Press Note

NAYA RAIPUR DEVELOPMENT AUTHORITY

Near Mahanadi Dwar, Old Mantralaya, Raipur-492001,Chhattisgarh
Ph:0771-4066011 Fax:0771-4066188, Website: www.nayaraipur.com

Tender Notice

NIT no. 37 /ST-LED-II/ELECT/CE(E)/NRDA/2013-14, **Raipur, Dated: 19 .07.2013**

Sealed tenders are invited from manufacturers or their authorized dealer or eligible registered Electrical Contractors with Central/State Govt/PSUs/Local bodies in appropriate class having Class "A" Electrical License and who fulfill the Pre-Qualification criteria, for the work of **"Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur".**

Estimated Cost (Rs in Lacs)	EMD (Rs in Lacs)	Cost of Tender Document (Rs)	Time Period	Date of submission	Date of opening
1563.35	15.64	10,000.00	08 Months	**14.08.2013,** upto **15.00** hrs	**14.08.2013,** After **16.00** hrs

Pre -Qualification Criteria

1. The intending tenderer's average annual turnover during last three (3) years ending 31st March (i.e 20010-11, 2011-2012 & 2012-13) should be equal to INR 1563.35 Lacs or more.
2. Should have completed satisfactorily similar work during last 7 years i.e. after 30/06/2006 as below: -
   At least one work of similar nature costing not less than 1250.00 Lacs or two works of similar nature costing not less than 780.00 Lacs . For this purpose, "cost of work" shall mean gross value of the completed work including the cost of materials supplied by the Employer /Client, but excluding those supplied free of cost. Similar work shall means the work of supply & erection of street lighting including its HV/LV distribution system, executed in single work in a Govt(Central/State) or PSUs or Local body.

Tenders can be downloaded from the website www.nayaraipur.com **from 20.07 .2013. Amendment in tender, if any, will only be uploaded on the website and shall not be published in any newspaper.**

Credible Chhattisgarh

Chief Executive Officer

NAYA RAIPUR DEVELOPMENT AUTHORITY (NRDA) RAIPUR, CHHATTISGARH

DETAILED NIT

NIT No.: 37/ST-LED-II/ELECT/CE(E)/NRDA/2013-14, Raipur, Dated: 19.07.2013

Last date and time for submission of tenders: 1500 hrs on 14.08.2013

1. Item Rate Tenders are invited in the prescribed tender documents by the Chief Executive Officer, Naya Raipur Development Authority (NRDA), Raipur Chhattisgarh from Sealed tenders are invited **manufacturers or their authorized dealer or eligible registered Electrical Contractors with Central/State Govt/PSUs/Local bodies in appropriate class having Class "A" Electrical License** and fulfill the Pre-Qualification criteria, for the work of, who fulfill the Pre-Qualification criteria. The detailed NIT is as under:-

Name of work	**Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur**
Estimated Cost (INR in Lacs)	**1563.35**
EMD (INR in Lacs)	**15.64**
Time allowed including rainy season	**08 months**
Cost of Tender (In INR)	**10,000.00**
Start Date of Tender download	**20.07.2013**
Last Date of download Tender	**13.08.2013**
Last Date and time of submission of Tender	**14.08.2013 & 15.00Hrs**
Date and time of opening of Tender	**14.08.2013 & 16.00Hrs**
Date of Mockup	**20.08.2013**

2. **Pre Qualification Criteria** -To be eligible under the contract, the intending tenderer should meet the mandatory criteria mentioned in **3.1 and 3.2 below:-**

3. **Tender Criteria**

3.1 Financial Criteria

Average Annual Turnover: The intending tenderer's average annual turnover during last three (3) years ending 31st March (i.e 20010-11, 2011-2012 & 2012-13) should be equal to INR 1563.35 Lacs or more. Annual turnover is total certified payments received for contracts in progress and completed during the financial year.

For above, the Tenderer has to submit audited balance sheets of their financial turn over/ accounts along with profit and loss acount for the last three(3) years, duly certified by the Chartered Accountant. Where necessary, the Authority can make enquiries with the Tenderer's Bankers.

3.2 Technical Criteria

i. **Particular Experience** The Tenderer shall provide documentary evidence that it has successfully/satisfactorily completed (without levy of liquidated damages):

At least one work of similar nature costing not less than 1250.00 Lacs or two works of similar nature costing not less than 780.00 Lacs in last Seven years. For this purpose, "cost of work" shall mean gross value of the completed work including the cost of materials supplied by the Employer /Client, but excluding those supplied free of cost. Similar work shall means the work of supply & erection of street lighting including its HV/LV distribution system, executed in single work in a Govt(Central/State) or PSUs or Local body.

