes, communication panel and interface cabling with field & communication equipment, the Contractor shall carry out the field-testing. The list of field tests for RTUis mentioned in **Table-2**

II. Availability Tests

After field testing, RTU shall exhibit a 98% availability during test period. Availability tests shall be performed along with Master station. The RTU shall be considered available only when all its functionality and hardware is operational. The non-available period due to external factors such as failure of DC power supply, communication link etc., shall be treated as hold-time & availability test duration shall be extended by such hold time.

1.4.3. TRAINING

The contractor shall provide training to the Employer's personnel. The training program shall be comprehensive and provide for interdisciplinary training on hardware

and software. The training program shall be conducted in English. RTU training course shall cover the following:

a) RTU operation including data flow.
b) Troubleshooting, identification and replacement of faulty Modules.
c) Preventive maintenance of the RTU
d) Use of RTU configuration and Maintenance tool
e) All functional and Diagnostic testing of RTU
f) Database modification and configuration of RTU

1.4.4. DOCUMENTATION

The Contractor shall submit 3 sets of all the standard and customised RTU documents for review and approval which includes the following:

a) RTU Function design document
b) RTU Hardware description document & all the documents referred therein to meetall the clauses of the specification.
c) RTU Test equipment user documents
d) RTU user guide
e) RTU Operation & Maintenance document
f) RTU Training documentation
g) RTU database document
h) RTU I/O list
i) RTU Test procedures
j) Data Requirement Sheet (DRS) of all items
k) Protocol documentation including implementation profile etc.
l) RTU installation and Layout, GA, BOQ, schematics and internal wiring drawings for each RTU site
m) RTU to C&R panels/ field device cabling details for each RTU site

After approval of all the above documents, the Contractor shall submit three sets as final documents. The site-specific drawings as indicated at item (i) and (j) above shall be submitted in three sets for each site before installation of RTU. In case some modifications/corrections are carried out at site, the contractor shall again submit as built site-specific drawings in three sets after incorporating all such corrections as noticed during commissioning of the RTU.

Table-1: List of Tests on RTU

Test Nos.	DESCRIPTION OF THE TEST	Type test	Routine test	Field test
A	**FUNCTIONAL TESTS FOR RTU**			
1.	Check for BOQ, Technical details, Construction & Wiring as per RTU drawings	√	√	√
2.	Check for database & configuration settings	√	√	√
3.	Check the operation of all Analog inputs, Status input & Control output points of RTU	√	√	√
4.	Check operation of all communication ports of RTU	√	√	√
5.	Check for communication with master stations including remote database downloading from master station	√		√
6.	Check for auto restoration of RTU on DC power recovery after its failure	√		√
7.	Test for self-diagnostic feature	√		√
8.	Test for time synchronization from Master	√		√
9.	Test for SOE feature	√		√
10.	End to end test (between RTU & Master station) for all I/O points			√
11.	Test for IED 61850 protocol implemented for acquiring data from IED relays and updation time demonstration in loop in loop out of FO connectivity	√		√
12.	Test for IEC 60870-5 -104,101 protocol implemented	√		√
13.	Test for supporting other protocol	√		
14.	Test for operation with DC power supply voltage variation	√		
15.	Test for internal Clock stability	√		
16.	Test for Noise level measurement	√		
17.	Test for Control Security and Safety for Control outputs	√		
18.	Test for functionality/parameters verification of Heavy duty trip relays	√	√	√
19.	Test for data concentrator	√*		
20.	Test for IED pass through	√*		
21.	Test for SOE buffer & time data back up	√		
22.	Other functional tests as per technical specification requirements including features in support/ capability (for future)	√		
23.	Test for DCPS of FRTU	√**		
24.	Test for compliance of standards for bought items viz. Heavy duty trip relays, MFT, weather sensor etc	√		
25.	Test for functionality/parameters for bought items viz. Heavy duty trip relays, MFT, weather sensor etc	√	√	
26.	Test for test tools		√	√
27.	Test for LDMS functioning		√**	√**
B	**EMI/EMC IMMUNITY TESTS FOR RTU**			
28.	Surge Immunity Test as per IEC 60870-2-1	√		
29.	Electrical Fast Transient Burst Test as per IEC-60870-2-1	√		
30.	Damped Oscillatory Wave Test as per IEC 60870-2-1	√		
31.	Electrostatic Discharge test as per IEC 60870-2-1	√		
32.	Radiated Electromagnetic Field Test as per IEC 60870-2-1	√		
33.	Damped Oscillatory magnetic Field Test as per IEC-60870-2-1	√		
34.	Power Frequency magnetic Field Test as per IEC-60870-2-1	√		
C	**INSULATION TEST FOR RTU**			
35.	Power frequency voltage withstand Test as per IEC 60870-2-1	√		
36.	1.2/50 µs Impulse voltage withstand Test as per IEC 60870-2-1	√		
37.	Insulation resistance test	√		
D	**ENVIRONMENTAL TEST FOR RTU—**			
38.	Dry heat test as per IEC60068-2-2	√		
39.	Damp heat test as per IEC60068-2-3	√		

Note: 1) Test levels for above type tests mentioned in B, C & D above are elaborated in Table 2 of this Chapter

a. * For RTU only

b. Contractor can provide test certificates for the type tests mentioned in B, C, D & supporting protocols from Govt of India/NABL/International accredited Labs. If not provided, the same needs to conducted at Govt of India/NABL/International accredited Labs

c. Transducer type test requirements are mentioned in the respective sub section of specification.

Table–2
RTU Type Test Requirements

Test Nos.	Test Name	EUT Status	Test Level	Power Supply Points		I/O Points	Passing Criteria
				CM	DM	CM	
20. 18	Surge Immunity Test	ON	Level 3	2 kV	1 kV	2 kV	A
21. 19	Electrical Fast Transient Burst Test	ON	Level 3	2 KV	-	1 kV	A
22. 20	Damped Oscillatory Wave Test	ON	Level 3	2.5 kV	1 kV	2.5 kV	A
23. 21	Electrostatic Discharge Test	ON	Level 3	+/- 6 kV in Contact discharge mode or +/- 8 kV in Air discharge mode			A
24. 22	Radiated Electromagnetic Field Test	ON	Level 3	10 V/m electric field strength			A
25. 23	Damped Oscillatory Magnetic Field Test	ON	Level 3	30 A/m at 1MHz of magnetic field strength			A
26. 24	Power frequency magnetic field	ON	Level 3	30 A/m of magnetic field strength (Continuous duration sine wave)			A
27. 25	Power frequency voltage withstand	OFF	-	1 KVrms for 1 minute			No break down or flashover shall occur
28. 26	1.2/50μs impulse voltage withstand	OFF	-	2 kVp			No break down or flashover shall occur
29. 27	Insulation Resistance Test	OFF	-	Measure Insulation resistance using 500 V DC Megger before & after Power Freq & Impulse voltage withstand tests			As per manufacturer standard
30. 28	Dry heat test	ON	-	Continuous operation at 55^0 C for 16 hrs			0
31. 29	Damp heat test	ON	-	at 95% RH and 40^0 C			0

1.4.5. The List of Standard I/O points in a substation

Signal List for Feeder IEDs (I/c, HV & 11kV)					
Sl.No	**Digital Input signal (Dounle DI)**	**Digital Input Signal (Single DI)**	**Digital Output (Dounle DO)**	**Analog Input**	**Accumulators (Energy Values)**
1	Circuit Breakeer (Close/Open)	Spring Charge	Circuit Breakeer (Close/Open)	R-Ph Current	KWH Import
2		Trip Circuit Healthy		Y-Ph Current	KWH Export
3		Master Trip operated		B-Ph Current	KVARH Import
4		SCADA In/Out		Neutral Current	KVARH Export
5		IDMT O/C operated		Voltage - RY	
6		IDMT E/F operated		Voltage - YB	
7		Instantaneous O/C operated		Voltage - BR	
8		Instantaneous E/F operated		PF	
9		CB Failure		KW	
10				KVAR	
11				KVA	
TOTAL	**1**	**9**	**1**	**11**	**4**
Signal List for Differential IEDs (LV)					
Sl.No	**Digital Input signal (Dounle DI)**	**Digital Input Signal (Single DI)**	**Digital Output (Dounle DO)**	**Analog Input**	**Accumulators (Energy Values)**
1	Circuit Breakeer (Close/Open)	Spring Charge	Circuit Breakeer (Close/Open)	R-Ph Current	KWH Import
2		Trip Circuit Healthy		Y-Ph Current	KWH Export
3		Master Trip operated		B-Ph Current	KVARH Import
4		SCADA In/Out		Neutral Current	KVARH Export
5		IDMT O/C operated		Voltage - RY	
6		IDMT E/F operated		Voltage - YB	

7		Instantaneous O/C operated		Voltage - BR	
8		Instantaneous E/F operated		PF	
9		CB Failure		KW	
10		Differential Operated		KVAR	
11		Bucholtz trip		KVA	
12		Bucholtz alarm		Oil Temperature	
13		Oil Temperature Alarm		Winding Temperature	
14		Oil Temperature Trip			
15		Winding Temperature Alarm			
16		Winding Temperature Trip			
TOTAL	**1**	**16**	**1**	**13**	**4**

Signal List for Hardwired Points				
Sl.No	**Digital Input signal (Dounle DI)**	**Digital Input Signal (Single DI)**	**Digital Output (Dounle DO)**	**Analog Input**
1	Dummy Breakeer (Close/Open)	Local/Remote	Dummy Breaker	OLTC Tap Position
2		AC Fail	OLTC Raise/Lower	DCPS Voltage
3		DC Fail		DCPS Current
4		Input AC Mains Supply Fail (DCPS)		Station DC Voltage
5		Battery Low Voltage (DCPS)		Station DC Current
6		DCPS Module Fail		
TOTAL	**1**	**6**	**2**	**5**

1.5. Warranty

The System provider is responsible for providing the warranty of RTUs for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

1.6. Licences

The contractor must provide the licences to install in minimum 10numbers PCs.

2. TRANSDUCERS

All transducers including weather sensor shall use a 48 Vdc auxiliary power supply as provided for the RTU. Optionally, MFTs can also be self-powered. All transducers shall have a maximum power consumption of 10 watts. Transducer shall be din rail or wall/plate mounted.

The input, output and auxiliary circuits shall be isolated from each other and earth ground. The transducer output shall be ungrounded and shall have short circuit and open circuit protection. The transducers shall comply to the following requirements, in addition to the requirement of IEC 60688, without damage to the transducer. Voltage:

Voltage test and other safety requirement compliance as specified in IEC 60688 or 607 and IEC 414.

a. Impulse Withstand:IEC 60688 or 60687 compliance is required.
b. Electromagnetic Compatibility: IEC 60688 or 60687 and IEC 801-3, level 1 compliance is required.
c. Permanent Overload Protection: IEC 60688 or 60687 compliance is required.
d. Temporary Overload Protection: IEC 60688 or 60687 compliance is required.
e. High Frequency Disturbance:IEC 60688 or 60687 compliance is required.
f. Shock Resistance: Minimum severity 50 A, IEC 68-2-27 requirements
g. Vibration Strength: Minimum severity 55/05, IEC 68-2-6 requirements.
h. Input Circuit Consumption: Less than or equal to 0.2 VA for voltage and 0.6VA for current circuits.
i. Reference Conditions for Accuracy Class: IEC 60688 or 60687compliance is required.
j. Temperature Rise: IEC 60688 or 60687 compliance is required.
k. Operating Temperature:0 ^{o} C to + 60 ^{o} C (-5 ^{o} C to + 55 ^{o} C for project area with snowfall history)

2.1. Multi-Function Transducers (MFTs)

Multi-Function Transducers (MFTs) 1 per each Substation mounted in RTU cabinet to monitor Station suppy

The contractor shall provide the multi-function transducers for acquiring the real time analog inputs through 3 phase 3 wire CT/PTs circuits/ 3 phase 4 wire CT/PTs circuits (Based on the field requirement). Based on the CT/PT secondary rating, the multi-function transducer shall be designed for nominal 110-160 V (Ph-Ph voltage) and 1A/5A (per phase current). The MFT shall be suitable for 20% continuous over load and shall be able to withstanding 20 times the normal current rating for a period one second. The MFT shall be able to accept the input voltages upto 120% of the nominal voltage. The MFT shall have low VA burden. MFTs shall be mounted in the interface cabinet to be supplied by the contractor.

Multi-function transducers shall provide at least phase voltage, phase current active/reactive power, import & export energy (active & reactive),pf, frequency with class 0.5 accuracy or better.

The parameters to be acquired from multifunction transducers shall be selectable. MFT shall provide the 15-minute values (configurable 15 minute/1 hour) of Active Energy Import, Active Energy Export, Reactive Energy Import and Reactive Energy Export.

Multi-function transducers shall accept nominal 48 V DC as auxiliary power supply. Optionally, MFT can be self-powered also. Multi-function transducer shall be provided with RS485 interface to communicate with RTU over Modbus protocol in multi-drop mode. Optionally, the MFT with IEC60870-5-101/104 can be used.

The MFTs shall be suitable for mounting on DIN rails. The MFT terminals shall accept upto two 2.5 mm2 / 4 mm2 for PT/CT circuit terminations as applicable.

The MFT shall be programmable with password protection thru suitable facia mounted key pad arrangement so that the configuration parameters such as CT /PT ratio, integration time of energy, reset, communication parameters setting (Address, baud,parity) can be set up at site also. The device shall have LCD displays to visualize all parameters being monitored & configuration etc have configurable at site for CT/PT ratio etc.

2.2. DC Transducer

The DC transducer (DCT) is of two types.

a. Voltage

b. Current

The Dc Transducer are required to measure battery chargercurrent& voltage shall be suitable for 20% continuous over load and shall be able to withstanding 20 times the normal current rating for a period one second. The DCT shall be able to accept the input upto 120% of the nominal voltage. The DCT shall have low VA burden. DCT shall be mounted in the interface cabinet to be supplied by the contractor. The input range for current & voltage are site specific & hence the same shall be specified RFP floated by utility/state Output of the device shall preferably be 4-20ma or MODBUS in order to optimize the BOQ. However, as a specific cases the output in line ranges specified in analog input card in clause for analog input shall be selected. The accuracy of transducer shall be ±0.5%

2.3. Transformer Tap Position Transducer

The transformer tap position indications shall be of variable resistance type.

The Contractor shall provide suitable resistance tap position transducers which shall have the following characteristics

a. The input measuring ranges shall be from 2 to 1000 ohms per step, which is tunable at site with at least 25 steps.

b. Dual output signal of 4 to 20 mA DC, 0.5% accuracy class as per IEC 688 shall be provided. One output will be used for driving a local digital indicator (to be provided by the contractor) and the other will be used for interfacing with the RTU. Alternatively, for RTU, MODBUS link may be used.

2.4. Warranty

The System provider is responsible for providing the warranty of Transducers, MFTs for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

3. AUXILIARY POWER SUPPLY SYSTEM

3.1. General

This section describes the technical requirements for Auxiliary Power Supply System. The BOQ for Auxiliary Power Supply system equipment required for RTU. The components of Auxiliary Power Supply system are Uninterruptible Power Supply (UPS), 48V DC power supply (DCPS), the batteries for UPS and DCPS and the supporting stand structures. The technical requirements for all the above components are described in the various subsequent clauses.

The Bidder is encouraged to offer their standard products and designs. The UPS, DCPS, Battery shall be manufactured & tested as per the relevant IS/IEC/ EN/BS standards. However, the Bidder shall conform to the requirements of this specification and shall provide any special interface equipment necessary to meet the requirements stated herein.

All equipment except Batteries shall be designed for an operating life of not less than 15 years, however, batteries shall have a minimum expected operating life of 5 years. The Contractor shall demonstrate the functionality of the equipment during tests in the factory. After the equipment is installed, the Contractor shall demonstrate all of the functions during well-structured field tests.

3.2. DC POWER SUPPLY SYSTEM

The DC Power Supply system shall be capable of meeting the load requirements for various Telecom equipment's, RTUs and other associated equipment located at indoor, i.e. at the substations, the control centers and customer care system. The AC input to the ACDB shall be provided from the ACDB described under clause 4.2 at control center. At other locations the AC input to the DCPS system shall be single phase AC which will be provided from the existing system. At these locations the class B & C level of surge protection (between phase-neutral and neutral – protective earth) as specified under and conforming to IEC 61312, IEC 61024 and VDE 0100-534 shall be installed in the DCPS system.

DCPS has to be supplied with a battery pack of 4X42 AH 12V safely placed inside the DCPS panel.

Surge protection devices shall be installed in the DCPS panel to provide adequate protection against current and voltage transients introduced on input AC due to load switching and low energy lightning surges. These protection devices shall be in compliance with IEC 62305-4:2006, IEC 62305-1:2006 and VDE 0100-534 for following surges:

a. Lightning Electromagneticimpulse and other HighSurges(ClassB):

Between	Requirement
Ph&N	Iimp≥50kA,10/350µSforeachphase
N&PE	Iimp≥100kA,10/350µS

Iimp=ValueofLightningImpulse Current

b. Low Voltage Surges (Class C)

Between	Requirement
Ph&N	I_n≥10kA,8/20 µSforeachphase
N&PE	I_n≥20kA,8/20 µS

I_n=ValueofNominal Discharge Current.

For SPD specific standard for testing is IEC 61643-11 and proper selection and application of SPD the standard is IEC 61643-12

3.2.1. General Technical Requirements for SMPS based DC power supply units

SMPS based DC power supply system is to be used in Auto Float-cum-Boost Charge mode as a regulated DC Power source. DCPS system is to be installed indoors and shall be provided with IP21 panels. The System shall consist of the following:

a. SMPS modules

b. Controller module to control and monitor all DCPS modules.

The number and rating of SMPS modules shall be provided as per the Employer's requirements stipulated in the BOQ. The Panel, Distribution/Switching arrangement shall be provided for the ultimate system capacity. Ultimate System capacity is defined as 150% of the present capacity specified. The ultimate capacity is over and above the requirement of redundancy wherever specified. All factory wiring for the panel shall be for the ultimate capacity so that only plugging-in of SMPS module shall enhance the DC power output. The size of fuses, MCBs, switch, bus etc shall be suitable for the ultimate capacity.

The system shall be sufficiently flexible to serve any load depending on manufacturer's design, rating and number of SMPS modules used in panel and system configuration. To cater for higher load requirements, same type of SMPS modules mounted in the same rack or different racks shall be capable of working in parallel load sharing arrangement. The DCPS system shall be suitable for operation from single phase A.C. mains.

3.2.2. Operational/Component Requirements

The basic modules shall operate at specified ratings and conform to requirements stipulated in this specification. The DCPS system shall meet requirement of the latest TEC specification / IEC/BS for other parameters not specified in this specification. The component parts of the equipment shall be of professional grade of reputed manufacturer to ensure prompt and continuous service and delivery of spare parts. The component shall confer to relevant IEC/IS standards. The contractor shall obtain Employers approval of major component before procurement of the same. Conceptual diagram is for DCPS is shown in figure - 1.

The DCPS shall be suitable for operation at ambient temperature of 0-50 deg and relative humilities up to 95 %.

3.2.3. Wiring

All insulated conductors except those within the confines of a printed circuit board assembly shall be of the rating enough to withstand the maximum current and voltage during fault and overload. All insulated conductors/cables used shall conform to IS 1554 or equivalent international standard.

All wiring shall be neatly secured in position and adequately supported. Where wires pass through any part of metal panel or cover, the hole through which they pass shall be suitably secured.

3.2.4. Bus Bars

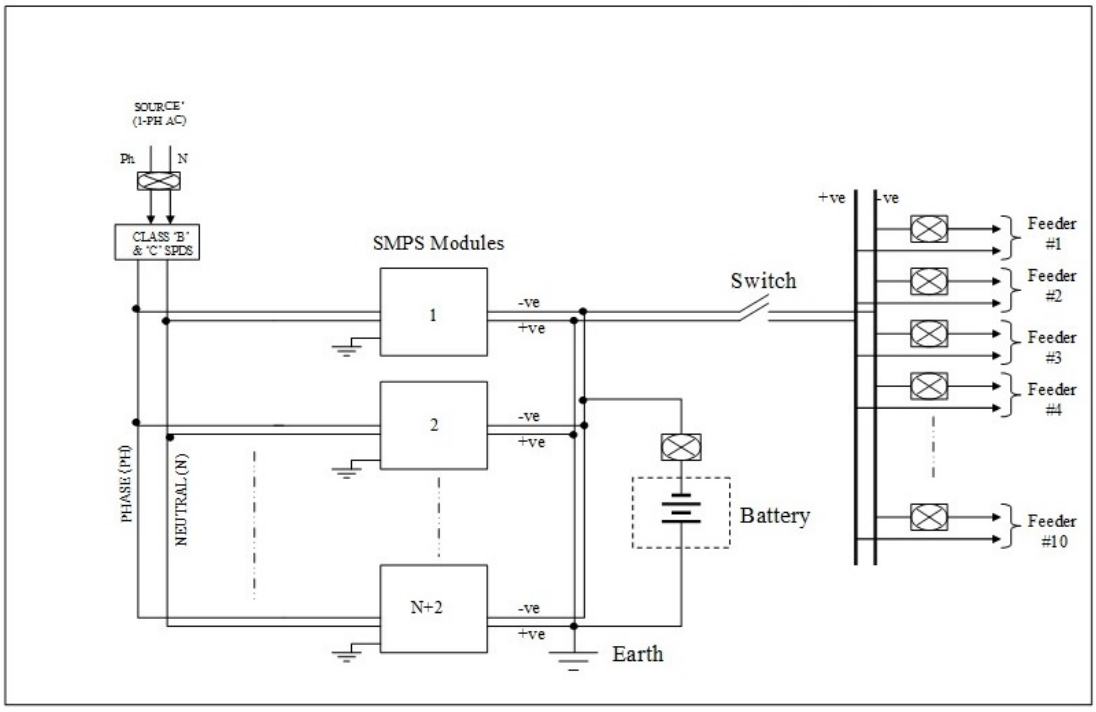
High conductivity Cu bus bar shall be provided and shall be sized to take care of the current of ultimate DCPS system capacity for which it is designed. However, it shall not be less than 25mm X 5mm.

3.2.5. Earthing

Two earth terminals shall be provided in the frame of the system. The Contractor shall connect these earth terminals to the earth bus. All modules and devices shall be connected to these earth terminals. The hinged door shall be connected to the panel with braided Cu at two points at least.

3.2.6. Conceptual configuration

FIG. 1 : CONCEPTUAL CONFIGURATION OF DC POWER SUPPLY (DCPS) SYSTEM



3.2.7. Finishing and labelling

a. Finishing and Painting

The finish of Steel/Aluminium alloy structure and panels shall conform to relevant IS specification (or equivalent international specifications). The colour scheme for panel, Door and Modules shall be decided during detailed engineering.

b. Marking and Labelling of Cables

The Contractor shall propose a scheme for marking and labelling the inter panel cables and get it approved from the Employer. A cabling diagram, screen printed or any other better arrangement ensuring better life expectancy shall be placed in the inside of the front door or any other convenient place for ready reference of the maintenance staff.

c. Name Plate

A name plate etched, engraved, anodized or any other better arrangement ensuring better life expectancy shall be suitably fixed on each panel /module and contain at least the following information :

a) Type of the Unit / Model No

b) Manufacturer's Name and identification

c) Unit serial No

d) Year of manufacture

e) Input voltage and phase

f) Output Voltage and Current

3.2.8. System and Panel Configuration

The mechanical and electrical requirements of the Panel are described as below:

I. System Configuration

The SMPS modules shall be accommodated in panels. The system shall employ a modular configuration to provide flexibility, keeping in view the future load requirements of DC Power. The system shall be configured for ultimate capacity. The control, Monitoring, Alarm arrangement and DC & AC distribution shall be provided suitably in the panel.

The number of SMPS modules to be provided in the DCPS system shall be provided in N+ 2 configurations, where N is the number of SMPS modules to meet the battery charging current (10% of C10 AH Capacity) of the offered battery plus the load requirement stipulated in the BOQ. The current rating of each module shall be considered as output current of the SMPS module at nominal voltage (48V).

It shall be possible to easily mount/remove the modules from the front side of the panel. The SMPS modules/SMPS module sub-racks shall be designed to slide into the panels and fixed securely by a suitable mechanical arrangement.

II. Constructional Features of Panel

Panel (Enclosure) shall be freestanding type of design. Cable entry shall be from the bottom/top of the enclosures (to be finalized during detailed engineering). The enclosures shall not have doors that are wider than 80 cm and doors shall be hinged with

locking as per standard design of the manufacturer. Keyed locking is required with identical keys for all enclosures. The enclosures shall not exceed 220 cm in height. The thickness of the structural frames and load bearing members shall be minimum 2.0 mm and for others shall be minimum 1.5 mm. The panels/boards shall be equipped with necessary cable gland plates. The Contractor shall state the type, size, and weight of all enclosures and Indicate the proposed manner of installation.

Wiring within panel shall be neatly arranged and securely fastened to the enclosure by non-conductive fasteners. Wiring between all stationary and moveable components, such as wiring across hinges or to components mounted on extension slides, shall allow for full movement of the component without binding or chafing of the wire. Conductors in multi conductor cables shall be individually colour coded, and numbered at both ends within enclosures.

The enclosures shall be painted inside and outside. The finish colour of all enclosures shall be an aesthetically pleasing and shall be approved by the owner. Further, finish colour of external surfaces shall be preferably of same colour for all enclosures/panels.

Maintenance access to the hardware and wiring shall be through lockable, full height, from doors.

Each panel shall be supplied with 240 VAC, 50Hz single-phase sockets with switch and lighting lamp for panel illumination.

The manufacturer so as to ensure the uninterrupted use of the equipment shall do proper thermal engineering of hardware design. The Panel shall be designed to allow cooling preferably by natural convection. The Bidders shall submit detail design of proposed Panel/enclosure and heat dissipation calculations during detailed engineering. Forced cooling is permitted (DC Fans are permitted in the Panel or SMPS module) for equipment mounted indoors (buildings/rooms/shelters). If cooling is provided at Panel level it shall be provided with additional fan with facility for manual switch over. Proper filtering shall be provided to control dust ingress. There shall be an arrangement for automatic Switching-OFF of fans during AC input failure. The required individual modules may be separated by air baffle to provide effective convection. The manufacturer

shall also ensure that the failure of fan does not cause any fire hazards. The failure of any of the fans shall draw immediate attention of the maintenance staff.

III. Electrical Requirements:

AC input supply: The nominal input frequency is 50 Hz, which may vary from 47.5-52.5Hz. The input voltage shall be single phase (Nominal 240V) varying from 190V to 265V. There shall be an automatic arrangement for shutting off of the SMPS module whenever the input voltage is beyond the specified operating limits with suitable alarm indication. The SMPS module shall resume normal working automatically when the input is restored within the working limits. Hysteresis within specified working limits shall not cause shutting down of the SMPS. A tolerance of ±5V may be acceptable for protection & alarm operation.

DC output Characteristics of Modules :

The module shall be capable of operating in "Auto Float-cum-Boost Charge" mode depending on the condition of the battery sets being sensed by the Control unit.

a. The float voltage shall be continuously adjustable & pre-settable at any value in the range of 48V to 56V either at the module or may be set from the common controller configuration. Further, the prescribed float voltage setting shall be based on recommendations of the VRLA battery supplier.
b. In Boost charge mode SMPS shall supply battery & equipment current till terminal voltage reaches set value, which is normally 2.3V/cell (55.2V) or as recommended by the VRLA battery supplier & shall change over to constant voltage mode.
c. The DC output voltage variation shall not be more than 2% for load variation from 25% load to full load.

IV. Current Limiting (Voltage Droop)

The current limiting (Voltage Droop) shall be provided in DCPS modules in float and boost charge modes of operation. The float/boost charge current limiting shall be continuously adjustable between 50 to 100% of rated output current for output voltage range of 44.4 volts to 56 Volts.

The float and boost charge current limit adjustment shall be provided in the DCPS system. The SMPS modules shall be fully protected against short circuit. It shall be ensured that short circuit does not lead to any fire hazard.

V. Soft/Slow Start Feature:

Soft/Slow start circuitry shall be employed such that SMPS module input current and output voltage shall reach their nominal value within 10 seconds.

The maximum instantaneous current during start up shall not exceed the peak value of the rectifier input current at full load at the lowest input voltage specified.

VI. Voltage overshoot/Undershoot:

The requirements of (a) to (c) given below shall be achieved without a battery connected to the output of SMPS module.

a. The SMPS modules shall be designed to minimize DC output voltage Overshoot/Undershoot such that when they are switched on the DC output voltage shall be limited to ± 5% of the set voltage & return to their steady state within 20 ms for load variation of 25% to 100%.

b. The DC output voltage overshoot for a step change in AC mains as specified in clause 4.3.12 Electrical Requirements shall not cause shut down of SMPS module and the voltage overshoot shall be limited to ± 5% of its set voltage and return to steady state within 20ms.

c. (c) The modules shall be designed such that a step load change of 25 to 100% and vice versa shall not result in DC output voltage Overshoot/Undershoot of not more than 5% and return to steady state value within 10 ms without resulting the unit to trip.

VII. Electrical Noise:

The Rectifier (SMPS) Modules shall be provided with suitable filter at output with discharge arrangements on shut down of the modules. The Psophometric Noise and ripple shall be as per relevant standards.

VIII. Parallel Operation

SMPS modules shall be suitable for operating in parallel with one or more modules of similar type, make and rating, other output conditions remaining within specified limits.

The current sharing shall be within ± 10% of the average current per rectifier module individual capacity of each rectifier module in the system (mounted in the same or different Panels) when loaded between 50 to 100% of its rated capacity for all other working conditions.

IX. Protection

The SMPS module, which has failed (for any reason) shall be automatically isolated from the rest of the modules and an alarm shall be initiated for the failure.

X. DC Over voltage protection

DCPS shall be fitted with an internal over voltage protection circuit.

In case output DC voltage exceeds –57V or as per the recommendations of the manufacturer of batteries, the over voltage protection circuit shall operate & shut off the faulty module. A tolerance of ± 0.25V is permitted in this case.

Shutting off of faulty SMPS module shall not affect the operation of other SMPS modules operating in the Panel. Operation of over voltage shut down shall be suitably indicated and extended monitoring/control unit. The circuit design shall ensure protection against the discharge of the Battery through the SMPS module in any case. The over voltage protection circuit failure shall not cause any safety hazard.

XI. Fuse/Circuit Breakers

Fuses or miniature circuit breakers (MCB) shall be provided for each SMPS module as follows:

I. Live AC input line

II. Control Circuit

All fuses/circuit breaker used shall be suitably fault rated.

XII. AC Under/Over Voltage Protection

AC input Under/Over voltage protection shall be provided as per clause 4.3.12 for Electrical Requirements.

XIII. Over Load/Short Circuit Protection

The SMPS shall be protected for Over load/Short circuit as per clause 4.3.14 Current Limiting (Voltage Droop).

XIV. Alarms and indicating lamps

Visual indications/display such as LEDs, LCDs or a combination of both shall be provided on each SMPS module for detection of SMPS module failure.

XV. Termination

Suitable termination arrangements shall be provided in the panel for termination of inter cubicle cables from other equipment such as owners ACDB, Telecom and other associated equipment and alarm cables. All the termination points shall be easily accessible from front and top. AC and DC terminals shall be separated by physical barriers to ensure safety. All the terminals except AC earth shall be electrically isolated.

XVI. DC Terminations

All terminations including through MCBs shall be through lock and screw type terminations. Load and batteries shall be connected to DCPS through appropriate MCBs. The isolation of any of the battery from the load shall create an alarm. DC distribution shall be provided with adequate no of feeders (with three no of spare) with appropriate MCBs (6 Amp thru 32 Amp) for termination of the loads. Actual rating of the MCBs and no of feeders shall be finalized during the detail engineering. DC distribution may be done either on wall mounted panel or on the DCPS panel. The proper rated MCB shall be provided at the combined output of the SMPS modules (if not provided at each SMPS module). All the AC, DC and Control/alarm cabling shall be supplied with the Panel. All DC +ve and –ve leads shall be clearly marked. All conductors shall be properly rated to prevent excessive heating.

XVII. Power Cables

All power cables shall be stranded copper conductor XLPE/PVC insulated and PVC sheathed, single core/two core/three core/four core, 1100V grade as per IS 1554 Part-I.

XVIII. Earthing Cables

Earthing cables between equipment and grounding bus bars shall be minimum size 70 mm2 stranded conductors copper/copper strip, rated at 300 volts. All hinged doors shall be earthed through flexible earthing braid. Signal and Safety earthing shall be provided separately.

XIX. Alarms

Following Visual indications/display such as LEDs, LCDs or a combination of both shall be provided to indicate (All the following alarms along with crucial status and analog points to be provided through RS-485MODBUS protocol):

Functional Indications for local monitoring:

a) Mains available (not mandatory if provided at module level)

b) DCPS/SMPSs in Float

c) DCPS/SMPSs in Charge Mode

Alarm Indication for local monitoring:

a) Load Voltage High /Low

b) DCPS module/SMPS fail

c) Mains out of range

d) System Over Load

e) Mains "ON"/Battery Discharge

f) Temp. Compensation fail

g) Battery fail/isolated

All the protections/alarms shall be within tolerance of 0.25V in case of DC voltage, 1% in case of DC current and ± 5V for AC voltage

Alarm Indication for remote monitoring:

a) Input AC mains supply fail alarm

b) Battery low voltage (Pre cut off) alarm

c) DCPS module fail

Potential free Contacts in two numbers for each of the above remote monitoring alarms (one for remote alarm interfaced through RTU and one redundant for local monitoring at suitable location) shall be provided. All these potential free contacts are to be wired and terminated at the suitable location for termination to RTU.

XX. Temperature Compensation for Battery

There shall be provision for monitoring the temperature of battery and consequent arrangement for Automatic temperature compensation of the SMPS output voltage to

match the battery temperature dependant charge characteristics. The output voltage of the rectifier in Float/Charge operation shall decrease or increase at the rate of 72 mV (24 cell battery) per degree increase or decrease in temperature over the set voltage or as may be recommended by the VRLA Battery supplier. The output voltage shall decrease till the open circuit voltage of the battery is reached.

The open circuit voltage range shall be settable between 2.1V/cell to 2.2V/cell. The increase in output voltage due to decrease in temperature has been taken care of by the tripping of the unit due to output voltage high (57V) protection. Failure of temperature compensation circuit including sensors shall create an alarm and shall not lead to abnormal change in output voltage.

XXI. Digital Meters/Display Unit

There shall be provision to monitor the following parameters through digital meters or digital display units:

a. **Input AC voltage.**

b. **Output DC voltage**

c. **Output DC current of charger**

d. **Battery current**

e. **Load current.**

The Digital display of meters or display unit shall be with minimum 31/2 digital display of height 12mm and shall have accuracy 1.5% or better.

3.2.9. Type Testing of DCPS

The contractor shall supply DCPS System, which was already type tested. The test reports for immunity, Emission and surge must be in accordance with relevant IEC/CISPR standards shall be submitted. The Contractor shall submit the DCPS type test reports of earlier conducted tests on the same make, model, type & rating which shall include the following tests. For type testing requirements in addition to provisions of this section 7 is also to be complied.

	I. Type Tests on DCPS
a.	urge immunity (Level 4- as per IEC 61000-4-5)
b	Electrical Fast Transients/Burst (Level 4 – as per IEC 61000-4-4)

c	Electrostatic Discharge (Level 4 – as per IEC 61000-4-2)
d	Radiated Electromagnetic Field (Level 3 – as per IEC 61000-4-3)
e	Conducted disturbances induced by radio-frequency field (Level 3 – as per IEC 61000-4-6)
f	Damped oscillatory magnetic field (Level 3 – as per IEC 61000-4-10)
g	Voltage dips, short interruptions and voltage variations (Level 2 – as per IEC 61000-4-11)
h	Conducted Emission (Level – Class A, Group 1 as per IEC CISPR 11)
i	Radiated Emission (Level – Class A, Group 1 as per IEC CISPR 11)
j	Verification of Protection class (IP 21) for enclosure
k	Safety Tests (as per IEC 60950)
l	Burn in test for 72 hours at maximum operating temperature

II. Factory/Site Testing of DCPS

The factory/site tests to be carried out on DCPS system/module in the factory and site are listed respectively in Table below. The manufacturer shall conduct routine tests on all the systems/modules and submit the report before offering for FAT. The routine tests shall include at least the tests mentioned under FAT.

Sl.No.	Test	FAT	SAT
Tests on DCPS System			
1.	Mechanical & Visual Check Tests	√	√
2.	Insulation Test.	√	
3.	High Voltage Withstand Test	√	
4.	Switch On Test	√	√
5.	DCPS Low voltage & High voltage limits check Test	√*	√
6.	Pre-alarm test for Battery Voltage Low	√*	√
7.	Battery Low Voltage Disconnect Level Test	√*	√
8.	AC Input Low and High voltage limits check Test	√*	
9.	Rectifier Fail Alarm Test	√*	√
10.	Voltage Regulation Test	√*	√
11.	Current Sharing Test	√*	
12.	Total Output Power Test	√*	√
13.	Hot Plug In Test	√*	√
14.	Calibration & Parameter settings	√*	√
15.	Automatic Float cum Boost Charge Mode Change Over Test	√*	√

Sl.No.	Test	FAT	SAT
16.	Battery Path Current Limiting Test	√*	√
17.	Battery Charging and full load Current Test	√*	√
18.	Battery Temperature Compensation Test	√*	
19.	Total Harmonic distortion Test	√*	
20.	Burn in Test for 8 hours at max operating temperature	√*	
Tests on SMPS module			
21	Mechanical & Visual Check Test	√*	
22	Module-On Test	√*	
23	Input low/high voltage cut-off test	√*	
24	Voltage Droop Test	√*	
25	Voltage Regulation Test	√*	
26	Power Output & Current Limit Test	√*	
27	DC High Voltage Test	√*	
28	O/P Voltage Ripple Test	√*	
29	Psophometric Noise Test	√*	
30	Efficiency Test	√*	
31	Power Factor	√*	
32.	Input Current Limit	√*	
33.	Input AC Frequency Range Test	√*	
34.	Rectifier Dynamic Response	√*	
35.	Output Short Circuit Test	√*	
36.	Hold up Time Test	√*	

Note* : These tests (Sl. No. 5-36) shall be conducted on 10% samples of the offered batch and other tests (Sl. No 1-4) shall be conducted on each equipment during the FAT.

3.2.10. Warranty

The System provider is responsible for providing the warranty of DCPS for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

3.3. UN INTERRUPTED POWER SUPPLY (UPS)

UPS shall be supplied for substations as per the quantity specified in the BOQ. The technical particulars of these UPS shall be as mentioned below.

Technical Specification for 1 KVA (0.6 KW) UPS**

	Parameter	Requirements
INPUT	Voltage	230±15%V AC, 50Hz, Single phase, An isolation transformer of suitable rating shall be coupled with 1kVA UPS input supply.
	Frequency	50 ± 5% Hz
OUTPUT	Power	1 kVA / 0.6 kW (at 0.8 pf)
	Voltage	230V AC Single phase (±1 %)
	Frequency	50 Hz & ±0.2%(Free Running)
	Regulation	±1%
	Transient Response	±5% for 100% load change and recovers to normal within 10 milliseconds
	Waveform	Pure Sine wave, THD <2% (linear load)
	Short term overload	110% for 15 minutes and 150% for 10 seconds
	Efficiency (Peak)	>90%
	Supported load pf	0.6-unity
	Change Over	Transfer time (in Sync Mode) less than 5 msec
ISOLATOR	Standards	IEC 60947-3, IEC 60529, IEC 61000, IEEE 80
	Operational	Capable of isolating AC 220VAC, Manual operation with clear ON/OFF indication
	Rated Voltage	AC 250VAC ± 20%
	Rated current	AC 32A
	Breaking capacity	≥10KA (short circuit withstand)
	Poles	AC 2pole
	construction	Inbuilt modular
	Mechanical life	≥10000 operations
	temperature	Operating : -20° C to 60°C
	Auxilary contacts	1NO + 1NC for remote status monitoring
	Indicator lights	LED for ON/OFF status
COMMUNICATION PORT	MODBUS	A MODBUS RS485 to be provided to indicate required alarms along with crucial status points and analog points
BATTERY	Type	SMF/lead Acid tubular (4X100Ah 12V)
	Recharge Time	Maximum12 hours*
	Life	Minimum 5 years (SMF)/ 8 years(LATB)
GENERAL	LED Indicators	Mains ON, Converter / Inverter faults, O/P high/low, Bypass mode, Inverter ON/OFF
	Audible Alarm	Main Failure, Low Battery, Overload
	Isolation	UPS output isolated from Mains Input
	Protection class	IP-21

	Parameter	Requirements
	Temperature	0-45º C (Battery shall be sized at an average temp. of 27 deg C.)
	Humidity	Upto 95% RH (Non condensing)

**UPS shall be equipped with Surge protection devices to provide adequate protection against current and voltage transients introduced on input AC due to load switching and low energy lightning surges. These protection devices shall be in compliance with IEC- 61312, IEC- 61024 and VDE 0100-534.

3.3.1. Documentation

The following specific document for items covered under this section shall be submitted.

a. Data Requirement Sheets (DRS)
b. Battery sizing calculations
c. Cable sizing calculations
d. Inventory of the hardware
e. Panel General arrangement drawing
f. Panel Internal General Arrangement drawing indicating modules, major devices/component's location etc.
g. Installation drawings
h. Schematic drawings
i. Type Test reports
j. FAT plan & procedure
k. SAT plan & procedure
l. External cable laying & termination schedule details
m. Availability test plan & procedure

3.3.2. Warranty

The System provider is responsible for providing the warranty of UPS for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

3.4. BATTERY REQUIREMENTS

The contractor shall supply Valve Regulated Lead Acid (VRLA) maintenance free Battery for UPS &DCPS system. Battery set shal be supplied as given below.

a. For DCPS : 4X42aH capacity 12V each

b. For UPS : 4X100aH capacity 12V each

The contractor supplying the cells/batteries as per this document shall be responsible to replace/repair free of charge, the battery/cell becoming faulty, owing to defective workmanship or material as per the provisions of the bid document.