For these, the certificate of satisfactory completion from Employer shall be submitted along with the application incorporating clearly the name of Contractor, name of the work, Contract value, billing amount, date of commencement of works, scheduled date of completion, actual date of completion, satisfactory performance of the Contractor, Quality of works executed (Very Good/Good/Fair/Poor), Time overrun if any (whether with or without levy of compensation or levy of compensation).

The works may have been executed by the Applicant as prime contractor or as member of joint venture or as authorised sub-contractor. In case a project has been executed as Joint Venture by two or more firms, weightage towards experience in the project would be given to JV partners in proportion to their participation in the Joint Venture. The copy of the document stating that the tenderer is an authorised sub-contractor of the work shall also be submitted.

In case the similar work, as described above, is only a part of a composite/bigger project, the certificate from Employer should also indicate the cost of similar work out of the total project cost of composite/bigger project.

ii. **Electrical License**

The Tenderer should have Electrical license to work in Chhattisgarh, if the same is not available with the vendor the same shall be obtained within 15 days of issue of LoA. In case intending tenderer is not aving the electrical class A license, he shall give an undertaking in the prescribed formate for the same.

Note: -

a) *For the purpose* ***value of executed works and annual turnover shall be brought to current costing level by enhancing the actual value of work/annual turnover at the rate of 10% per annum (compounded annually), calculated from the date of completion to last date of receipt of applications for tenders.***

b) Ongoing project / part project experience shall not be considered for evaluation.

c) For the benefit of the intending tenderer's a checklist is enclosed at Schedule-D (vi), for the documents to be submitted along with tender.

4. **Certificates:**

a) All tenderers should submit the valid registration certificate. Commercial tax certificate, balance sheet with profit and loss statement, duly certified by Chartered Accountant.

b) The tenderers shall also submit satisfactory completion certificates in support of each quoted experience along with work order. The satisfactory completion certificate should be signed by an officer not below the rank of Executive Engineer concerned in case of Government **department or officer not below the rank of General Manager in case of public/ private sector** as the case may be.

c) All the documents to be submitted shall be duly notarized.

5. The tender document for the above work is available on NRDA's **websites: www.nayaraipur.com and www.cg.gov.in** Tenderer will have to download the tender document, and shall submit the tender along with the tender cost as mentioned in the Para 1 above. For tender cost, DD drawn in favor of "**CHIEF EXECUTIVE OFFICER, NRDA**" should be enclosed. The tenderers shall attach the cost of tender document along with EMD as mentioned in the Para 1 above.

6. **Three** envelope Tender procedures shall be followed. Tenderer has to submit three sealed envelopes containing the documents as detailed below simultaneously, enclosed in a **Fourth Envelope.**

ENVELOPE-1	EMD & Cost of tender in the prescribed format
ENVELOPE-2	Technical Tender consisting of the documents/certificate in proof of prequalification criteria PART ONE, **Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur** and tender specification in soft & hard copy and (NRDA F-1) excluding schedule-A
ENVELOPE-3	Financial Tender PART ONE (Schedule-A)

All the three tenders shall be put in a fourth envelope which shall be dully sealed. All the 4 envelopes shall be super-scribed with the Name of Work and Name of intending tenderer. Respective envelopes shall also be marked as envelope 1, envelope 2, and envelope 3 as detailed above. Tenders who do not conform to the specified requirements will be held non-responsive.

Initially, only the **envelope -1** shall be opened, if found responsive then the **envelope-2** (Technical tender) shall be opened at the date and time given in the Tender Document. The Price tender shall remain sealed and unopened in the custody of NRDA.

7. TENDER OPENING AND EVALUATION

7.1 TENDER OPENING

7.1.1 NRDA will open the outer envelope of all the Bids received for the work (except those received late) containing the sealed technical package and the sealed financial package and announce the names of (i) Tenderers, (ii) Tenderers who have submitted modification of technical/financial packages, and (iii) Tenderers who have given notice for withdrawal of their Tenders in the presence of Tenderers or their representatives who choose to attend Tender opening on the date and time mentioned in the NIT. In the event of specified date of Bid opening being declared as a holiday for NRDA, the Technical Package will be opened at the appointed time and location on the next working day.