3.4.1. Constructional Requirements

Protective transparent front covers with each module shall be provided to prevent accidental contact with live module/electrical connections. It shall be possible to easily replace any cell of the battery at site in normal working condition.

I. Containers

The container material shall have chemical and electro-chemical compatibility and shall be acid resistant. The material shall meet all the requirements of VRLA batteries and be consistent with the life of battery. The container shall be fire retardant and shall have an Oxygen Index of at least 28%. The porosity of the container shall be such that so as not to allow any gases to escape except from the regulation valve. The tensile strength of the material of the container shall be such that so as to handle the internal cell pressure of the cells in the wor

Cell shall not show any deformity or bulge on the sides under all working conditions. The container shall be capable of withstanding the rigours of transport, storage and handling. The containers shall be enclosed in a steel tray.

II. Cell Covers

The cell covers shall be made of suitable material compatible with the container material and permanently fixed with the container. It shall be capable to withstand internal pressure without bulging or cracking. It shall also be fire retardant. Fixing of Pressure Regulation Valve & terminal posts in the cover shall be such that the seepage of electrolyte, gas escapes and entry of electro-static spark are prevented.

III. Separators

The separators used in manufacturing of battery cells, shall be of glass mat or synthetic material having high acid absorption capability, resistant to sulphuric acid and good insulating properties. The design of separators shall ensure that there is no misalignment during normal operation and handling.

IV. Pressure Regulation Valve

Each cell shall be provided with a pressure regulation valve. The valve shall be self re-seal able and flame retardant. The valve unit shall be such that it cannot be opened without a proper tool. The valve shall be capable to withstand the internal cell pressure specified by the manufacturer.

V. Terminal Posts

Both the +ve and –ve terminals of the cells shall be capable of proper termination and shall ensure its consistency with the life of the battery. The surface of the terminal post extending above the cell cover including bolt hole shall be coated with an acid resistant and corrosion retarding material. Terminal posts or any other metal part which is in contact with the electrolyte shall be made of the same alloy as that of the plates or of a proven material that does not have any harmful effect on cell performance. Both +ve and –ve posts shall be clearly and unambiguously identifiable.

VI. Connectors, Nuts & Bolts, Heat Shrinkable Sleeves

Where it is not possible to bolt the cell terminals directly to assemble a battery, separate non-corroding lead or copper connectors of suitable size shall be provided to enable connection of the cells. Copper connections shall be suitably lead coated to withstand corrosion due to sulphuric acid at a very high rate of charge or discharge.

Nuts and bolts for connecting the cells shall be made of copper, brass or stainless steel. Copper or brass nuts and bolts shall be effectively lead coated to prevent corrosion. Stainless steel bolts and nuts can be used without lead coating.

All inter cell connectors shall be protected with heat shrinkable silicon sleeves for reducing the environmental impact including a corrosive environment.

VII. Flame Arrestors

Each cell shall be equipped with a Flame Arrestor to defuse the Hydrogen gas escaped during charge and discharge. Material of the flame arrestor shall not affect the performance of the cell.

VIII. Battery Bank Stand

All batteries shall be mounted in a suitable metallic stand/frame. The frame shall be properly painted with the acid resistant paint. The suitable insulation shall be provided between stand/frame and floor to avoid the grounding of the frame/stand.

3.4.2. Capacity Requirements

When the battery is discharged at 10-hour rate, it shall deliver 80% of C (rated capacity, corrected at 27ºCelcius) before any of the cells in the battery bank reaches 1.85V/cell.

All the cells in a battery shall be designed for continuous float operation at the specified float voltage throughout the life. Float voltage of each cell in the string shall be within the average float voltage/cell +0.05V band.

The capacity (corrected at 27ºCelcius) shall also not be less than C and not more than 120% of C before any cell in the battery bank reaches 1.75V/cell. The battery voltage shall not be less than the following values, when a fully charged battery is put to discharge at C/10 rate:

a. After Six minutes of discharge : 1.98V/cell
b. After Six hours of discharge : 1.92V/cell
c. After 8 hours of discharge : 1.85V/cell
d. After 10 hours of discharge : 1.75V/cell

Loss in capacity during storage at an average ambient temperature of 35º Celsius for a period of 6 months shall not be more than 60% and the cell/battery shall achieve 85% of its rated capacity within 3 charge/discharge cycles and full rated capacity within 5 cycles, after the storage period of 6 months. Voltage of each cell in the battery set shall be within 0.05V of the average voltage throughout the storage period. Ampere-hour efficiency shall be better than 90% and watt-hour efficiency shall be better than 80%.

I. Expected Battery Life

The battery shall be capable of giving more than 1200 charge/discharge cycles at 80% Depth of discharge (DOD) at an average temperature of 27º Celsius. DOD (Depth of Discharge) is defined as the ratio of the quantity of electricity (in Ampere-hour) removed from a cell or battery on discharge to its rated capacity. The battery sets shall have a minimum expected operational life of 5 years at normal operating conditions or 1200 charge / discharge cycles (whichever is early).

3.4.3. Routine Maintenance of Battery system

For routine maintenance of battery system, the contractor shall supply 1 set of following tools:

a. Torque wrench.
b. Tool for opening /closing of pressure regulation valve of battery.
c. Hand held digital Multimeter for measurement of resistance, AC/DC voltages.

3.4.4. Testing of Battery

The contractor shall supply type tested battery as required for DCPS and UPS system. The Contractor shall submit the Battery type test reports of earlier conducted tests on the same make, model, type & rating as offered as per the IEC 60896 or equivalent IS/EN/BS standards. These Type test reports shall be submitted for the highest rating battery to be supplied under the contract. For type testing requirements in addition to provisions of this section 7 is also to be complied. The tests mentioned in the Table 4.2 shall be conducted on the battery at site and factory.

LIST OF FACTORY & SITE TESTS FOR BATTERY

S. No.	Test	Site Tests
1.	Physical Verification	√
2.	8 Hrs. Charge and 30 minutes (duration as specified) discharge test at full rated load for UPS.	√

I. Testing Requirements

The requirements for type tests, factory acceptance tests and field acceptance testing have been specified under the respective clauses. After completion of field acceptance testing the auxiliary power supply system shall be put under availability

test for fifteen (15) days. Availability test shall be carried out by the employer/owner. During the availability test the APS shall be used as required to be used for rest of the life. In case of any failure or mal-operation during this period the contractor shall take all necessary action to rectify the problems. The APS shall be accepted only after rectification of the problems by the contractor in a manner acceptable to the employer.

3.4.5. Warranty

The System provider is responsible for providing the warranty of UPS, DCPS and battery set of both UPS & DCPS for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

4. Substation Routers

Type: Industrial-grade cellular router with dual SIM, dual-active capability and high-speed 4G LTE support.

Device Class: Cellular CPE

Application: Communication between SCADA/DMS Control Centre and RTU at Substation/ RVDUs

Functionality: The offered MPLS-VPN Cellular CPE (Modem-cum-Router) shall be capable to connect the RTU installed in the field to the existing SCADA system using IEC 60870-5-104 without using any proprietary protocol converters. The device shall be capable to establish MPLS-VPN connection without using any proprietary scripts in the RTU at Substation.

Network Coverage: 4G, with 3G and 2G fallback With the support for all bands used in India by ISPs

4.1. Hardware Requirements:

4.1.1. Cellular Connectivity:

a. High-speed 4G LTE (Category 4 or higher, minimum download speed of 150 Mbps, upload speed of 50 Mbps).

b. Fallback to 3G/2G for compatibility with legacy networks.

c. Dual SIM slots, each with independent high-speed 4G LTE modems to support simultaneous active connections to two different service providers (for load balancing or failover).

d. Four antennas (SMA or equivalent) per router (two per modem) to support 4x4 MIMO for maximum signal reliability and throughput, multi-band 4G LTE antennas.

e. Multiple 4G LTE for all bands used in India by ISPs (e.g., B1, B3, B7, B20, B28) to ensure compatibility with all four service providers.

f. Support for SMS feature on 13-digit M2M MPLS-VPN SIMs

g. Complies with European (EU) or Global standards

4.1.2. Interfaces:

a. Minimum three fast Ethernet Ports:

i. 1 WAN port (10/100/1000 Mbps): Dedicated WAN port with MPLS-VPN Support. Supports fast failover between sources (Dual SIM/WAN) for connectivity to external networks or devices.

ii. 2 LAN ports (10/100/1000 Mbps):

1) 1 LAN port for local connection to SCADA devices (e.g., RTUs).

2) 1 LAN port for laptop connection for firmware upgrades, configuration, or diagnostics without interrupting the MPLS-VPN connection to SCADA/DMS Control Centre.

iii. 2 RS232 Ports (1No on each modem interface): Without interrupting the MPLS-VPN connection with SCADA system.

1) The operations on these ports should not affect the MPLS-VPN connection to the SCADA/DMS Control Centre.

2) This port is to be utilised for sending SMS alerts to the mobile no. of authorised personnel of DISCOM.

3) The SMS alert shall be sent from the FRTU/RTU

4) The SMS alert feature shall work even in the absence of MPLS-VPN data connection to the Control

Centre.1 USB port for additional configuration, diagnostics, or external modem support.

iv. 2 SIM Slots: 2 Nos External SIM slot (No need to open device) With MPLS-VPN data and SMS facility.

4.1.3. Processing and Memory:

a. Minimum 1 GHz dual-core processor, 1 GB RAM, and 512 MB flash storage to handle high-speed 4G LTE traffic and encryption.

b. Kernal Linux based Operating System

4.1.4. Power Supply:

a. 12Vdc / 24Vdc & Adapter for 230Vac to 12Vdc

b. The device should not consume more than 6W on each engine

4.1.5. Environmental Specifications:

a. Operating temperature: -40°C to +65°C,

b. IP rating:IP30 or higher

c. Mounting:DIN-rail (inside RTU panel)

4.1.6. Certifications:

CE, FCC, UL, IEC 61850-3, RoHS.

4.1.7. LEDs:

9 LEDs :

a. 1 - Power

b. 2,3 - GSM Signal for each Cellular Engine

c. 4,5 - Registration for each Cellular Engine

d. 6,7 - Cellular Activity for each Cellular Engine

e. 8,9 - user configurable

4.2. Functional Requirements:

a. **Reliability:** Intelligent Network Watchdog to monitor Data connection stability. Hardware Watchdog.

b. **Dimensions and Mounting:** Suitable to mount in the available free space on the mounting plate inside the panel of RTU/FRTU

c. **Auto Reconnect/ Fault recovery:** Device shall recover from faults automatically and reconnect to Control Centre network without manual intervention or resetting the power supply.

d. **Redundancy:** VRRP for router-level redundancy.

e. The device can be used as modem/router/switch

f. **Scalability:**Support at least 100 simultaneous IEC 104 sessions per router.
g. Firmware upgradable for future enhancements.
h. **Performance:**Minimum 150 Mbps throughput per SIM over 4G LTE.
i. Low-latency IEC 104 transmission (<100 ms).

4.2.1. Dual SIM Operation:

a. Simultaneous active connections on both SIMs (load balancing or primary/backup) over 4G LTE with 3G and 2G fallback.
b. Multiple sources of WAN network – WAN via Ethernet WAN, Cellular1 & Cellular2 Failover between sources of WAN Support of fast failover.
c. Automatic failover (<5 seconds) based on signal strength (RSRP < -100 dBm), latency, or packet loss.
d. True Dual SIM – with 2 Cellular engines for Active – Active connection
e. Support for Carrier Aggregation and 4x4 MIMO.
f. Load Balancing and WAN affinity – Ability to lock a LAN connected device to a source of WAN

4.2.2. Routing Protocols:

a. Static routing, OSPF, and BGP for MPLS integration.
b. Unique IP addresses per SIM (e.g., 10.10.0.0/16 for SIM1, 10.20.0.0/16 for SIM2).
c. Port blocking, port access and port forwarding
d. The Router should be capable for communicating with multiple protocol RTUs in Transparent Mode IEC 104 Slave mode Multi Master support
e. Routing Support:
    i. MPLS-VPN, L2TP and PPTP
    ii. TCP, UDP, DHCP, DHCPv6
    iii. DNS, Dynamic DNS
    iv. NTP Client

v. Static IPv4 and IPv6 routes
vi. Network Diagnostic etc.

f. VPN Support:
   i. IPsec VPN with IKEV1, IKEv2, AES-256, SHA-256 for secure IEC 104 traffic.
   ii. GRE tunneling support if required.
   iii. DHCP, Static IP IPV4 and IPV6 support
   iv. Configurable APN support
   v. Configurable Dial-up number support

g. IEC 104 Protocol Support:
   i. Transport IEC 104 over TCP/IP (port 2404) via WAN and LAN ports.
   ii. Support legacy protocols (e.g., Modbus RTU) via RS-232/RS-485 with conversion to IEC 104.
   iii. QoS to prioritize IEC 104 traffic (<100 ms latency).

4.2.3. Management and Monitoring:

a. Web-based GUI, CLI, SNMP v3, remote management via HTTPS.
b. Local management via dedicated LAN port for laptop upgrades.
c. Logging of 4G signal strength, connection status, and failover events.

4.2.4. Response Time:

a. Bootup time taken to be in Run mode after switching ON the power must be less than 30 – 45 Sec
b. MPLS-VPN Data Connection establishment and data update time from RTU/FRTU to SCADA/DMS Control Centre (Time taken to for data update after switching ON the power) must be less than 45 – 60 Sec

c. Time taken to changeover between networks of SIM1 and SIM2(if passive failure mode is configured) must be less than 5 – 10 Sec (The changeover should not cause Offline state of the RTU/FRTU on SCADA/DMS.)

4.2.5. Security:

a. Firewall support:
    i. Stateful packet inspection, VLANs, MAC filtering
    ii. Support for IPv4 and IPv6.
    iii. Port Forward
    iv. NAT rules
    v. Traffic Rules and Custom rules
    vi. Traffic shaping / filtering in firewall
    vii. SYN-flood protection
b. Secure VPN client – Open VPN, IPSec
c. IPSec should support IKEV1 and IKEv2 Normal Mode as well as Aggressive mode
d. Selectable Encryption schemes
e. Support Certificate uploads
f. Ability to lock the Router to a SCADA IP
g. Ability to lock the Router to limited connected FTRUs
h. Secure RS-232/RS-485 communication.

4.3. Configuration Requirements

4.3.1. IP Addressing:

a. Assign unique IP ranges (e.g., 10.10.0.1–10.10.15.255 for SIM1, 10.20.0.1–10.20.15.255 for SIM2).
b. **LAN ports:** 192.168.2.x for SCADA devices, 192.168.3.x for laptop upgrades.
c. **IPsec VPN:**Configure IPsec tunnels to PE routers.

4.4. Test Certificates:

a. IS 13252 (Part 1):2010 In accordance with IEC 60950-1:2005
b. Speed throughput Test report for all the sources & ports
c. Dual SIM failover and load balancing test report
d. WAN and Cellular Backup test report
e. Signal strength and cellular coverage test report
f. Latency and Jitter test report
g. Multi Device perfomance test report

h. Security and VPN test report
i. Power and thermal performance test report
j. Setup and management test report
k. Port and connectivity test report

4.5. Warranty

The System provider is responsible for providing the warranty of 4G Routers for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

5. LOCAL DISPLAY MONITORING SYSTEM (LDMS)

5.1. System Requirements

a. Compatible with [SCADA system & RTU]
b. Supports substations Data display
c. Handles RTU (Intelligent Electronic Devices) data in substation

5.2. Hardware Requirements

a. **Processor (CPU) :** Intel Core Ultra 7 (14th generation) or equivalent AMD (Capable of handling multiple office applications (e.g., Microsoft Office, web browsers with 10+ tabs, video conferencing) simultaneously without lag.)
b. **Memory (RAM) :** Minimum: 16GB DDR5 (Supports seamless multitasking with office productivity software and relay & RTU related softwares).
c. **Speed :** 3.2Ghz or higher
d. **Storage :** 1TB Solid State Drive (Fast boot times and file access; sufficient capacity for office documents, software, and local data storage.)
e. **Display :** 21" TFT Screen Monitor.
f. **Resolution :** Minimum 1920x1200 (WUXGA) or higher, IPS or OLED panel.
g. **Brightness :** Minimum 300 nits, with anti-glare coating for office lighting conditions.
d. **Ports and Connectivity :** Minimum Ports: 3 x USB-A (3.2 Gen 1 or higher), 1x HDMI (2.0 or higher), 3.5mm headphone jack, Dual 10/100/1000mbps Ethernet ports
h. **Operating System :** Windows 11 Pro
e. **Keyboard :** 1 keay pad (ps/2 MODEL)
f. **Mouse :** 1 optical mouse (ps/2 MODEL)
g. **Audio :** Two inbuilt speakers in the cpu for audible alarms.

i. **Software:** Pre-installed with licensed office productivity suite (e.g., Microsoft 365) or equivalent

5.3. Functional Requirements

a. Data Management:

i. Acquires data from RTU (e.g., voltage, current, temperature)
ii. Stores data in a local database
iii. Displays data of SCADA system at substation
iv. Custome data management requirements will be given by TGSPDCL while execution of the project

b. Data Processing:

i. Performs data validation and filtering
ii. Executes basic calculations (e.g., averages, totals)
iii. Supports data aggregation and trending
iv. Custome data processing requirements will be given by TGSPDCL while execution of the project

c. Data Fertching:

i. Fetching the IED events with time stamps and storing in the LDMS in a prescribed format and folder structure.
ii. Fetching the IED Disturbance records Data with time stamps

d. Alarm Management

i. Receives alarms from RTU
ii. Filters and prioritizes alarms
iii. Generates various reports
iv. Custome Alarm Management requirements will be given by TGSPDCL while execution of the project

e. Communication

i. Supports [communication protocols] for communication with RTU
ii. Ensures data encryption and security

f. User Interface

i. Provides web-based or desktop application for local monitoring and configuration
ii. Displays real-time data and alarms
iii. Custome User Interface requirements will be given by TGSPDCL while execution of the project

g. Scalability

i. Scalable architecture to accommodate future expansion

h. Security

i. Implements access control and authentication

ii. Ensures data integrity and confidentiality

i. Maintenance

i. Provides logging and diagnostics for troubleshooting

ii. Supports remote firmware updates

iii. Custome maintanance requirements will be given by TGSPDCL while execution of the project

5.4. Furniture

i. Desktop Table – 1

ii. Z type office Chairs – 2

Note: The specific hardware requirements (e.g., RAM capacity, hard disk size, processor speed) should be tailored to the specific needs of the project.

5.5. Warranty

The System provider is responsible for providing the warranty of LDMS for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

6. Integration Procedure

6.1. New IEDs Retrofitting & Integration

6.1.1. SCOPE

The specification covers Retrofitting, configuration and commissioning of SCADA compatible control and relay panel Intelligent Electronic devices for feeder & Transformer protection relays with Loop in and Loop out internal and external FO ports for integrating to RTU with FO cable by splicing and pig tail terminations including Line Interfacing units (LIU), FO patch cords.

Each IED integration requires following material & fixing:

Sl.No	Item	Qty
1	FO Cable (multimode 6 core)	As per field requirement
2	HDPE pipe	As per field requirement
3	LIU Box & Splicing at required points	1 no.
4	Patch cords with Rx & Tx Set	2 no.
5	Laying of FO Cable in HDPE pipe by excavating trench at 1mtr depth. Only flexible pipe has to be used over the ground to FO gland level	As per field requirement
6	Splicing of FO Cable and terminating to the next IED/RTU to form a loop	6 splicings (3 core at each end)
7	Extraction of CID file (Configuration, files uploading and integration)	1
8	PVC Flexible Pipe 1'' (Routing in Feeder cables)	As per field requirement
9	2.5 sq.mm10 core & 4 core cables if required	As per field requirement

The contractor has to integrate RTU/Data Concentrator to get IED data and control at SCADA control center. The bidder has to demonstrate the interface and data communication between IEDs and RTU with IEC- 61850/Data concentrator.

6.1.2. Retro fitting

Retrofitting of IED relay and Self reset Master trip relay and necessary wiring with control cable shall be done in the existing breaker panels with necessary accessories.

In case of no adequate space to mount IED in the breaker, the suitable size box/panel with IP 65 shall be made and installed over a plinth of iron structure (as per the field engineer) as per standards with necessary wiring

6.1.3. Terminations

The FO cable where ever laid from IEDs to IEDs and from IEDs to FO Switch/RTU in the panels, in the trenches and in ground shall be run in HDPE of suitable size with sufficient free space inside.

Each cable and inner duct is to be permanently labeled at each end with a unique cable number. Each fiber optic strand shall be labeled with a unique

identifier at the coupler in the FIC (Fiber Distribution Interface box. Connectors shall be labeled on the identifying sheets on the front of the FIC.

6.1.4. Connectors and Splices

Fiber ends are to be terminated in SC-type adaptors with Line interfacing unit at every breaker panel and FO Switch ends with composite ferrules. Connection between Line interfacing unit with IED's shall be with FO Patch cords. All the 6 core of FO cable shall be terminated and no cable shall be left free without termination.

If it is necessary to splice pigtails and terminations shall suit to existing IED's and internal and external FO switches Clearance from TGSPDCL must be obtained before installing any type of splice. At each end of the cable, sufficient slack (15 – 30') shall be left to facilitate reasonable future relocation.

7. Self reset Master trip relay

a. Operating Voltage : 24VDC depends on application

b. Output Contacts : Minimum 4 pairs of Self reset output contacts in combination of 3NO & 1NC

c. Insulation : The relay meets the requirements of IS.3231: 196/IEC 255-5 Series C-2KV for 1 minute

d. Duty: 1250 VA.

   i. Attracted armature type compact design with positive action

   ii. Din Standard size compact cabinet.

   iii. SR contacts are available (with or without flags)

   iv. Simple in construction.

   v. High speed operation.(10 milli sec)

e. Contact Ratings :

   i. Make and Carry :1250 W with max. of 5A & 660 Volts.

   ii. Make and Carry For 3 Sec.:7500 W with max. of 30A & 660 Volts.

   iii. Break:100 W Resistive, 50 W Inductive, 5A / 660V.

7.1. Warranty

The System provider is responsible for providing the warranty of Self reset master trip relays for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

8. POWER TRANSFORMER MARSHALLING BOX WITH ANALOG HYBRID WTI & OTI

8.1. Hardware requirements

a. Marshalling box should have sufficient space for hybrid WTI/OTI, two numbers WTI&OTI Dials along with minimum 20numbers terminal blocks and one DC MCB with fuse protection.

b. Marshalling box door should have a view glass for monitoring temperatures from outside manually.

c. Temperature range :0-150°C,

d. Dial Size : 150mm (6'') dia Round

e. Dail angular sweep : 270°

f. Dail graduation : 2°C

g. Accuracy Class: +/- 1.5% of FSD

h. No. 'NO' of Switches : 2

i. Switching accuracy : +/- 2.5°C of set value

j. Min capillary length : 10Mtrs

k. Degree of Protection : Minimum IP – 65

l. WTI should have CT secondary input to record the temperature rise

8.1.1. Analog Dials to show the WTI & OTI temperatures

a. The marshalling box should have two analog dials for monitoring the WTI & OTI

b. Analog dials has to work without any power supply

c. Both dials should have pointer facility to record maximum temperature and manual reset facility to be provided.

8.1.2. Contacts

a. Contact Rating : minimum 0.5A @30V DC, Standard Micro Switch

b. All the switch contacts must be potential free micro switches

8.1.3. Hybrid Model

a. Embedded PT-100 sensor to be provided in the sensing bulb of the OTI/WTI to connect to master/RTD sensor in the Relay

b. PT-100 sensor should contain minimum 10mtrs capilary length

8.1.4. Test reports

a. Embedded PT-100 sensor to be provided in the sensing bulb of the OTI/WTI to connect to master/RTD sensor in the Relay

8.2. Power Supply Unit (PSU)

1. Output Signal : 1numbers PT100 for WTI &1numbers PT100 for OTI.

8.3. Installation & Configuration

a. Supply, Laying and termination of suitable Shielded cable for Connection of Tap position, WTI & OTI (PT100) out put connections to Transformer (differential) IED relays including Tap rise and tap lower operation wiring.

b. Supporting mounting accessories to be provided by the contractor.

c. Old Marshalling box has to be dismantled and submitted to the TGSPDCL authorities

d. Any misscellenious supplies or arrangments to dismantle the old box and installation of new marshalling box is the sole responsibility of the contractor.

e. Configuration in the Relay & RTU and complete integration to SCADA is in the scope of contractors work.

f. Marshalling Box must have IP 65 Standard and should be spacious enough to house all WTI,OTI, Buch holtz, OLTC, PRV, MOG and all other wiring related to PTR.

g. All the wiring of the PTR has to be done by the Contractor.

8.4. Type Test Reports

The following type test reports to be submitted

a. Test report 1

b. Test report 2

c. Test report 3

8.5. Warranty

The System provider is responsible for providing the warranty of power transformer marshalling box with analog hybrid wti & oti for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

9. REMOTE VIDEO DISPLAY UNIT (RVDU)

Specifications for Substation RVDU (Remote Video Display Unit) for Zonal offices, Circle offices:

9.1. Hardware Requirements

a. **Processor (CPU) :** Intel Core Ultra 7 (14th generation) or equivalent AMD (Capable of handling multiple office applications (e.g., Microsoft Office, web browsers with 10+ tabs, video conferencing) simultaneously without lag.)

b. **Memory (RAM) :** Minimum: 16GB DDR5 (Supports seamless multitasking with office productivity software and relay & RTU related softwares).

c. **Speed :** 3.2Ghz or higher

d. **Storage :** 1TB Solid State Drive (Fast boot times and file access; sufficient capacity for office documents, software, and local data storage.)

e. **Display :** 21" TFT Screen Monitor.

f. **Resolution :** Minimum 1920x1200 (WUXGA) or higher, IPS or OLED panel.

g. **Brightness :** Minimum 300 nits, with anti-glare coating for office lighting conditions.

h. **Ports and Connectivity :** Minimum Ports: 3 x USB-A (3.2 Gen 1 or higher), 1x HDMI (2.0 or higher), 3.5mm headphone jack, Dual 10/100/1000mbps Ethernet ports

i. **Operating System :** Windows 11 Pro

j. **Keyboard :** 1 keay pad (ps/2 MODEL)

k. **Mouse :** 1 optical mouse (ps/2 MODEL)

l. **Audio :** Two inbuilt speakers in the cpu for audible alarms.

m. **Software:** Pre-installed with licensed office productivity suite (e.g., Microsoft 365) or equivalent

Note: The specific hardware requirements (e.g., RAM capacity, hard disk size, processor speed) should be tailored to the specific needs of the project.

9.2. Warranty

The System provider is responsible for providing the warranty of RVDU for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

10. FO cabling & Accessories

10.1. FO Cable

Premium Cable (Inside Cable, Armored and loose tube), Premium rated cable shall be used for all interior/Exterior installations. Supplied cable must meet or exceed the following specifications:

a. Supplied cable shall be 62.5/125micron core/cladding, enhanced grade, multimode, and graded index glass fiber. All materials in the cable shall be dielectric

b. Tight buffered 900 nm, mechanical strippable Teflon (for plenum applications).

c. EIA/TIA -598 color coding for fiber optic cable.

d. Aramid yarn strength member, capable of supporting a short-term tensile load of 400 lb. without stretching.

e. Capable of bend radii as small as 20 x outside cable diameter (under installation load) and 10 x outside cable diameter (long term load).

f. Capable of a minimum crush resistance of 850 lb./in.

g. Flooded core

h. Gel filled buffer tube, 250µm, acrylate.

10.2. HDPE Pipe

a. HDPE pipe 40mm or 50mm

b. Wall thickness from 2.8mm to 3.8 mm

c. Suitable for PN6, PN8 pressure applications

d. Corrosion resistance and UV resistant’s

e. HDPE pipes do not rust or corrode

10.3. Patch cords:

a. Patch cords minumum 5 meters length (may extend based on the field conditions)

b. Multimode, Duplex

c. 62.5/125 micro meter

d. Suitable for ST to ST, SC to SC, LC to LC, LC to SC and ST to SC depending on the site requirements

10.4. IED Relay Panel

The IP68 standard IED relay panel may be required at some locations which is to be confirmed after site survey. The IED panel supplied must have the follwing equipment. The IED has to be erected over a iron structure as per the field engineer.

a. IED
b. SCADA In and OUT switch
c. AC and DC MCB with necessary fuses
d. Contact mulltiplication relays

10.5. LIU Box

a. 6 port SC Multimode, fully loaded power coated metalic body, wall mounted type line interface units

b. Pigtails multimode along with glands PG11 and fixing clamps

c. Size L-150mm, H-120mm, W-40 mm thickness of the sheet 2mm with 2Numbers cable glands

11. LAPTOP

a. **Processor (CPU) :** Intel Core Ultra 7 (14th generation) or equivalent AMD (Capable of handling multiple office applications (e.g., Microsoft Office, web browsers with 10+ tabs, video conferencing) simultaneously without lag.)

b. **Memory (RAM) :** Minimum: 16GB DDR5 (Supports seamless multitasking with office productivity software and relay & RTU related softwares) and extendable in future with extra Slot..

c. **Storage :** 1TB Solid State Drive (Fast boot times and file access; sufficient capacity for office documents, software, and local data storage.) with Extra slot for extendable storage.

d. **Display :** 13.3–14 inches.

e. **Resolution :** Minimum 1920x1200 (WUXGA) or higher, IPS or OLED panel.

f. **Brightness :** Minimum 300 nits, with anti-glare coating for office lighting conditions.

g. **Battery Life :** Minimum: 10 hours of real-world usage (web browsing, office apps, video calls).

h. **Ports and Connectivity :** Minimum Ports: 3 x USB-A (3.2 Gen 1 or higher), 1x HDMI (2.0 or higher), 3.5mm headphone jack, RJ45 Ethernet

i. **Connectivity :** Wi-Fi 6E or Wi-Fi 7, Bluetooth 5.3 or higher.

j. **Operating System :** Windows 11 Pro

k. **Keyboard :** Backlit with minimum 1.4mm key travel for comfortable typing.

l. **Webcam :** Minimum 1080p resolution with privacy shutter

m. **Audio :** Stereo speakers with clear audio.

n. **Software:** Pre-installed with licensed office productivity suite (e.g., Microsoft 365) or equivalent

o. **Warranty and Support :** Minimum: 5-year on-site warranty with next-business-day support.

12. INTELLIGENT ELECTRONIC DEVICE RELAY FOR FEEDER CONTROL VCB

The offered relay shall be approved or receive a successful performance certificate from a minimum of two government of India organizations, either utility or industry, as well as any two state utilities.

S.No.	Technical Parameter
A	***Hardware***
1	Make, model/type
2	IED supports with IEC-61850 with IED 2 (loop in loop out) Fiber optic interfaces
3	Metering and protection functionality shall be derived from CT protection core with **4CT (1 Amp & 5 Amp) and 4 VT Inputs**.
4	**Auxiliary Supply** : **18-30 V DC ± 15 %** Ripple **Digital Inputs** : Atleast **18 No**. Configurable Inputs with configurable thresold voltage atleat 80% of Rated Voltage. **Digital Output** : Atleat **11 No**. Configurable Outputs with Burden rating **atleast 400 W** for Closing & Tripping VCB directly **and DC Contactor's with suitable breaking capacity required** for utilized DOs. 1No. Watch dog contact for continuous checking of internal health of the relay and should have dedicated output for alarm and tripping for the same. **LEDs** : Atleast **7 No.** Bi-Color Configurable LEDs **Display** : **Big Graphical Display** with Atleat 8 Line, With **exclusive button for resetting relay** & **exclusive 2 No. push buttons** for closing/tripping via HMI. It shall also have keypad to view measurement / settings / SLD The display shall be in English Language. **Software :** Bidder should have supply IED configuration and Programming software for extracting ICD, CID files and settings, required cables etc. for **free with the supplies & also provide free software upgrades.** The relay shall have **IP51** Ingress Protection on the front & **IP20** in rear.
5	All PCBs shall be **conformally coated**
6	**Terminals :** Auxiliary Supply, CTs, PTs – **Ring Terminals** required DIs, DOs, Analog Inputs (If any) – **PIN/Fork/Ring** Terminal with Screw required.

<table>
<tr><td>7</td><td>Ports : One Serial port or USB port in front for relay programming with baud rate atleast 10 Mbits/sec. . Also it should supports with IEC-61850 with IED 2 (loop in loop out) Fiber optic interfaces.</td></tr>
<tr><td>8</td><td>Hard Wiring for following Digital Inputs including Spare DIs till TBs required: -
<table>
<tr><td>Circuit Breaker Close Status</td><td>S SCADA In (LR in Remote) Status</td></tr>
<tr><td>Circuit Breaker Open Status</td><td>S SCADA Out (LR in Local Position) Status</td></tr>
<tr><td>Spring Charge Status</td><td>VCB Test Position Status</td></tr>
<tr><td>Master Trip Relay Operated</td><td>VCB Service Position Status</td></tr>
<tr><td>Trip Circuit Healthy-1 (Pre)</td><td>Trip Circuit Healthy-2, (Pre)</td></tr>
<tr><td>Trip Circuit Healthy-1 (Post)</td><td>Trip Circuit Healthy-2, (Post)</td></tr>
<tr><td>Close Circuit Healthy</td><td>CLOSE VIA TNC</td></tr>
<tr><td>TRIP VIA TNC</td><td>DC Healthy</td></tr>
<tr><td>Spare 1</td><td>Spare 2</td></tr>
</table>
Hard Wiring for following Digital Outputs including Spare DOs till TBs required: -
<table>
<tr><td>86 Trip</td><td>86 Trip Spare - 1</td></tr>
<tr><td>Remote Close VIA SCADA & Closing with HMI Push Button</td><td>Remote Trip VIA SCADA & Tripping with HMI Push Button</td></tr>
<tr><td>Closing for Autoreclosure Function</td><td>Tripping for Autoreclosure Function</td></tr>
<tr><td>For Hooter when Any Protection Function Operates</td><td>50BF/LBB to upstream VCB</td></tr>
<tr><td>Watch Dog Contact for giving alarm</td><td>HTC TO INDICATION BULB</td></tr>
<tr><td>Spare-1</td><td></td></tr>
</table></td></tr>
<tr><td>9</td><td>Following Protection Functions & Supervisions Required in Relay</td></tr>
<tr><td></td><td>51 – IDMT Over Current Protection</td></tr>
<tr><td></td><td>50 - Instantaneous Over Current Protection</td></tr>
<tr><td></td><td>51N – IDMT Earth Fault Protection</td></tr>
<tr><td></td><td>50N – Instantaneous Earth Fault Protection</td></tr>
<tr><td></td><td>49 – Thermal Overload Protection</td></tr>
<tr><td></td><td>46 – Broken Conductor Protection</td></tr>
<tr><td></td><td>51 V - Voltage Dependent Inverse Time Over Current Protection</td></tr>
<tr><td></td><td>50BF - Breaker Failure Protection</td></tr>
<tr><td></td><td>79 Auto Reclose</td></tr>
<tr><td></td><td>27 - Under Voltage Protection</td></tr>
<tr><td></td><td>59 - Over Voltage Protection</td></tr>
<tr><td></td><td>59N - Neutral Displacement Voltage Protection</td></tr>
<tr><td></td><td>For 51, 51N Protection Function All standard IEEE/IEC curves shall be available in relay by default including IEC 1.3 Sec Curve. Also user configurable curve must be available for user to configure if required. For Reset Curve Characteristrics user shall have all standard IEC/IEEE curves.</td></tr>
</table>

<table>
<tr><td></td><td>For 51, 51N Protection 2nd harmonic current blocking must be available.</td></tr>
<tr><td></td><td>Relays should have atleast 10 element's "Flexible Protection" function, allowing us to configure the protections associated with Current, Voltage Inputs, DIs & DOs using logical conditions. These options are essential for configuring additional Over Current, Earth Fault protection, Voltage related and power related functions in along with the default built-in functions.</td></tr>
<tr><td></td><td>74 – Trip Circuit Supervision for both trip coils</td></tr>
<tr><td></td><td>Circuit Breaker Condition Monitoring</td></tr>
<tr><td></td><td>CT Supervision & VT Supervision</td></tr>
<tr><td></td><td>Cold load Pickup & Inrush (68)</td></tr>
<tr><td>11</td><td>The Relay should have at least four setting Groups & atleast four stages in each group which are selectable by logical conditions as well as remote setting facilities for thresholds and time delay adjustments</td></tr>
<tr><td></td><td>Disturbance record of atleast 50 No. X 1 Sec with atleat 16 fault records point per cycle.
DR should have a facility to record the following parameters in each DR, selectable from DI/DO/Pick Up/Start/Trip with all Analog Channels & atleast 20 Digital Channels.
<table>
<tr><td>All Measured Currents, Voltages Values & Derived Values in Analog Channels</td><td>All Binary Inputs in Digital Channels</td></tr>
<tr><td>All Binary Outputs in Digital Channels</td><td>All Alarm/Pick Up in Digital Channels</td></tr>
<tr><td>All Trip in Digital Channels</td><td></td></tr>
</table>
Fault Log of atleast 16 No to be visible in HMI displaying all Phase, Neutral Current & All Voltages with date & time stampings.
Events Log atleast 500 with resolution of 1 msec
Security Logs atleast 1000</td></tr>
<tr><td></td><td>Access to setting mode should be protected by Two different customized passwords of at least 4 characters.
(1) Viewing Protection Settings
(2) Editing Protection Settings & Parameter Settings</td></tr>
<tr><td>B</td><td>Metering Functionality of IED Relay</td></tr>
<tr><td>21</td><td>The relay should have all the Measurement functions for Feeder Breaker.</td></tr>
</table>

		Three Phase Currents RMS, Max, Avg, Instantaneous Magnitude & Phase Angle	Neutral Current RMS, Max, Avg, Instantaneous Magnitude & Phase Angle
		Phase to Earth Voltage RMS, Max, Avg, Instantaneous Magnitude & Phase Angle	Phase to Phase Voltage RMS, Max, Avg, Instantaneous Magnitude & Phase Angle
		All Energy Measurement KWH, KVARH, KVAH	Maximum Demand, Minimum Demand recorded **Hourly, Daily, Weekly, Monthly**
		Active Power Per Phase & 3 Phase	Reactive Power Per Phase & 3 Phase
		Apparent Power Per Phase & 3 Phase	Power factor Phase wise & 3Phase
		All Sequence Currents with Magnitude & Phase Angle	All Sequence Voltages with Magnitude & Phase Angle
		Frequency	
	Bidder should have supply IED configuration and Programming software for extracting ICD, CID files and settings, required cables etc. for **free with the supplies**		
22	Capability of Switching on and off the feeder breaker with DO from RTU with IEC 61850 shall be facilitated		
	Communication **IEC 61850 protocol Edition 2.0** with optical loop in and loop out ring topology with RSTP Protocol. Relay should communicte with Other make IED relays Via GOOSE and it has to be demonstrated in POC.		
	The relay should have one serial port **or** USB port in front for relay programming, **Also it should have one serial port at rear for service purpose.**		
	Parameters to be Reported by Feeder IED to Remote Control Centre		
	Digital Inputs	**Digital outputs**	
	Breaker ON	Remote Close	
	Breaker off	Remote Trip	
	Breaker spring charge	TCS on Close alarm	
	Breaker trip circuit supervision		
	SCADA IN		
	SCADA OUT		
	Soft Signals to be Reported	**Soft Signals to be Reported**	
	Breaker tripped on 51R> with set values and acted values	Breaker tripped on 51Y>with set values and acted values	
	Breaker tripped on 51B>with set values and acted values	Breaker tripped on 50N>with set values and acted values	
	Breaker tripped on 51R>>with set values and acted values	Breaker tripped on 51Y>>with set values and acted values	
	Breaker tripped on 51B>>with set values and acted values	Breaker tripped on 50N>>with set values and acted values	

Breaker failure protection	Auto recloser function
Breaker tripped on broken conductor	Current of R
Current of Y	Current of B
Current of N	
Voltage of RY	Voltage of YB
Voltage of BR	KWH import and export
KVAH import and export	KVARH import and export
Average PF Phase wise and 3 Phase	MD Maximum and average
Facility to **transmit the disturbance recording when trigerred** in COMTRADE 2000 Format through IEC 61850 and it shall be saved in substation LDMS	Facility to transmit **the Fault Record when triggered** with Date & Time stamping through IEC 61850 and it shall be saved in substation LDMS

All BIs, BOs and Protection functions when operated shall be report in substation LDMS. Every relay should comply with SNTP Protocol. The relays All BOs and All LEDs shall be RESET from Control Center and LDMS when command is given remotely.

Type Tests

Type tests to be conducted as per IEC60255/27:2005 the date of type test will not be later than 5years.

12.1. Warranty

The System provider is responsible for providing the warranty of IED for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

12.2. Licences

The contractor must provide all supplied IED relays software licences as per the field requirement.

Note: - Bids received without type test reports / partial type test reports will be treated as non-responsive.

13. INTELLIGENT ELECTRONIC DEVICE (DIFFERENTIAL) RELAY FOR TRANSFORMER CONTROL VCB

<table>
<tr><th>S.No</th><th>Technical Parameter</th></tr>
<tr><td>A</td><td>Hardware</td></tr>
<tr><td>1</td><td>Make, model/type</td></tr>
<tr><td>2</td><td>IED supports with IEC-61850 with Ed 2.0 loop in loop out Fiber optic interfaces with RSTP Protocol.</td></tr>
<tr><td>3</td><td>Metering and protection functionality shall be derived from CT Protection core with 8CT and 4VT inputs (8CTs 1Amp&5Amp selectable)</td></tr>
<tr><td></td><td>Auxiliary Supply : 18-30 V DC ± 15 % Ripple
Digital Inputs : Atleast 22 No. Configurable Inputs with thresold voltage atleat 80% of Rated Voltage.
Analog Inputs : Atleast 8 No. Temparature Sensing Inputs taken from PT100 Transducer.
Digital Output : Atleat 11 No. Configurable Outputs with Burden rating atleast 400 W for Closing & Tripping VCB directly and DC Contactor's with suitable breaking capacity required for utilized DOs. 1No. Watch dog contact for continuous checking of internal health of the relay and should have dedicated output for alarm and tripping for the same.
LEDs : Atleast 18 No. Configurable Tri Color LEDs, Protection tripping should be indicated on the front of the device by a dedicated LED and text indicating the cause of the fault
Display : Big Graphical Display with Atleat 8 Line, With exclusive button for resetting relay & exclusive 2 No. push buttons for closing/tripping via HMI. It shall also have keypad to view measurement / settings / SLD The display shall be in English Language. The Display Shall indicate type of the fault.
The relay shall have IP54 Ingress Protection on the front & IP20 in rear.
Software : Bidder should have supply IED configuration and Programming software for extracting ICD, CID files and settings, required cables etc. for free with the supplies & also provide free software upgrades.</td></tr>
<tr><td></td><td>All PCBs shall be conformally coated</td></tr>
<tr><td></td><td>Terminals :
Auxiliary Supply, CTs, PTs – Ring Terminals required
DIs, DOs, Analog Inputs (If any) – PIN/Fork/Ring Terminal with Screw required.</td></tr>
<tr><td></td><td>Ports : 1No. Serial port or USB port in front for relay for programming with baud rate atlest 10 Mbits/Sec & 1No. Serial port at rear of relay should be available. Also it should supports with IEC-61850 with IED 2 (loop in loop out) Fiber optic interfaces.</td></tr>
<tr><td></td><td>Hard Wiring for following Digital Inputs including Spare DIs till TBs required :-
<table>
<tr><td>Circuit Breaker Close Status</td><td>S SC ADA In (LR in Remote) Status</td></tr>
<tr><td>Circuit Breaker Open Status</td><td>S SCADA Out (LR in Local Position) Status</td></tr>
<tr><td>Spring charge Status</td><td>VCB Test Position Status</td></tr>
<tr><td>Master Trip Relay Operated</td><td>VCB Service Position Status</td></tr>
</table></td></tr>
</table>

		Trip Circuit Healthy-1 (Pre)	PTR Buchholz Alarm Operated
		Trip Circuit Healthy-1 (Post)	PTR Buchholz Trip Operated
		Trip Circuit Healthy-2 (Pre)	PTR Low Oil Alarm Operated
		Trip Circuit Healthy-2 (Post)	PTR OLTC Buchholz Alarm Operated
		Close Circuit Healthy	PTR OLTC Buchholz Trip Operated
		TNC Close	PTR PRV Operated
		TNC Trip	
		DC Healthy	
	Hard Wiring for following Analog Inputs for measuring PTR Oil & Winding Temparature		
		Oil Temperature	Winding Temperature
	Hard Wiring for following Digital Outputs including Spare DOs till TBs required :-		
		86 Trip	86 Trip Spare - 1
		Remote Close VIA SCADA & Closing with HMI Push Button	Remote Trip VIA SCADA & Tripping with HMI Push Button
		For Hooter when Any Protection Function Operates	50BF/LBB to upstream VCB
		Trip Upstream/Down Stream VCB	Watch Dog Contact for giving alarm
		Trip Upstream/Down Stream VCB (Spare)	HTC to Indication Bulb
			For Hooter when PTR Alarm, Trip Operates
	Following Protection Functions & Supervisions Required in Relay		
	51 – IDMT Over Current Protection		
	50 - Instantaneous Over Current Protection		
	51N – IDMT Earth Fault Protection		
	50N – Instantaneous Earth Fault Protection		
	49 – Thermal Overload Protection		
	46 – Broken Conductor Protection		
	51 V - Voltage Dependent Inverse Time Over Current Protection		
	50BF - Breaker Failure Protection		
	27 - Under Voltage Protection		
	59 - Over Voltage Protection		
	59N - Neutral Displacement Voltage Protection		
	24 – Over Excitation Protection		
	32 – Power Protection		
	37 - Undercurrent Protection		
	47 – Sequence Over Voltage Protection		
	55 – Power Factor Protection		
	67 – Directional Over Current Protection		

<table>
<tr><td></td><td>67N – Directional Earth Fault Protection</td></tr>
<tr><td></td><td>87GH – Restrcted Earth Fault Protection High Impeadance</td></tr>
<tr><td></td><td>87NL – Restricted Earth Fault Protection Low Impeadance</td></tr>
<tr><td></td><td>87T – Transformer Bias Differential Protection</td></tr>
<tr><td></td><td>For 51, 51N Protection Function All standard IEEE/IEC curves including IEC 1.3 Sec Curve shall be available in relay by default. Also user configurable curve must be available for user to configure if required. For Reset Curve Characteristrics user shall have all standard IEC/IEEE curves.
For 51, 51N Protection 2nd harmonic current blocking must be available. For 87T Protection 2nd & 5th Harmonic current blocking must be available.</td></tr>
<tr><td></td><td>Relays should have atleast 18 element's "Flexible Protection" function, allowing us to configure the protections associated with Current, Voltage Inputs, DIs & DOs using logical conditions. These options are essential for configuring additional Over Current, Earth Fault protection, Voltage related and power related functions in along with the default built-in functions.</td></tr>
<tr><td></td><td>Trip Circuit Supervision for both trip coils</td></tr>
<tr><td></td><td>Close Circuit Supervision</td></tr>
<tr><td></td><td>Circuit Breaker Condition Monitoring</td></tr>
<tr><td></td><td>CT Supervision & VT Supervision</td></tr>
<tr><td></td><td>Cold load Pickup & Inrush Restrain</td></tr>
<tr><td></td><td>Temparature Supervision shall have provision to Set Temparature for generating Alarm & Trip</td></tr>
<tr><td></td><td>The Relay should have at least four setting Groups & atleast four stages in each group which are selectable by logical conditions as well as remote setting facilities for thresholds and time delay adjustments</td></tr>
<tr><td></td><td>Disturbance record of atleast 50 No. X 1 Sec with atleat 16 fault records point per cycle.
DR should have a facility to record the following parameters in each DR, selectable from DI/DO/Pick Up/Start/Trip with all Analog Channels & atleast 20 Digital Channels.
<table>
<tr><td>All Measured Currents, Voltages Values & Derived Values in Analog Channels</td><td>All Binary Inputs in Digital Channels</td></tr>
<tr><td>All Binary Outputs in Digital Channels</td><td>All Alarm/Pick Up in Digital Channels</td></tr>
<tr><td>All Trip in Digital Channels</td><td></td></tr>
</table>
Fault Log of atleast 16 No to be visible in HMI displaying all Phase, Neutral, Bias, Difference Currents & All Voltages with date & time stampings.
Events Log atleast 2000 with resolution of 1msec
Security Logs atleast 1000</td></tr>
<tr><td></td><td>Access to setting mode should be protected by Two different customized passwords of at least 4 characters.
(1) Viewing Protection Settings
(2) Editing Protection Settings & Parameter Settings</td></tr>
<tr><td></td><td>Metering Functionality</td></tr>
<tr><td></td><td>The relay should have all the Measurement Values</td></tr>
</table>

Three Phase Current RMS, Max, Avg, Instantaneous Magnitude & Phase Angle of HV Side	Neutral Current RMS, Max, Avg, Instantaneous Magnitude & Phase Angle of HV Side
Three Phase Current RMS, Max, Avg, Instantaneous Magnitude & Phase Angle of LV Side	Neutral Current RMS, Max, Avg, Instantaneous Magnitude & Phase Angle of LV Side
All Bias, Difference Currents RMS, Max, Avg, Instantaneous Magnitude & Phase Angle	Maximum Demand, Minimum Demand recorded **Hourly, Daily, Weekly, Monthly**
Phase to Earth RMS Voltage RMS, Max, Avg, Instantaneous Magnitude & Phase Angle	Phase to Phase RMS, Max, Avg, Instantaneous Voltage Magnitude & Phase Angle
Active Power Per Phase & 3 Phase	Power factor Phase wise & 3 Phase
Apparent Power Per Phase & 3 Phase	Reactive Power Per Phase & 3 Phase
Frequency	All Energy Measurement KWH, KVARH, KVAH
Oil Temparature	Winding Temparature
All Sequence Voltages with Magnitude & Phase Angle	All Sequence Currents with Magnitude & Phase Angle

Bidder should have to supply IED configuration and Programming software for extracting ICD, CID files and settings, required cables etc. for **free with the supplies**

Capability of Switching ON & OFF the breaker with DO via RTU with IEC 61850 shall be facilitated

Communication

IEC 61850 protocol Edition 2.0 with optical loop in and loop out ring topology with RSTP Protocol. Relay should communicte with Other make IED relays Via GOOSE and it has to be demonstrated in POC.

The relay should have one serial port **or** USB port in front for relay programming, **Also it should have one serial port at rear for service purpose.**

Parameters to be Reported by Feeder IED to Remote Control Centre

Digital Inputs	**Digital outputs**
Breaker ON	Breaker close
Breaker off	Breaker trip
Breaker spring charge	TCS on Close alarm
Breaker trip circuit supervision	Two output for goose
SCADA IN	
SCADA OUT	**Analog Inputs**
Buchholz Alarm Operated	Oil Temparature
Buchholz Trip Operated	Winding Temparature
Low Oil Alarm Operated	
OLTC Buchholz Trip Operated	

	OLTC Buchholz Alarm Operated		
	Soft Signals to be Reported	**Soft Signals to be Reported**	
	Breaker tripped on 51R> with set values and acted values	Breaker tripped on 51Y>with set values and acted values	
	Breaker tripped on 51B>with set values and acted values	Breaker tripped on 50N>with set values and acted values	
	Breaker tripped on 51R>>with set values and acted values	Breaker tripped on 51Y>>with set values and acted values	
	Breaker tripped on 51B>>with set values and acted values	Breaker tripped on 50N>>with set values and acted values	
	Breaker failure protection	Breaker tripped on REF with set values and acted values	
	Oil Tempararature Alarm Operated	Oil Temparature Trip Operated	
	Winding Tempararature Alarm Operated	Winding Temparature Trip Operated	
	Breaker tripped on Differential with set values and acted values	Current of R	
	Current of Y	Current of B	
	Voltage of RY	Voltage of YB	
	Voltage of BR	KWH import and export	
	KVAH import and export	KVARH import and export	
	PF Phase wise and Average	MD Maximum and average	
	CT Supervision	VT Supervision	
	Facility to communicate the disturbance recording in COMTRADE 2000 Format through IEC 61850 and it shall be saved in substation LDMS	Facility to communicate the Fault Record with time stamping through IEC 61850 and it shall be saved in substation LDMS	
	The relays All BOs and All LEDs shall be RESET from Control Center and LDMS when command is given remotely.		
	The relay shall have Cyber security feature such as Security logs, signed firmware etc. The relay shall have Role Based Access Control(RBAC) feature. Every relay should comply with SNTP Protocol.		

All BIs, BOs and Protection functions when operated shall be report in substation LDMS

2Nos IED Relays.. 1No Feeder relay and 1No Differential to be provided for testing all parameters at SCADA Control Center to check functionality of the Relay.

13.1. Type Tests

Type tests to be conducted as per IEC60255/27:2005 the date of type test will not be later than 5years.

13.2. Warranty

The System provider is responsible for providing the warranty of IEDs for a period of 5years from the date of Go-Live as certified by the SE/SCADA.

13.3. Licences

The contractor must provide all supplied IED relays software licences as per the field requirement.

Note: - Bids received without type test reports / partial type test reports will be treated as non-responsive.

14. SCADA INTEGRATION POC STEPS

Proof of Concept (POC) Process to be taken up by EPC Contractor:

14.1. Overview:

The EPC (Engineering, Procurement, and Construction) bidder is responsible for demonstrating a proof of concept (POC) for a Supervisory Control and Data Acquisition (SCADA) system installation. The steps involved include bringing necessary equipment to the substation, retrofitting new relays at existing non-compatible Relays, completing wiring, and ensuring all systems are integrated and operational. Successful continuous operation for 24 hours is required for certification.

14.2. Detailed Steps:

1. **Equipment Mobilization**:

The bidder must transport all necessary equipment to the designated substation. This includes any hardware required for the SCADA system and other related infrastructure components.

2. **Retrofitting and Replacement:**

Replace non-compatible Relays with supplying IED Relays. This involves retrofitting, which means making modifications to existing equipment to ensure compatibility with the Existing SCADA system.

Complete the wiring and connections to the Remote Terminal Unit (RTU). This also includes connecting the local database management system, display management system, battery system, AC supply.

3. **Integration of Specific Components:**

Ensure the following specific components are connected and integrated:

1) Feeder relay (HV/11kV) supplied by bidder

2) Differential relay (LV) supplied by bidder

3) TMU (Transformer Monitoring Unit).

4) Power transformer marshalling box with analog hybrid wti & oti

5) 15numbers Trivector meters (available at field). Bidder has to arrange the necessary material required to complete the POC (like RS485 switches for loopin & loopout arrangement, Cables)

6) Capacitor Bank (If available).

4. Communication and Clearance:

Provide communication links, for all above mentioned Relays through FO Cable & Meters through Cat-6 cable to RTU.

5. Fiber Optic Cable Connectivity:

i. Implement a loop-in-loop out methodology for Fiber Optic (FO) cable & Cat-6 cable connectivity.

ii. Provide Line Interfacing Unit (LIU). Upload all necessary CID files to the RTU system to facilitate integration to Existing Control Centre with OSI Software.

iii. Provide RS485 switches at each trivector meter and configure in RTU for MODBUS synchronisation. Map the values at OSI software.

6. Integration to OSI Application Platform:

Prepare the system for integration with an OSI application platform available in the control room.

The integration process will be overseen by TGSPDCL in coordination with the existing system integrator.

7. Validation and Certification:

The POC must demonstrate continuous and seamless data reception for at least 24 hours.

If successful, the SCADA system will be certified by the responsible authorities. Upon certification, the financial bid for the project will be opened.

Conclusion:

The POC process involves meticulous planning, retrofitting, wiring, and integration of various components to ensure the SCADA system is fully operational. Successful demonstration of continuous performance for 24 hours is crucial for certification and subsequent project approval.

15. Work Station Specifications

No.	Item	Description
1	**Processor**	Intel Core i7-14700(14^{th} Gen, 16Cores(8P+8E)/24 threads or better, ≥3.4GHz) Cache ≥30MB intel Smart Cache
2	**Main Memory (RAM)**	32GB 1600MHz DDR5(5200MHz) expandable to 128GB, Dual channel, ECC support
3	**Auxiliary Memory (SSD)**	1TB NVMe (PCIe 4.0, read ≥ 5000MB/s, write ≥ 4000 MB/s)
4	**Motherboard**	Chipset : Intel z790
5	**CD-R/W Drive**	16x DVD+/-RW Drive
6	**Graphics Card**	Intel UHD Graphics 770
7	**Ethernet Ports (LAN)**	2X2.5Gbps Dual LAN
8	**Interface**	2XUSB 3.2 Gen2, 1 USBX2.0; Rear: 4XUSB (2X3.2, 2X2.0); 2XPS/2 (1-Keyboard & 1-Mouse)
9	**Cooling**	CPU: Air cooling(120mm heatsink/fan) Chassis: Minimum 2X120mm fans; dust filters required; noise level <30 dB at idle.
10	**Power Supply**	230V AC, 50Hz
11	**Audio Speakers**	Dual speakers (Realtek ALC897or equivalant); 3.5mm combo jack
12	**Keyboard**	PS/2 Keyboard (full size with numeric keypad; spill resistant)
13	**Mouse**	PS/2 Mouse (1600DPI minimum); ergonomic with programmable buttons
14	**Work Station Type**	Mini Tower
15	**Operating System**	**Windows -11 Pro 64Bit, Pre- installed licensed office productivity Suite (MS 365)**
16	**Monitor**	Dual Monitor 27-inch IPS, QHD(2560x1440) 75Hz. 350 cd/m² brightness, 5ms response time, anti glare, VESA mount (100X100mm); Ergonomics : Height/tilt/swivel/ivot adjustable stand
1	**Power Consumption**	550W (Maximum)

SECTION - V

SCHEDULE OF REQUIREMENTS, BILL OF QUANTITIES AND PRICES

SCHEDULE OF REQUIREMENTS, BILL OF QUANTITIES

SL	Description of the Equipment	Qty	Unit Material Rate incl GST	Unit Labour/ Service Rate incl GST	Total Cost
	A	**B**	C	D	E=B*[C+D]
1	Remote terminal units (RTUs) for non SCADA substations	**116**			
2	4G Routers for substations(dual SIM) & RVDUs	**127**			
3	UPS with batteries for auxiliary power supply	**127**			
4	48V DCPS for RTU	**116**			
5	Local display monitoring system (with software installed depicting SS SLD & reports)	**116**			
6	LDMS furniture (1-Computer Table, 2- Z Type office Chairs)	**116**			
7	Feeder IED relays requirement in substations with retrofitting charges (I/C, HV and 11kV Feeders)	**925**			
8	Transformer(Differential) IED relays requirement in substations with retrofitting charges (LV side of PTR)	**234**			
9	Self resetting Master Trip Relays	**1159**			
10	Hybrid WTI & OTI Sensors and panel	**234**			
11	Integration of RTU to SCADA Control center server software (OSI SCADA Software) charges	**116**	-		
12	Maintenance for 5 years after integrations of project (complete FMS/AMC with spares & repairs in bidder scope)	**116**	-		
13	Remote Visual Display Units (RVDUs) with Routers(treated as Desktop computers to be installed in local offices for view of SCADA system)	**11**			
14	Laptops	**50**			
15	Work stations to control center	**10**			

*All the material shall invariably comply with cyber security norms/protocols

Note:

A. Bidder shall quote the Total Contract Value and upload the signed copy of the above table (schedule) in pdf format in e-procurement platform at commercial stage only.

B. Bidder shall submit all the spare component unit rates of major material (such as RTU, IED, DCPS, UPS, LDMS, Hybrid WTI & OTI) which will be used during FMS period in pdf format in e-procurement platform at commercial stage only. It is to be noted that these prices are meant only for future use & reference and not meant for price bid evaluation.

C. Submission Requirements : Bidders must submit a detailed compliance matrix addressing each specification of all the equipment as given in the technical specififcations document.

D. Sample units may be requested for evaluation before final procurement.

Points to be noted:

1) By clubbing the Sl no. (1) & (2) of the above schedule, bidder may supply the RTU with built-in 4G Router in line with the technical specifications mentioned.

SECTION - VI

QUALIFICATION REQUIREMENTS

QUALIFICATION REQUIREMENTS

The minimum "Bid Qualification Requirements" with respect to experience, capability and other particulars of the Bidder to be considered eligible for participation in the bid for the proposed work are stated in this section. The Bidder shall become eligible to bid on satisfying the following and on production of the required documentary evidences along with the Tender.

1. Financial:

i. Financial Turnover criteria shall be met by the sole bidder. In case of consortium, both lead & Consortium partner shall meet the criteria mentioned as given below:

QF1 For lead or sole bidder :

Bidder participating as a sole bidder: sole bidder shall meet 100% of the minimum annual average turnover (MAAT) of the Bid value in best of 3years in last 5 years.

Bidder participating as a lead and consortium partner: Individually shall meet at least 30% of MAAT and together 100% of MAAT in best of 3 years within 5 years.

QF2 For consortium partner :

Average Annual financial turnover of best 3 years in the last 5 FYs including last completed financial year, ending 31st March, should be at least 15% of Bid value.

(Proof: Annual Audited Financial Statements for last 5 financial years or 3 best financial years considered for qualification shall be submitted. In case Audited Financial Statements for the previous year is not prepared then certificate from statutory auditor shall be submitted certifying the annual financial turnover).

Both lead bidder and consortium partner together should meet 100% of the estimation cost.

The maximum number of partners allowed are TWO (including lead bidder).

QF3 : The bidder (Sole or lead and consortium both) should have a net worth not less than paid-up equity, in each of the best 3 years in the last 5 FYs incl last completed financial year

(Proof: Annual Audited Financial Statements for last 5 financial years or 3 best financial years shall be submitted. In case Audited Financial Statements for the previous year is not prepared then certificate from statutory auditor shall be submitted certifying the net worth.)

ii. The total turnover shall be Rs.60 Crores during the last five years certified by CA.

iii. The bidder should meet 100% of the minimum annual average turnover (MAAT) of the Bid value in best of 3years in last 5 years.

iv. Net Worth for the last three Financial Years should be positive.

(Proof: Annual Audited Financial Statements for last 5 financial years or 3 best financial years shall be submitted. In case Audited Financial Statements for the previous year is not prepared then certificate from statutory auditor shall be submitted certifying the net worth.)

v. The bidder should have successfully executed at least two Turnkey contract of SCADA System in last 10 years in INDIA in any power utility/ Government organizations/Limited companies for Electrical distribution system. The Cumulative value of contracts shall not be less than Rs.30Cr for the total contracts executed during the last 5 years.

vi. Liquid assets and credit facilities of not less than 25% of the bid value.

(credit lines/ letter of credit/solvency certificates from Banks, etc – usually the equivalent of the estimated cash flow for 3 months in peak work period).

2. Technical:

i. The following qualifying requirements shall be met by the sole bidder. In case of consortium bidding, Partners shall meet the following criteria together. The maximum no of consortium partners allowed are Two. (QR- Technical)

ii. The bidder should have supplied minimum 50 nos. RTUs, 400Nos IEDs and necessary accessories in India directly or through System Integrator (SI). The performance certificate for at least 2nos Distribution Networks Systems working satisfactorily should be enclosed with the bid.

iii. The bidder must produce necessary certificates along with type tests reports in respect of the equipment supplied along with the bid.

iv. A Project Manager with Graduation in Electrical/Electronics Engineering with experience in SCADA system implementation should be engaged for execution of this work.

v. A technically qualified bidder must integrate one 33/11KV substation under POC. Only upon successful integration, will qualify for the opening of the price bid.

vi. The materials of same Make & Model which were used at the time of POC should be utilized during execution of the whole project.

vii. The Qualified Bidder should have at least 1No. Stores for storage of spares/materials and the material responsibility solely lies with the bidder until successful commissioning at all substations of TGSPDCL.

viii. Pre-dispatch testing/Inspection will be done by TGSPDCL Engineers on the quality of materials to be supplied at manufacturing factory.

3. a. Any company/ vendor/ supplier/ contractor which is blacklisted/ debarred by any other power utility i.e., DISCOMs/ TRANSCO/ GENCO or Government or any other Government body in India as on date of bid submission and up to the issue of Letter of Intent is not eligible to participate in the tenders.

b. The bidders shall have to furnish an undertaking in the prescribed format regarding any relation to the promoters of blacklisted / debarred companies by any utility. Any false information furnished in the declaration while rendering bid, such contract is liable for termination as well as recovery of damages.

4. Bidder shall submit documentary evidences such as Order copies, Work completion certificate, Performance Certificates, Copies of contracts and Balance sheets etc., Performance Certificates issued by Head of Purchasing Authority (as per spec).

5. All bidders shall provide Forms of bid and Qualification information, a preliminary description of the proposed work, method and schedule, including drawings and charts as necessary.

6. The bidder should furnish the information on all past supplies and satisfactory performance in Proforma under Form 2 attested by a Gazetted officer. Copies of Purchase Orders, invoices and other documents in support of the above supplies (for Qualification requirement and Performance requirement) should be enclosed.

7. All bidders shall also include the following information and documents with their bids:
   a. Copies of original documents defining the constitution or legal status, place of registration, and principal place of business, written power of attorney of the signatory of the Bid to commit the Bidder.
   b. Total monetary value of automation work performed for each of the last five years.
   c. Experience in works of a similar nature and clients who may be contacted for further information on those contract.
   d. Qualifications and experience of key site managements and technical personnel proposed for the Contract.
   e. Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years.
   f. Evidence of adequacy of working capital for this contract (access to line (s) of credit and availability of other financial resources).
   g. Authority to seek references from the Bidder's bankers.
   h. Information regarding any litigation, current or during the last five years, in which the Bidder is involved, the parties concerned, and disputed amount.
   i. The proposed methodology of execution of works backed with their planning and deployment, duly supported with broad calculations and quality assurance procedures proposed to be adopted, justifying their capability of achieving the completion of work as per milestones specified within the stipulated period of completion.
   j. Financial turnover should be supported by Income Tax return submitted to the Income Tax Department by the contractor.
   k. Certificate along with supporting Xerox copies of Agreements for the works executed in any one year during last 5 years .

8. The bidder's experience as Subcontractor will not be taken into account**.**

9. Sub-contractor's experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria.

10. The Bidder shall also furnish the following documents with its Bid.

a. Details of the workers to be engaged in the agreement of the subject work along with the breakup of wages including EPF and ESI contribution individually, which forms the part of corresponding agreements as per the Employees Provident Fund & Miscellaneous Provisions Act, 1952.

b. Firm Registration/Registered Partnership deed in case of firm.

c. PAN Card

11. Even though the bidder meets the above qualifying criteria, they are subject to be disqualified if they have…

a. made misleading or false representations in the forms statements and attachments submitted in proof of qualification requirements and / or

b. record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completions, litigation history or financial failure etc. in earlier works executed with TGSPDCL or any other company.

c. If they have been executing similar nature of work in TGSPDCL and have been not completing the work as per the work programme i.e. as per the milestones of the agreement.

12. **Proof of Concept (POC) Process to be taken up by EPC Contractor:**

Overview:

The EPC (Engineering, Procurement, and Construction) contractor is responsible for demonstrating a proof of concept (POC) for a Supervisory Control and Data Acquisition (SCADA) system installation. The steps involved include bringing necessary equipment to the substation, retrofitting existing non-compatible Relays, completing wiring, and ensuring all systems are integrated and operational. Successful continuous operation for 24 hours is required for certification.

Detailed Steps:

1. Equipment Mobilization:

The contractor must transport all necessary equipment to the designated substation. This includes any hardware required for the SCADA system and other related infrastructure components.

2. Retrofitting and Replacement:

Replace non-compatible Relays with supplying IED Relays. This involves retrofitting, which means making modifications to existing equipment to ensure compatibility with the Existing SCADA system.

Complete the wiring and connections to the Remote Terminal Unit (RTU). This also includes connecting the local database management system, display management system, battery system, AC supply.

3. Integration of Specific Components:

Ensure the following specific components are connected and integrated:

1) HV breaker.
2) LV breaker.
3) TMU (Transformer Monitoring Unit).
4) 11KV Feeder Breaker retrofitted with EPC supplied IED Relay.
5) Capacitor Bank(If available).

4. Communication and Clearance:

Provide communication links, for all above mentioned breakers and transformer to RTU through FO Cable.

5. Fiber Optic Cable Connectivity:

Implement a loop-in-loop out methodology for FiberOptic (FO) cable connectivity.

Provide Line Interfacing Unit (LIU).

Upload all necessary CID files to the RTU system to facilitate integration to Existing Control Center with OSI Software.

6. Integration to OSI Application Platform:

Prepare the system for integration with an OSI application platform available in the control room.

The integration process will be overseen by TGSPDCL in coordination with the existing system integrator.

7. Validation and Certification:

The POC must demonstrate continuous and seamless data reception for at least 24 hours.

If successful, the SCADA system will be certified by the responsible authorities.

Upon certification, the financial bid for the project will be opened.

Conclusion:

The POC process involves meticulous planning, retrofitting, wiring, and integration of various components to ensure the SCADA system is fully operational. Successful demonstration of continuous performance for 24 hours is crucial for certification and subsequent project approval.

SECTION VII

SAMPLE FORMS

1. BID FORM

Date. .....

TO: (Name and Address of Purchaser)
Gentlemen and/or Ladies:

Having examined the Bidding documents, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply and deliver. ..... (Description of Materials / equipment) in conformity with the said bidding documents for the sum of. ..... (total bid amount in words and in figures) or such other sums as may be ascertained in accordance with the schedule of prices attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to deliver the Materials / equipment in accordance with the delivery schedule specified in the Schedule of Requirements.

If our Bid is accepted, we will obtain the guarantee of a bank in a sum equivalent to. 10% of the Contract Price for the due performance of the Contract, in the form prescribed by the Purchaser.

We agree to abide by this Bid upto ……. (for the Bid Validity Period) specified in Clause and it will remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal contract is prepared and executed, this Bid, together with your written acceptance thereof and your notification of award, will constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any bid you may receive.

We certify / confirm that we comply with the eligibility requirements as per clause of the bidding documents.

Dated this. .....day of. 2025

[Signature] *[in the capacity of]*
Duly authorized to sign Bid for and on behalf of

_____

2. QUALIFICATION INFORMATION
(FOR SUBMISSION IN TECHNICAL BID)

The information to be filled in by the Bidder in the following pages will be used for purposes of post-qualification as provided for in Clause 6 of the Instructions to Bidders. This information will not be incorporated in the Contract.

For Individual Bidders

1.1 Constitution of legal status of Bidder
(Attach Copy)
Place of Registration:
Principal place of business:
Power of Attorney of Signatory of Bid
(Attach Copy)

1.2 Total value of Electrical Works performed in the past 7 years (in Rs. Lakhs)

Year	Amount	Year	Amount
		2021-22	
2018-19		2022-23	
2019-20		2023-24	
2020-21		2024-25	

1.3.1 Work performed as prime contractor (in the same name) on works of a similar nature over the last 07 years (2018-2019 to 2024-2025).

Name of the work	Name of Employer	Description of work	Contract No.	Value of contract (Rs. Lakhs)	Date of issue of work order	Stipulated period of completion	Actual date of completion	Remarks Explaining reasons for delay and work completed

1.3.2 Quantities of work executed as prime contractor (in the same name and style) in the last seven years (2018-2019 to 2024-2025).

Year	Name of the work @	Qty in Nos.	Amount (Rs. lakhs)	Remarks * (Indicate contract ref.)

* Enclose certificate(s) from the Engineer(s) in-Charge.

@ The item of work for which data is requested should tally with that specified in ITB clause 6

1.4 Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

(A) Existing commitments and on-going works:

Description of work	Place & State	Contract No. & Date	Name and Address of Employer	Value of Contract (Rs.Lakhs)	Stipulated period of completion (Rs.lakhs)	Value of works * remaining to be completed	Anticipated date of completion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(B) Works for which bids already submitted:

Description of work	Place & State	Estimated value of works (Rs.lakhs)	Stipulated period of completion	Date when decision is completed	Remarks if any expected
(1)	(2)	(3)	(4)	(5)	(6)

*Enclose certificate (s) from the Engineer (s)-in-Charge.

1.5 The Bidder should list all the equipment essential for carrying out the works in the format given below.

Item of equipment	Requirement		Availability proposals			Remarks (from whom to be purchased)
	No.	Capacity	Owned / leased	Nos. / Capacity	Age/ Condition	

1.6 Qualifications and experience of key personnel proposed for administration and execution of the contract. Attach biographical data.

Position	Name	Qualifications	Years of Experience (general)	Years of experience in the proposed position Project Manager

1.7 Financial reports for the last seven years: balance sheets, profit and loss statements, auditor's report (in case of companies / corporation) etc. List them below and attach copies.

1.8 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List them below and attach copies of support documents.

1.9 Name, address and telephone, telex, and fax numbers of the Bidders' bankers who may provide references if contacted by the Employer.

1.10 Performance certificate for the works executed is to be furnished

1.11 Statement of compliance under the requirements of Clause 6 of the instructions to Bidders.

1.12 Proposed work method and schedule. The Bidder should attach descriptions, drawings and charts as necessary to comply with the requirements of the Bidding documents.

2. Additional Requirements

2.1 Bidders should provide any additional information required to fulfill the requirements of Clause 6 of the Instructions to the Bidders, if applicable.

Signature of the Bidder

3. FORMS OF SECURITIES

Acceptable forms of securities are annexed. Bidders should not complete the Performance forms at this time. Only the successful Bidder will be required to provide Performance Securities in accordance with one of the forms, or in a similar form acceptable to the Employer.

Annex A: Bid Security (Bank Guarantee/Bank Draft)

Annex B: Performance Bank Guarantee

Bid Security Deposit:

O Along with the Technical Bid, the Vendor shall submit the Bid security deposit of Rs. 1.20crores (Rupees One Crore Twenty Lakhs only). In case of the non-selected parties, the amount would be returned within 28 days of the end of the bid validity period.

Performance guarantee:

O The vendor shall submit the performance bank guarantee for 10% of the quoted amount, which will cover 6 months beyond the Contract Period or extended thereafter performance obligations including warranty obligations. The performance security will be discharged by the Purchaser and returned to the supplier not later than sixty (60) days after the validity period.

3 a). BID SECURITY (BANK GUARANTEE)
(FOR SUBMISSION IN TECHNICAL BID)

To
The Chief Engineer/Projects
TGSPDCL, Mint Compound, Hyderabad.

Whereas _____ (name of Bidder) (here in after called "the Bidder") has submitted his bid dated _____ (date) for the work of _____ (name of Contract) hereinafter called "the Bid").

Know all people by these presents that We _____ (name of bank) having our registered office at. ..... (address of bank) (hereinafter called "the Bank") are bound unto you, in the sum of _____* for which payment well and truly to be made to you, the Bank binds itself, it's successors and assigns by these presents.
SEALED with the Commission Seal of the said Bank this _____day of_____ 2025.
The conditions of this obligation are:

1) If the Bidder
   a) withdraws his Bid during the period of bid validity specified by the Bidder on the Bid Form; or
   b) does not accept the correction of errors in accordance with the Bid Specification,

or

2) If the Bidder having been notified of the acceptance of his bid by you during the period of Bid Validity.
   a. Fails or refuses to execute the Form of Agreement in accordance with the Bid specification, or
   b. Fails or refuses to furnish the Performance Security, in accordance with the Bid specification, or
   c. Does not accept the correction of the Bid Price pursuant to Clause 33.

We undertake to pay to you up to the above amount upon receipt of his first written demand, without having to substantiate his demand, provided that in his demand you will note that the amount claimed is due to him, owing to the occurrence of one or both of the two conditions specifying the occurred condition or conditions.
This guarantee will remain in force up to and including_____(the date 180 days later than Tender opening) with an additional claim period of 45 days i.e. up to_____ (claim period date), and any demand in respect thereof should reach the Bank not later than the above claim period date.

Date _____ Signature of the Bank _____
Seal _____

(Signature, name and address)

* The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees.

NOTE : This will be executed on a Rs.100/- non-judicial stamp paper issued by any **Nationalized/ Scheduled Bank**.

3 b). PERFORMANCE BANK GUARANTEE

To
The Chief Engineer/Projects
TGSPDCL, Mint Compound, Hyderabad.

Whereas _____ (Name and address of Contractor) (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. ___ dated _____ to execute _____ (name of Contract and brief description of works) (hereinafter called "the Contractor").

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract:

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ (amount of guarantee) * _____ (in words), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ (amount of guarantee) * as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be 10% of the quoted amount, which will cover 6months beyond the Contract Period or extended thereafter performance obligations including warranty obligations.

Signature and seal of the Guarantor _____
Name of the Bank _____
Address _____
Date _____

* An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.

4. CONTRACT FORM (FORMAT-IV) (agreement form for successful Bidder)

THIS AGREEMENT made the. ..... day of. ..... 2025 Between. .....(Name of Purchaser) of the one part and. .....(Name of Supplier) of the other part:

WHEREAS the Purchaser invited bids for certain Materials / equipment and ancillary services viz.,.....(Brief description of Materials / equipment and Services) and has accepted a bid by the Supplier for the supply of those Materials / equipment and services in the sum of. .....(Contract Price in Words and Figures)(hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions will have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents will be deemed to form and be read and construed as part of this Agreement, viz.:
   (a) the Bid Form and the Price Schedule submitted by the Bidder;
   (b) the Schedule of Requirements;
   (c) the Technical Specifications;
   (d) the General Conditions of Contract;
   (e) the Purchaser's Notification of Award.
3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Materials / equipment and services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Materials / equipment and services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

Brief particulars of the Materials / equipment and services which will be supplied/ provided by the Supplier are as under:

Sl. No.	**Brief Description of Materials / Equipment & services**	**Quantity to be supplied**	**Unit Price Rs.**	**Total Price Rs.**	**Delivery Terms**

TOTAL VALUE: (Rupees _____only)

IMPLEMENTATION SCHEDULE:

IN WITNESS where of the parties here to have caused this Agreement to be executed on the day and year first above written.

Signed, Sealed and Delivered by the

said. .....(for the Purchaser)

in the presence of. .....

Signed, Sealed and Delivered by the

said. .....(for the Supplier)

in the presence of. .....

NOTE: To be executed on a Rs.100/- Non-judicial stamp paper.

5. DETAILS TO BE FURNISHED BY THE MANUFACTURER (Format A)

1. Specification No.	:	
2. Name of the Material	:	
3. Quantity to be procured	:	
4. Last date and time for submission of Bid	:	
5. Date and time for opening of Bid	:	
6. State whether Bid guarantee is enclosed	:	
7. State whether the quotation in two parts has been submitted.	:	
8. State whether total quantity is quoted	:	
9. Whether willing to furnish performance B.G**. @ 10%** if order is placed	:	
10. Whether month wise delivery schedule indicated	:	
11. Prices whether Firm	:	
12. Whether any other tax / duty payable. If so give details and the same is included / not included.	:	
13. State whether TGSPDCL terms of payment are accepted	:	
14. Quantity offered for supply	:	
15. State whether 180 days validity offered	:	
16. Whether sample is enclosed (if specified)	:	
17. Whether the material / equipment offered conforms to the relevant TGSPDCL Specification	:	
18. Whether you have executed orders of the TGSPDCL previously for these items. (Please give details)	:	
19. Similar details in respect of supplies made to other utilities	:	
20. Whether Bid guarantee exemption letter enclosed, if exempted.	:	
21. Whether sales tax clearance certificate enclosed	:	
22. Whether Income-tax clearance certificate enclosed.	:	
23. Whether Warranty clause accepted	:	
24. Whether Penalty clause accepted	:	
25. Whether delivery schedule accepted	:	
26. Whether willing to implement POC	:	

6. SCHEDULE OF DEVIATION

(i) TECHNICAL

Sl. No.	Requirements / Equipment	Specification Clause No.	Deviations	Remarks

It is hereby conformed that except for deviations mentioned above, the offer conforms to all the other features specified in Technical Specification Section ____ of this Bid Document

Place: Signature of the Bidder:

Date: Name:

Business address:

6. SCHEDULE OF DEVIATION

(ii) COMMERCIAL

Sl. No.	Requirements / Equipment	Specification Clause No.	Deviations	Remarks

It is hereby conformed that except for deviations mentioned above, the offer conforms to all the other features specified in Commercial Specification Section ____ of this Bid Document

Place : Signature of the Bidder :

Date : Name :

Business address:

7. DECLARATION FORM

Declaration to be given by the Company in regard to relation to promoters of Blacklisted / debarred companies by any power utilities.

I declare that, myself or any of the representatives of my company / firm do not have any relatives with promoters of blacklisted / debarred companies by any utilities.

It is certified that the information furnished above is true to the best of my knowledge and belief. It is hereby undertaken that in the event of the above information found to be false or incorrect at a later date, the TGSPDCL is entitled to terminate the contract/agreement entered into besides recovering damages as may be found necessary, with due notice.

Signature of authorized representative

Annexure - I
List of Substations proposed for SCADA integration

Sl. No.	Circle	Substation
1	MAHABUBNAGAR	OLD POWER HOUSE
2		KC ROAD
3		ZP INDOOR
4		T D GUTTA
5		SLC MILLS
6		VIDYUTH BHAVAN
7		CHRISTIAN PALLY
8		SVS
9		YEDIRA
10		BOYAPALLY
11		BADEPALLY (JADCHARLA)
12		KOURAMPET
13		POLEPALLY SEZ
14		BHOOTHPUR
15	SIDDIPET	SIDDIPET NDOOR
16		DIVISION OFFICE (MUSHTABAD)
17		LINGAREDDY PALLY
18		KOMATI CHERUVU
19		NARASAPUR
20		RANGADAMPALLY
19		PONNALA
20		ENSANPALLY
21		GAJWEL 1
22		GAJWEL PRAGNAPUR
23		HUSNABAD TOWN
24		HUSNABAD IPDS
25		DUBBAK
26	GADWAL	GADWAL OLD
27		GADWAL NEW
28		JAMMICHEDU
29		IEEZA
30		IEEZA NEW(IPDS)
31		ALAMPUR X ROADS
32	YADADRI	BHONGIRI TOWN
33		ANANTHARAM
34		BHONGIRI IDA
35		PANTHANGI SS
36		GREEN INDUSTRIAL PARK SS
37		BIBINAGAR
38		KONDAMADUGU
39		CHOUTUPPAL IPDS
40		CHOUTUPPAL

41	**SANGAREDDY**	SANGAREDDY TOWN 1
42		SANGAREDDY TOWN 2
43		COLLECTORATE OFFICE
44		SADHASHIVPET
45		VELIMELA
46		ISNAPUR SS
47		EPIP 1
48		EPIP 2
49		EPIP 3
50		ZAHEERABAD TOWN
51		JOGIPET
52		NARAYANKHED
53		PATANCHERU TOWN
54		SHIVA NAGAR
55		BOLLARAM 1
56		BOLLARAM 2
57		BOLLARAM 4
58	**NARAYANPET**	KOSGI
59		MADDUR
60		MAKTHAL
61		NARAYANPET
62	**NAGARKURNOOL**	NAGARKURNOOL
63		NAGARKURNOOL IPDS
64		KOLLAPUR
65		ACHAMPET
66		KALWAKURTHY
67		KALWAKURTHY IPDS
68	**NALGONDA**	GOLLAGUDA
69		NALGONDA INDOOR
70		SHANTHI NAGAR
71		PANAGAL
72		NALGONDA POLE CENTER
73		BEET MARKET
74		SLBC
75		MIRYALAGUDA TOWN
76		EDULAGUDEM
77		INDIRAMMA COLONY
78		RAMACHANDRAPURAM
79		FCI COLONY
80	**SURYAPET**	B MADARAM
82		SV COLLEGE
83		JAMMIGADDA
84		SURYAPET TOWN
85		THIRUMALAGIRI
86		KUDA KUDA
87		DURAJPALLY
88		KODAD INDOOR
89		KODAD OUTDOOR
90		BALAJI NAGAR
91		HUZURNAGAR
92		HUZURNAGAR ANUMULAGUDEM
93		DIRSINCHERLA
94		MARKET_YARD

95	**WANAPARTHY**	WANAPARTHY
96		KD POLYTECHNIC
97		SRINIVASPUR
98		KOTHAKOTA
99	**MEDAK**	MEDAK TOWN
100		NARASAPUR
102		TOOPRAN
103		KALLAKAL
104		MANOHARABAD
105		RAMAYAMPET
106		CHEGUNTA
107	**VIKARABAD**	VIKARABAD
108		PARIGI
109		THANDUR NEW
110		THANDUR OLD
111		KODANGAL
112		BHURANPALLY
113		MADGUL_CHITTEMPALLY
114		GOUTHAPUR
115	**SAROORNAGAR**	IBRAHIMPATNAM
116	**RAJENDRANAGAR**	SHAD_NAGAR

SECTION – VIII

Brief about Existing SCADA system and scope in this Bid

Existing SCADA system

Connectivity between feeder breaker points/Substation control room points and RTU/Data Concentrator:

The existing SCADA system in TGSPDCL having 334 numbers 33/11kV substations integrated to SCADA control centre in the GHMC area of Hyderabad. All the substations feeder points like Incomers, HV, GC, LV and 11kV are having Intelligent Electronic Device (IED) relays which are having Fiber optic ports to communicate to RTU via 61850 protocols. All the IEDs are connected in a single loop terminating both the ends of the loop at RTU with FO cable in loop in and loop out method in order to get un interrupted data from any relay. There is a Line Interfacing Unit (LIU) box at each relay point, where the FO cable is connected to LIU box to loop in the respective IED relay where splicing is needed to loop in the IED relay . And, there are a few signal points connected to RTU to communicate the AC and DC power supply position of the Substation's control room like Substation transformer AC supply position, Substation DC supply position and Auxiliary supplies to SCADA equipment position. Etc as given in the General signals table in the Annexure.

Connectivity between 33/11kV Substation and SCADA Control centre:

The existing SCADA system having 334 numbers 33/11kV substations integrated to SCADA control centre in the GHMC area of Hyderabad. All the substations are having either last mile Fiber optic or RF communication connected to SCADA control centre through MPLS connectivity being provided by M/s Airtel. And, all the substations are having a 3G redundant connectivity to SCADA control centre through the same MPLS connectivity. All the data received from 33/11kV substations to SCADA control centre, OSI is the SCADA software installed in the SCADA control center servers. The Software and the servers are being maintained by M/s Chemtrols Industries pvt ltd.

Scope of work in this tender

Other than the existing 334 numbers 33/11kV substations, there are additional 116 numbers 33/11kV substations to be integrated to existing SCADA control centre. A new RTU, Dual SIM Router, Hybrid WTI & OTI sensors with panel, UPS, DCPS and LDMS have to be installed and commissioned to integrate to SCADA system with necessary accessories. The FO cabling has to be done for all the IED relays in all these 33/11kV substations, by connecting all the required Substation general signals to RTU as given in Annexure. Hybrid WTI & OTI sensors with panel at each PTR in the 33/11kV substation have to be installed, connected to LV Differential relay and commissioned to communicate to RTU. It is the responsibility of the bidder to make SLDSs views, create database, set alarms, configure messages on required alarms, configure to reports and configure RTU data points to the existing SCADA system.

Substations to be integrated to SCADA Control Centre:

All the feeding points have to be taken into FO connectivity in loop in and loop out method to RTU. All the General signal points given in the Table in the Annexure have to be connected to RTU.

The feeding points may not have IED relays available in these substations. Hence, it is required to install a new IED relay, connect to the breaker as per the standards given in Technical specifications, commission and integrate the IED to SCADA control centre by laying and connecting the FO cable to RTU.

The configuration of IED relay protection settings, extraction of ICD files, making CID file, uploading in RTU in compatible file format, and configuring in RTU has to be done by the bidder and the TAP position monitoring and control cables have to be connected to LV relay(Transformer relay).

SECTION – IX

GENERAL TERMS & CONDITIONS OF CONTRACT

GENERAL CONDITIONS OF CONTRACT

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3	Language and Law
4	Superintending Engineers'/ SCADA Decisions
5	Delegation
6	Communications
7	Subcontracting
8	Other Contractors
9	Personnel
10	Employer's & Contractor's Risks
11	Employer's Risks
12	Contractor's Risks
13	Insurance
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15	Queries about the Contract Data
16	Contractor to Construct the Works
17	The Works to be completed by the Intended completion date
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48	Training
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GENERAL CONDITIONS OF CONTRACT

A. GENERAL

Terms, which are defined in the Contract Data, are not defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

1. DEFINITIONS

In this Contract, the following terms will be interpreted as indicated:

a) **"Bill of Quantities"** : Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.

b) **"Compensation of Events"** : Compensation Events are those defined in Clause 40 hereunder.

c) "Operational Go-Live" : The Operational Go-Live is the date of completion of the Works as certified by the Superintending Engineer/SCADA

d) **SCADA System**: Supervisory Control and Data Acquisition system enables to monitor and control the field substation equipment from remote area (control center) through installation of automation equipment (the main scope of this project)..

e) **Inbuilt IEDs** : Inbuilt IEDs : SCADA Compatible relays IED (Intelligent electronic device) relays which support IEC 61850 protocol. This project envisages to integrate those relays to SCADA Control center by connecting them in the substation Fiber optic (FO) loop and configuring the ICD/CID files in the RTU..

f) **"Defects Liability Period"**: The Defects Liability Period shall be in force and effect up to the end of the Contract period for the Agreement Quantity.

g) **"The contractor"** is a person or corporate body whose bid to carry out the works has been accepted by the employer.

h) **"The Contract"** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.3 below.

i) **"The Contract Data"** defines the documents and other information which comprise the bid accepted by the Employer.

j) **"The Contractor's Bid"** is the completed Bidding document submitted by the Contractor to the Employer consisting of a) Technical bid and b) Price bid.

k) **"The Contract Price"** is the price stated in the Letter of Intent and thereafter as adjusted in accordance with the provisions of the Contract.

l) **"Days**" are calendar days; months are calendar months.

m) **A Defect** is any part of the works not completed in accordance with the contract.

n) The Employer is the party who will employ the Contractor to carry out the works. The Employer/ Utility/ Purchaser/ Discom/ TGSPDCL convey the same meaning.

o) **The Superintending Engineer/SCADA** is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Superintending Engineer/SCADA) who is responsible for supervising the Contract, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, and valuing the Compensation Events.

p) Equipment is the Contractor's machinery and vehicles brought temporarily to the Site for undertaking the Works.

q) The Initial Contract Price is the Contract Price listed in the Employer's Letter of Intent.

r) **"The Intended Completion Date"** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Employer by issuing an extension of time.

s) **"Materials"** are all supplies, including consumables, used by the Contractor for incorporation in the Works.

t) **"Plant"** is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

u) The Site is the area defined as such in the Contract Data.

v) **"Site Investigation Reports"** are those which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site.

w) **"Specification"** means the Specification of the Works included in the Contract and any modification or addition made or approved by Chief Engineer (Projects)

x) **The Start Date** is given in the Contract Data and is the date of issue of "Notice to Proceed" to the Contractor. It does not necessarily coincide with any of the Site Possession Dates.

y) **"Temporary Works"** are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

"A Variation" is an instruction given by the Superintending Engineer/SCADA which varies the Works.

"The Works" are what the Contract requires the Contractor to Construct, install, and turn over to the Employer, as defined in the Contract Data.

2. INTERPRETATION

2.1. In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Superintending Engineer/ SCADA will provide instructions clarifying queries about the Conditions of Contract.

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works the Completion Date, and the Intended Completion Date apply to any Section of the works (other than references to the Completion Date and Intended Completion date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement
(2) Letter of Intent, notice to proceed with the works.
(3) Contractor's Bid
(4) Contract Data
(5) Conditions of Contract
(6) Specifications
(7) Bill of quantities and

(8) Any other document listed in the Contract Data as forming part of the Contract.

3. LANGUAGE AND LAW

The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. SUPERINTENDING ENGINEER/ SCADA DECISIONS

Except where otherwise specifically stated, the Superintending Engineer/SCADA will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

5. DELEGATION

The Superintending Engineer/ SCADA may delegate any of his duties and responsibilities to other people except to the Adjudicator after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. COMMUNICATIONS

Communications between parties which are referred to in the conditions are effect only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act.)

7. SUBCONTRACTING

Deleted

8. OTHER CONTRACTORS

The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors. The Contractor shall as referred in the Contract Data, also provide facilities and services for them as described in the Schedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modification.

9. PERSONNEL

The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule of other personnel approved by the Chief General Manager/Projects. The Chief General Manager / Projects will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

If the Superintending Engineer/SCADA asks the Contractor to remove a person who is a member of the Contractor's staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.
The contractor has to provide separate batches of workers and other key personnel for each bid, if he is awarded more than one bid.

10. EMPLOYER'S AND CONTRACTOR'S RISKS

The Employer carries the risks which the Contract states are Employer's risks, and Contractor carries the risks which this Contract states are Contractor's risks.

11. EMPLOYER'S RISKS

The Employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the Employer's country, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive or (b) a cause due solely to the design of the Works, other than the Contractor's design.

12. CONTRACTOR'S RISKS

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. INSURANCE

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

(a) loss of or damage to the Works, Plant and Materials;
(b) loss of or damage to Equipment
(c) loss of or damage of property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
(d) Personal injury or death.

13.2 Policies and certificates for insurances shall be delivered by the Contractor to the Superintending Engineer/SCADA for the Superintending Engineer/SCADA approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred

13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the

Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of insurance shall not be made without the approval of the Superintending Engineer/SCADA.

13.5 Both parties shall comply with any conditions of the insurance policies.

14. SITE INVESTIGATION REPORTS

The Contractor, in preparing the Bid, shall rely on any site Investigation Reports referred to in the Contract Data, supplemented by any information available to the Bidder.

15. QUERIES ABOUT THE CONTRACT DATA

Chief General Manager (Projects) will clarify queries on the Contract Data.

16. CONTRACTOR TO CONSTRUCT THE WORKS

The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.

17. THE WORKS TO BE COMPLETED BY THE INTENDED COMPLETION DATE

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor as updated with the approval of the Superintending Engineer/SCADA, and complete them by the intended completion Date.

18. APPROVAL BY THE CHIEF GENERAL MANAGER/PROJECTS

The Contractor shall submit Specifications, schematics and Drawings showing the proposed Works to Chief General Manager (Projects), who is to approve them if they comply with the Specifications and Drawings.

19. SAFETY

The Contractor shall be responsible for the safety of all activities on the Site.

20. DISCOVERIES

Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Superintending Engineer/SCADA of such discoveries and carry out the Superintending Engineer/SCADA instructions for dealing with them.

21. POSSESSION OF THE SITE

21.1 The Employer shall give possession of all parts of the Site to the Contractor, if possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be compensation Event.

21.2 As per the contract data, the site possession dates shall be within a month after entering into the agreement.
If the site handing over is delayed by the Superintending Engineer/SCADA, the intended completion date shall be extended by the period of delay.

22. ACCESS TO THE SITE

The Contract shall allow the Superintending Engineer/SCADA and any person authorized by the Superintending Engineer/SCADA access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured/fabricated/assembled for the works.

23. INSTRUCTIONS

23.1 The Contractor shall carryout all instructions of the Superintending Engineer/SCADA which comply with the applicable laws where the Site is located.

23.2 The Contractor shall permit employer or his representative to inspect the Contractor's accounts and records relating to the performance of the Contractor.

24. DISPUTES

24.1 If the Contractor believes that a decision taken by the Superintending Engineer/SCADA was either outside the authority given to the Superintending Engineer/SCADA by the Contract or that the decision was wrongly taken, the decision shall be referred to the Arbitrator within 30 days of the notification of the Superintending Engineer/SCADA decision.

24.2 SETTLEMENT OF DISPUTES

If any dispute or difference of any kind whatsoever will arise between the Purchaser and the Supplier in connection with or arising out of the Contract, the parties will make every effort to resolve amicably such dispute or difference by mutual consultation.
If, after thirty (30) days the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.
Any dispute of difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause will be finally settled by

arbitration. Arbitration may be commenced prior to or after delivery of the Materials / equipment under the Contract.

Arbitration proceedings will be conducted in accordance with the following rules of procedure. The dispute resolution mechanism will be as follows:

24.1 In the case of a dispute or difference arising between the Purchaser and a Supplier relating to any matter arising out of or connected with this agreement, such dispute or difference will be settled in accordance with the Arbitration and Conciliation Act. 1996. The Arbitral Tribunal will consist of three Arbitrators one each to be appointed by the Purchaser and the supplier the Third Arbitrator will be chosen by the two Arbitrators so appointed by the parties and will acts as Presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within period of 30 days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator will be appointed by The Institution of Engineers (India).

24.2 If one of the Parties fails to appoint its Arbitrator in pursuance of Sub-Clause (a) within 30 days after receipt of the notice of the appointment of its Arbitrator by The Institution of Engineers (India), will appoint the Arbitrator. A certified copy of the order of the Institution of Engineers (India), making such an appointment will be furnished to each to the parties.

24.3 Arbitration Proceedings will be held at Purchaser's Headquarters, and the language of the Arbitration Proceedings and that of all documents and communication between the parties will be English.

24.4 The decision of the majority of Arbitrators will be final and binding upon both parties. The cost and expenses of Arbitration Proceedings will be paid as determined by the Arbitral Tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc., of its proceedings as also the fees and expenses paid to the Arbitrator appointed by such party or on its behalf will be borne by each party itself.

24.5 Where the value of the Contract is Rs. One Crore and below, the disputes or differences arising will be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority namely The Institution of Engineers (India).

Notwithstanding any reference to arbitration herein,

(a) The parties will continue to perform their respective obligations under the Contract unless they otherwise agree; and

(b) The Purchaser will pay the Supplier any monies due the Supplier.

The arbitration if any in the disputes arising out of bidding process or in the execution of the contract, payments, penalties etc. shall be conducted in accordance with the arbitration procedure as laid down in Indian arbitration and conciliation Act. 1996. All disputes are subject to courts situated at HYDERABAD only.

B. TIME CONTROL

25. PROGRAM

25.1 Within the time stated in the Contract Data the Contractor shall submit to the Superintending Engineer/SCADA for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works along with monthly cash flow forecast.

25.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

25.3 The Contractor shall submit to the Chief Engineer/Projects, for approval, an updated Program at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Program within the period, the Chief General Manager/Projects may with hold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.

25.4 The 'Chief Engineer /Projects' approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Chief Engineer /Projects again at any time. A revised Program is to show the effect of variations and Compensations Events.

26. EXTENSION OF THE INTENDED COMPLETION DATE

26.1 The Employer shall extend the Intended Completion Date if a Compensation Event occurs or a variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.

26.2 The Chief Engineer /Projects shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Chief Engineer/Projects for a decision upon the effect of a Compensation Event or variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new intended completion Date.

27. DELAYS ORDERED BY THE CHIEF ENGINEER/PROJECTS

The Chief Engineer /Projects may instruct the Contractor to delay the start or progress of any activity within the Works.

28. MANAGEMENT MEETINGS

28.1 Progress meetings shall be scheduled by the Utility and attended by the successful bidder each reporting period to review progress of the project. Progress meetings shall be used to review the progress report, written correspondence exchanged since the last meeting, and open action items. The review meeting will also be used to discuss upcoming milestones during the contract period, support needed from the Utility, risk identified by the Program team, risk mitigation strategies and to make decisions for path forward.

28.2 The successful bidder shall also attend technical meetings as and when required by the Utility to discuss technical aspects of the project and to review Utility comments on documents. When appropriate, these technical meetings shall be conducted as extensions to the progress meetings.

29. EARLY WARNING

29.1 The Contractor is to warn the Chief Engineer /Projects at the earliest opportunity of specific likely future events of circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of works. The Chief Engineer /Projects may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate is to be provided by the Contractor as soon as reasonably possible.

29.2 The Contractor shall cooperate with the Chief Engineer /Projects in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Chief Engineer /Projects.

C. QUALITY CONTROL

30. IDENTIFYING DEFECTS

The Superintending Engineer/SCADA shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Superintending Engineer/SCADA may instruct the Contractor to search for a Defect and to uncover and test any work that the Superintending Engineer/SCADA considers may have a Defect.

31. TESTS

If the Superintending Engineer/SCADA instructs the Contractor to carryout a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be Compensation Event.

32. CORRECTION OF DEFECTS

32.1 The Superintending Engineer/SCADA shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

32.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Superintending Engineer/ SCADA notice.

33. UNCORRECTED DEFECTS

If the Contractor has not corrected a Defect within the time specified in the Superintending Engineer/SCADA notice, the Superintending Engineer/SCADA will assess the cost of having the Defect corrected, and the Contractor will pay this amount and it will be recovered from his future bills.

D. COST CONTROL

34. BILL OF QUANTITIES

34.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

34.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities.

35 CHANGES IN THE QUANTITIES

35.1 If the final quantity of the work done differs from the quantity in the Part-II for the particular item by more than 25 percent provided the change not exceeds 1% of initial Contract Price, the Engineer shall adjust the rate to allow for the change.

35.2 The Engineer shall not adjust rates from changes in quantities if thereby the initial Contract Price is exceeded by more than 15 percent, except with the Prior approval of the Employer.

35.3 If requested by the Engineer, the Contractor shall provide to the Engineer with a detailed cost breakdown on any rate in the Bill of Quantities.

36. VARIATIONS

All variations shall be included in updated Programs produced by the Contractor.

37. PAYMENT FOR VARIATIONS

No price variation will be allowed. The new services which are going to be released during the contract period shall also be taken up by the vendor as per the rates agreed upon mutual consent based on prevailing market rate with the ceiling as per the agreement rate.

38. CASH FLOW FORECASTS

When the Program is updated, the Contractor is to provide the Superintending Engineer/SCADA with an updated cash flow forecast.

39. PAYMENT CERTIFICATES

39.1 The Contractor shall submit to the Superintending Engineer/SCADA monthly statements of the estimated value of work completed less the cumulative amount certified previously.

39.2 The Superintending Engineer/SCADA shall check the Contractor's monthly statement within 14 days and certify the amount to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amounts.

39.3 The value of work executed shall be determined by the Superintending Engineer/ SCADA.

39.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

39.5 The value of work executed shall include the valuation of Variations and Compensation Events.

39.6 The Superintending Engineer/SCADA may exclude any item certified in previous certificates or reduce the proportion of any item previously certified in any certificate in the light of later information.

40. PAYMENTS

40.1 The payment shall be made in Indian Rupees (INR) only.

40.2 If the supplier has received any over payments by mistake or if any amounts are due to the TGSPDCL due to any other reason, when it is not possible to recover such amounts under the contract resulting out of this specification, the TGSPDCL reserves the right to collect the same from any other amount and / or Bank Guarantees given by the company due to or with the TGSPDCL.

40.3 The supplier shall provide the GIS coordinates of installed major equipment such as RTU, IED, TMU, Auxiliary power supply etc after installation for release of related milestone payment.

40.4 Payments shall be adjusted for deductions for any applicable liquidated damages and/or penalty due to noncompliance of SLAs by the supplier, advance payments, retention, and other recoveries in terms of the contract and deduction at source of taxes as applicable under the law.

41. Facility Management Services (FMS)/Annual Maintenance (AMC)

41.1 The contractor must maintain adequate spare parts (around 5-10%) for all the equipment during FMS/AMC period.

(a) The contractor shall be required to provide the services through Facility Management Service provider so as to manage SCADA system including all equipments, installations including hardware, software & networks installed & commissioned by contractor for the utility in order that they meet the availability requirement as specified in the document.

(b) To achieve the desired Service Levels, the Contractor may need to interact, Coordinate and collaborate with the other Service Providers as required. The Contractor will act as the Single Point of Contract for all issues relating to the Service Levels. The Contractor will have the responsibility to deal with the other vendors (during warranty period)/other vendors as selected by utility (after warranty period) as the case may be, to provide the services at agreed service levels. However, the prime responsibility of providing desired services shall be that of lead contractor during warranty period. The role of FMS contractor shall immediately after systems are installed, commissioned and handed over to the owner after operational acceptance of the SCADA System.

(c) The Scope of work shall include the software and hardware maintenance support to be provided by the Contractor in respect of the system supplied under this project during five year Facility Management Service (FMS) period along with Supervision & Operational wing five year warranty of the SCADA system after the Acceptance of the SCADA system.

d) The maintenance of the SCADA System under FMS period shall be comprehensive, as set forth herein, in nature and would broadly include but not be limited to diagnosis and rectification of the hardware and software failures.

e) Routing works like database building, addition of analog and status points and other such day-to-day operational activity would primarily be the responsibility of Utility and in case of any difficulty in this regard the same shall be referred to the contractor for support.

41.2 The Contractor's on–site support standard hours of service the timings for Emergency Software Support Would be 24 hours a day, 7 days a week through out the year (i.e 24x365). At least three Engineers including Site Manager along with one on–site support personnel for Hardware and one on –site personnel for Software shall be deployed at each control center. The support personnel so deployed shall be qualified personnel having experience in the delivered SCADA system. The contractor shall submit the CV's of all such personnel to Utility for approval before deployment at site. The Contractor shall be responsible for 24*7*365 management of all the systems as per scope of work with services rendered at least as per Service Level Agreement between utility & contractor.

42. TAX

Goods and services tax (GST) as applicable

43. CURRENCIES

All payments shall be made in Indian Rupees

44. RETENTION

44.1 The Employer shall retain 6% from each payment made to the Contractor until Completion of the whole of the Works subject to a maximum of 5% of contract value.

44.2 On Completion of the whole of the Works half the total amount retained is repaid to the Contractor and half when the Defects Liability Period has passed and the Superintending Engineer/SCADA has certified that all Defects notified by the Superintending Engineer/SCADA to the Contractor before the end of this period have been corrected.

44.3 On completion of the whole works, the contractor may substitute retention money with an "on demand" Bank guarantee.

45. LIQUIDATED DAMAGES:

For the works executed beyond the Intended completion schedule, penalty shall be levied for an amount of equivalent to **½ %**of the value of the works not completed within the prescribed time limit for every week of delay or part thereof subject to a maximum of 5% of cost of the undelivered/unexecuted portion within scheduled time. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.

46. SECURITIES

The Performance Security (including additional security for unbalanced bids) shall be provided to the Employer not later than the date specified in the Letter of Intent and shall be issued in an amount form and by a bank or surety acceptable to the Employer, and denominated in Indian Rupees.

47. COST OF REPAIRS

Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. FINISHING THE CONTRACT

48. COMPLETION

48.1 Physical works of installation, testing, commissioning and communication to Control center should be completed within three (06) months from the date of issue of Letter of Intent/Award.

48.2 The Contractor shall request the Superintending Engineer/SCADA to issue a Certificate of Completion of the Works and the Superintending Engineer/ SCADA will do so upon deciding that the work is completed.

49. Training to TGSPDCL Employees

a. Training should cover overview of fundamentals like RTU and IEDs hardware components, processor, I/O modules. Software applications operating system and firmware up gradations.

b. RTU and IEDs configurations and Programming, configuration tools practical exercises and simulations working with RTUs and IED devices and software. Resolving common issues and performing routine maintenance works of RTU and IEDs.

50. FINAL ACCOUNT

The Contractor shall supply to the Superintending Engineer/SCADA a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Superintending Engineer/SCADA shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Superintending Engineer/SCADA shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Superintending Engineer/SCADA shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the contractor's revised account.

51. PROGRAMMING AND MAINTENANCE MANUALS:

51.1 The Contractor shall supply the above by the dates stated in this document.

51.2 If the Contractor does not supply manuals by the dates stated in the Contract Data, or they do not receive the Superintending Engineer/SCADA approval, the Superintending Engineer/SCADA shall withhold the amount stated in the Contract Data from payments due to the Contractor.

Incidental Services

The Supplier may be required to provide any or all of the following services, including additional services, if any.

f) Performance or supervision of on-site assembly and/or start-up of the supplied Materials / equipment;
g) Furnishing of tools required for assembly and/or maintenance of the supplied Materials / equipment;
h) Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Materials / equipment;
i) Performance or supervision or maintenance and/or repair of the supplied Materials/ equipment, during warranty period, provided that this service will not relieve the Supplier of any warranty obligations under this contract; and

52. TERMINATION

52.1 The Employer or the Contractor may terminate the contract if the other party causes a fundamental breach of the Contract.

52.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) The Contractor stops work for 14 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Superintending Engineer/SCADA.

(b) The Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation.

(c) The Superintending Engineer/SCADA gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Superintending Engineer/SCADA.

(a) The contractor does not maintain a security which is required.

(b) The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and

(c) If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in the executing the Contract.

For the purpose of this paragraph: "Corrupt practice" means the offering, giving receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition".

52.3 When either party to the Contract gives notices of a breach of contract to the Superintending Engineer/SCADA for a cause other than those listed under Sub Clause above, the Superintending Engineer/SCADA shall decide whether the breach is fundamental or not.

52.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

52.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and leave the Site as soon as reasonably possible.

52.6 If there is any delay by the contractor in executing any item of works in the agreement as observed by the Superintending Engineer/SCADA or his representative , the Employer may at his discretion get such item of works executed through L2 (second lowest contractor or any other contractor who is willing to take up the works) so as to adhere to the targets / milestones fixed for the progress and to achieve the targets in time and the expenditure so incurred by the department will be deducted from the contractor's bills / deposits besides levying penalty for the non-fulfillment of the contractual terms and conditions as per the terms and conditions of the agreement.

52.7 If the contractor is terminated due to delay in execution of works and as per clause 53.2, the execution of balance works will be entrusted to the next lowest bidder or any other contractor who is willing to take up the works and the extra financial commitment to the employer due to termination of contract and executing the works with another agency will be recovered from the contractor besides levying penalty for non-fulfillment of the terms and conditions of the agreement.

53. PAYMENT UPON TERMINATION

53.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Superintending Engineer/SCADA shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the differences shall be a debt payable to the Employer.

53.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Superintending Engineer/SCADA shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received upto the date of the Certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

54. PROPERTY

All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor's default.

55. RELEASE FROM PERFORMANCE

If the Contract is frustrated by the outbreak of war or by another event entirely outside the control of either the Employer or the Contractor the Superintending Engineer/SCADA shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

56. SUSPENSION OF LOAN OR CREDIT BY GOVT. OF INDIA.

In the event that the funding agencies' suspend the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made.

(a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the funding agencies' suspension notice.

57. FORCE MAJEURE

The Supplier will not be liable for forfeiture of its performance security, penalty for late delivery, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contact is the result of an event of Force Majeure.

For purposes of this clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not restricted to, wars or revolutions fires, floods, epidemics, quarantine restrictions, and freight embargoes.

If a Force Majeure situation arises, the supplier will promptly notify the Employer in writing of such condition and the cause thereof. Unless otherwise directed by the Employer in writing, the Successful Bidder will continue to perform its obligations under the Contract as far as is reasonably practice, and will seek all reasonable alternative means for performance not prevented by the Force Majeure event.

58. TRAINING SCHEDULE

As part of the project implementation plan, the successful Bidder shall draw up a training schedule in consultation with the Utility. This will enable the Utility representatives gain knowledge and understanding of the activities during the project implementation, so that they may discharge effective oversight and witness capabilities.

59. EXIT MANAGEMENT

Upon Termination of the Contract or expiry of the contract period, the successful bidder shall prepare and present a detailed Exit Management Plan with in5 (five) working days to the Utility.

After the Contract Period or Upon Termination of the Contract, the ownership, rights and title of the installed SCADA system and other equipment (if any) installed by the Bidder for operation of the SCADA system pursuant to this Contract shall be transferred to the Utility without any cost.

The bidder shall transfer the ownership of the entire system including all the hardware, software along with its valid licenses, and any data collected during the Project to the Utility at the end of the Contract Period to facilitate seamless operation of Utility businesses.

The Exit Management Plan should cover at least the following:

a) Execute all documents that may be necessary to effectively transfer the ownership and title, including OEM warranties in respect of all equipment;
b) Handover all developed codes, related documentation and other Configurable Items, if any in his possession;
c) Handover the list of all IT Assets, passwords at all locations to Utility.
d) Handover of ICD/CID files to utility

The exit management shall be done in such a manner that operations should continue without any restriction on access/usage of any kind of functionality. At the end of the Contract period, successful bidder shall provide necessary handholding and transition support to the Utility or its agency for maintaining the system post the Contract with the Bidder. This includes (but not limited to):

a) Conducting training sessions;

b) Knowledge Transfer;

Any other activity, over and above these, as may be deemed necessary to meet the service levels and requirements specified in the tender document.

SPECIAL CONDITIONS OF CONTRACT

S. NO.	ITEM
1.	DESCRIPTION
1.1A	RESPONSIBILITY FOR EXECUTION OF THE CONTRACT
1.1B	NOTICES
2.	WORKING HOURS
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4.	ACCIDENTS
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9.	SAFETY PRECAUTIONS
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11.	WORKING AREA AND CLEANLINESS
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14.	APPROVAL OF INSTALLATION BY GOVERNMENT AUTHORITIES (CEIG)
15.	MEASUREMENT OR WORK
16.	INCOME TAX
17.	TERMINATION OF CONTRACT FOR BOARDS CONVENIENCE
18.	LABOUR
19.	COMPLIANCE WITH LABOUR REGULATIONS
20.	ARBITRATION
21.	RESPONSIBILITY FOR EXECUTION OF THE CONTRACT

SPECIAL CONDITIONS OF CONTRACT

1. DESCRIPTION

The Contractor shall, at all times during the continuance of the contract, comply full with all existing Acts, regulations and byelaws including all statutory amendments and reenactments of State or Central Government and other local authorities and any other enactments, notifications and acts that may be passed in future either by the State or the Central Government or local authority, including Indian workmen's Compensation Act, 1923. Contract Labour (Regulation and Abolition) Act 1970, the Child Labour Prohibition and Regulation Act, 1986 an Equal Remuneration Act 1976, Factories Act, Minimum Wages Act 1948, Provident Fund Regulations, Employees Provident Fund Act 1952 EPF Act 1996 and related acts passed from time to time. Schemes made under the Same Act the Buildings and other construction workers (Regulation of Employment and condition of service) Act 1996, the Cess Act 1996 and also applicable Labour Regulations, Health and Sanitary Arrangement for Workmen, Insurance and other benefits and shall keep TGSPDCL indemnified in case any action is commenced by Competent authorities for contravention by the Contractor.

If the TGSPDCL is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provision stipulated above on the part of the Contractor, the Superintending Engineer/SCADA shall have the right to deduct from any amounts due to the Contractor, his amount of Performance Security or recover from the Contractor personally any sum required or estimated to be required for making good the loss or damage suffered by the TGSPDCL, responsibility in connection with the employees of the contractor, who shall, in no case, be treated as the employee of the TGSPDCL at any point of time.

1.1A RESPONSIBILITY FOR EXECUTION OF THE CONTRACT

The Contractor shall carry out the entire work according to sound Engineering practices. The responsibility lies with the Contractor for the proper execution of the erection work according to existing laws and byelaws at the time of contract execution. The Contractor shall confirm in all respects to the requirements of CEIG (Chief Electrical Inspector to Government of Telangana) as and when required by them. However, the Contractor shall have to follow the instructions of the TGSPDCL or his authorized representative in respect of the following:

1.1 Progress report to be submitted from time to time

1.1.1 Progress and completion of the work according to the time schedule

1.1.2 Execution of contract work to the TGSPDCL entire satisfaction

1.1.3 Submitting the details regarding the name of the responsible persons for execution of this contract.

1.1.4 Preparing, submission and getting approval of the complete electrical system of the power plant including the switchyard, from the CEIG will be contractor's responsibility.

1.1B NOTICES:

All Certificates, notices or written orders to be given by the TGSPDCL to the Contractor under the terms of the contract shall be served by sending by post or delivering the same to the Contractor's principal place of business, or such other address as the
Contractor shall nominate for this purpose.
All notices to be given to the TGSPDCL under the terms of the Contract shall be served by sending by post or delivering the same to the respective addressee nominated for that purpose.
The TGSPDCL's address is
Chief Engineer (Projects),
TGSPDCL, 4th Floor, Corporate office,
Mint Compound, Hyderabad

2. WORKING HOURS

Before commencement of work, the contractor shall inform in writing, the normal working hours for his staff and workers. These hours shall be as far as possible in consonance with the TGSPDCL's working hours for better coordination.
All the staff and workers should positively leave the site premises after these hours, except for authorized watch and ward personnel, approved by the TGSPDCL.

3. EXTRA SHIFTS & OVERTIME WORK

At the commencement of work, the Contractor shall arrange for a general shift, as per working hours.
If, at a later date the TGSPDCL feels that extra shifts should be started to complete the work allotted to the Contractor within the time stipulated or to make up for any past delays, the contractor shall arrange for.

4. ACCIDENTS

The TGSPDCL will not be responsible for any damages or compensation payable in consequence of an accident or injuries to any of the Contractor's personnel or any third party.
The Contractor shall insure at his cost-against any such eventually as per rules in force and submit the documentary evidence of the Insurance Policy taken, positively prior to commencement of work at site and should keep policy valid by paying premium and other charges till handing over of the plant.
In case of any accidents at or near the site in connection with the execution of work, the contractor shall within 24 hours, make a detailed report of the accident and submit the same to the purchaser in the form provided by the purchaser. The contractor shall also report such accidents to the competent authority as laid down by the existing rules and regulations and inform the TGSPDCL regarding the same.

5. INSURANCE

Insurance coverage for all items shall be at the risk of the contractor.

5.1 INDEMNITIES

The contractor is liable for and indemnifies the TGSPDCL against losses, expenses and claims for loss or damage to physical property, personal injury and death caused by his own acts or omissions.

The contractor claiming indemnity is to take all reasonable steps to mitigate the lower damage will occur.

The contractor indemnifies the TGSPDCL against claims to damages caused by the movement of his equipment or temporary works.

The Contractor shall submit an "Indemnity Bond" to the TGSPDCL incorporating the above points before taking up the execution of the work.

6. LICENSE

The contractor shall have valid contractor's license from Electrical Inspector of Telangana State, and he shall maintain its validity for the complete duration of the contract.

7. TRANSPORT ARRANGEMENT

The contractor shall make the transport arrangement at his cost for his staff and workers to site.

8. MACHINERY, TOOLS & TACKLES

The Contractor shall provide the required equipment, accessories, necessary tools and tackles, instruments, and all the normal consumable materials required for the satisfactory execution of this contract. The Contractor shall arrange for cranes for unloading and erection purpose, if required.

Gate Pass for Materials:

All tools, tackles, construction materials, welding materials etc. will be taken inside the site limits only after registration with security personnel. Also any material will be taken out only on valid gate pass issued by purchaser's representative after checking the proper "IN" gate passes. The contractor shall have to preserve the "IN" gate passes obtained from security when every /any material is route inside the site to enable taking back the balance/excess materials, Tools and Tackles after completion of works.

9. SAFETY PRECAUTIONS

All the safety measures to avoid accidents shall be followed strictly in accordance with the safety rules and regulation laid down by the government authorities. The Contractor shall take all safety precautions and shall provide proper scaffolding, lifebelts, ladder, shock proof helmets, etc. to avoid accidents and to ensure safety, of not only his personnel but also the safety of the staff and workers of other contractors working at the same site.

The contractor shall take necessary precautions to ensure that no part of the building/structure damage or disfigured due to negligence on his part while carrying out

the work. In case of excess damage, the same shall be made good by the contractor immediately at his own cost. Recommissioning on energized equipment shall be carried out with proper safety permits issued by the Purchaser/Competent authorities. When required to work at heights or at hazardous location areas, the contractor shall carry out the same with utmost care and all safety precautions.

10. FIRE PRECAUTIONS

The contractor shall strictly instruct his site staff and workers to abide by the regulations in force at the site regarding all precautions to be taken to avoid fire hazards.

11. WORKING AREA & CLEANLINESS

The Contractor shall keep the site of work in a clean and sanitary condition. After the completion of the entire work, the contractor shall arrange to remove all the temporary structures, surplus materials, dirt, debris etc. from the site and the same should be transported to the District stores or any outside location as instructed by the Superintending Engineer/SCADA and finished work shall be handed over to the TGSPDCL in a clean and complete shape.

12. SITE DISCIPLINE

Strict discipline shall be observed by all contractors' personnel inside the premises of the site. The contractor and his personnel shall abide by all the rules and regulations of the TGSPDCL, Disciplinary action shall be taken against the Contractor/his personnel and their services liable to be terminated, if found quarreling violating the rules.

13. SITE OFFICE & STORES

The contractor will make necessary arrangements for erection of his site office and site stores after getting written permission from the TGSPDCL to erect such temporary structure at his own cost. Temporary metered power supply will be provided at one point on chargeable basis at the nearest switch room and further cabling upto the contractor's office or work is included in the Contractor's scope. Every meter of adequate rating and associate equipment for construction power distribution is in the Contractor's scope. The Contractor shall indicate construction power requirement in the Offer. The power consumption charges will have to be borne by the Contractor. However the non availability of the Crane does not leave the contractor off his responsibilities. The contractor is permitted to make use of water source available in any sub-station sites for construction purpose. Transport of water from the source to the working areas will be contractor's responsibility and to the account of the contractor only.

14. APPROVAL OF INSTALLATION BY GOVERNMENT AUTHORITIES (CEIG)

Whenever approval of government authorities is required, as per existing rules and regulations, the Contractor shall obtain the same.

15. MEASUREMENT

The Superintending Engineer/SCADA shall, except as otherwise stated ascertain and arrange to determine by measurement the value in terms of the contract of work done in accordance with the contract. He shall, when required any part or parts of the works to be measured, give notice to the contractor's authority agent or representative, who shall forth with attend or send a qualified agent to assist or the representative of the Superintending Engineer/ SCADA in making such measurement, and shall furnish all particulars required by either of them. Should the contractor not attend or neglect or omit to send such agent, then the measurement made by the representative of the Superintending Engineer shall be taken to be the correct measurement of the work.
The contractor shall submit his bills for work accomplished and to get the quantities measured by the representative of the Superintending Engineer/ SCADA.

16. INCOME TAX

Deductions will be made towards Income Tax at source by the TGSPDCL as directed by Income Tax Department. The Contractor's staff, personnel and labour will be liable to pay personnel income taxes in India in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

17. TERMINATION OF CONTRACT FOR TGSPDCL CONVENIENCE

The TGSPDCL shall be entitled to terminate this contract any time for the TGSPDCL convenience after giving 30 days prior notice to the contractor with a copy to the Superintending Engineer/SCADA.

18. LABOUR

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements, for the engagements of all staff and labour, local, or other, and for their payment, housing, feeding and transport.
The Contractor shall, if required by the Superintending Engineer/SCADA, deliver a return in detail, in such form and at such intervals as the Superintending Engineer/SCADA may prescribe showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Contractor's Equipment as the Superintending Engineer/SCADA may require.

19. COMPLIANCE WITH LABOUR REGULATIONS

During continuance of the Contract, the Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, byelaws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that

are applicable to construction industry are given below. The Contractor shall keep the TGSPDCL indemnified in case any action is taken against the TGSPDCL by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the TGSPDCL is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/ bye laws/ Acts/ Rules/ regulations including amendments, if any, on the part of the Contractor, the Superintending Engineer/ SCADA shall have the right to deduct any money due to the contractor including his amount of performance security. The Superintending Engineer/ SCADA shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the TGSPDCL.
The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the TGSPDCL at any point of time.
Salient features of some major labour laws applicable to establishments engaged in building and other construction work.

a) **Workmen Compensation Act 1923**: - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

b) **Payment of Gratuity Act 1972**: - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishment employing 10 or more employees.

c) **Employees P.F. and Miscellaneous Provision Act 1952**: - The Act provides for monthly contributions by the TGSPDCL plus workers (as applicable). The benefits payable under the Act are:
   i. Pension or family pension on retirement or death, as the case may be.
   ii. Deposit linked insurance on the death in harness of the worker.
   iii. Payment of P.F. accumulation on retirement/death etc.

d) **Maternity Benefit Act 1951**: - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

e) **Contract labour (Regulation & Abolition) Act 1970**: - The Act provides for certain welfare measures to be provided by the contractor to the Contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal TGSPDCL by Law. The Principal TGSPDCL is required to take Certificate of Registration and the Contractor is required to take license from the designated officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.

f) **Minimum Wages Act 1948**: - The TGSPDCL is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.

g) **Payment of Wages Act 1936**: - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

h) **Equal Remuneration Act 1979**: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.

i) **Payment of Bonus Act 1965**: - The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employee drawing Rs.3500/- per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above upto Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

j) **Industrial Disputes Act 1947**: - The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations or lock-out becomes illegal and what are the requirements of laying off or retrenching the employees or closing down the establishments.

k) **Industrial Employment (Standing Orders) Act 1946**: - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.

l) **Trade Unions Act 1926**: - The Act lays down the procedure for registration of trade unions of workmen and employees. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

m) **Child Labour (Prohibition & Regulation) Act 1986**: - The Act prohibits employment of children below 14 of age in certain occupations and process and provides for regulations of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

n) **Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979**: - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.

o) **The Building and Other Construction worker (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996**: - All the establishment who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

p) **Factories Act 1948**: - The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities.

It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

20. ARBITRATION

The procedure for arbitration will be as laid down in Indian Arbitration and conciliation act 1996. All disputes are subjected to courts situated at **HYDERABAD** only.

21. RESPONSIBILITY FOR EXECUTION OF THE CONTRACT

The contractor shall carryout the entire work according to best Engineering practices. The responsibility lies with the contractor for proper execution of work according to existing laws and bylaws. The contractor shall have to follow the instructions of the TGSPDCL or Engineer – In – Charge. The contractor shall furnish the following details.

a) Progress reports shall be furnished weekly.
b) The details of project manager and site supervisors.
c) Approval test certificates before dispatch the material to site.
d) Operating manuals and operating instructions shall be furnished**.**