7.1.2 Envelopes marked Technical Tender shall be opened first. Tenderer‟s names, „Modification of Technical Tender‟, the presence/or absence of EMD, the amount and validity of EMD furnished with each Tender and such other details, as NRDA may consider appropriate will be announced by NRDA at the opening.

7.1.3 The Tenderers or their representatives who are present shall sign attendance sheet evidencing their attendance.

7.1.4 The sealed envelope containing the Financial Tender shall not be opened at this stage.

7.2 EXAMINATION, EVALUATION AND DETERMINATION OF RESPONSIVENESS OF TECHNICAL TENDER

Test of Responsiveness :-

7.2.1 Prior to evaluation of Technical Tender, NRDA will determine whether the Tender is accompanied with the tender cost, EMD in the required form, amount and validity. In case of any non conformity tender shall be rejected as non responsive.

7.2.2 If the EMD furnished does not conform to the amount and validity period as specified in the Instructions to Tenderers and has not been furnished in the form specified in GCC, the Tender shall be rejected by NRDA as non -responsive and the Technical Tender and the sealed Financial Tender will be returned to the Tenderer.

7.2.3 Prior to the detailed evaluation of technical bid, the Employer will determine whether each Tender is responsive to the requirements of the Tender documents. For the purpose of this Clause, a responsive Tender is one, which conforms to all the terms, conditions and

specifications of the Tender documents without material deviation or reservation which include exceptions, exclusions & qualifications. A material deviation or reservation is one which affects in any substantial way the scope, quality, performance or administration of the works to be undertaken by the Tenderer under the Contract, or which limits in any substantial way, the NRDA's rights or the Tenderer"s obligations under the Contract as provided for in the Tender documents and / or is of an essential condition, the rectification of which would affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders at reasonable price.

7.2.4 Subject to confirmation of the EMD by the issuing bank, the Technical tender accompanied with valid EMD will be taken up for further evaluation. In case, the Bank does not confirm the issuance of EMD, the Tender shall be rejected as non-responsive. The tenderers who found responsive will be considered for technical evaluation.

Technical Evaluation

A – Mandatory Criteria:-

7.2.5 The Technical Tender shall be further evaluated for determining the eligibility of the Tenderer as per the evaluation & qualification criteria given clause no 3.1 & 3.2.

B – Additional Criteria

7.2.6 Tenderer shall submit design of Street lighting along with complete details of light fixtures and other equipments as per the specific requirement mentioned in the tender.

7.2.7 The Technical Tender will be checked to ascertain whether the Tender has been properly signed and all the details/documents as indicated in check list have been submitted.

7.2.8 Design submitted by the bidder must clearly show the median, main carriageway, shoulder. Design shall be made through dialux software or any other software as approved. All file of the generated output must be submitted in soft copy as well as hard copy. IES file of the specified light product must be submitted in soft copy for verification purpose. Any error or overwriting shall not be acceptable.

7.2.9 The design criteria shall be fulfilled. The light product, driver current, lumen output, input wattage and other relevant details in design shall be considered for technical evaluation of the rest criteria.

Those who qualify in the technical criteria as above shall be invited for the mock up.

C- Mockup

7.2.10 Tenderer are required to submit 6 nos. light fixtures as per proposed design along with the other accessories of light fixtures/lumineir of specified types as per submitted design and specifications mentioned in the submitted tender documents(by the tenderer) for mockup. Submission of light fixtures & Lamp shall be at site address –

O/o Chief Engineer(Engg), Near Polic Station New Rakhi,

Naya Raipur, Chhattisgarh.

The exact location shall be communicated in due course of time.

7.2.11 The mockup shall be done in 3 nos poles on existing roads of Naya Raipur.

7.2.12 Tenderer shall depute representative having complete knowledge to explain their product in detail.

7.2.13 Tenderer shall organize & bear all cost of providing samples material, illumination arrangement, power generator, transport, loading, unloading, security, etc for the mockup.

7.2.14 Mockup will be evaluated by a committee, nominated by NRDA. If required modifications will be suggested and an undertaking to agree to the modifications without any financial implications will be taken from the tenderer. However, in case of major changes, if any in the work or if NRDA feels that some modifications need to be done to create a level playing field, a revision in the price-bid could be allowed only at the discretion of NRDA.

7.2.15 Those who qualify in the mockup as above shall be invited for the opening of financial bid.

7.2.16 The qualified tenderer shall be intimated by registered post/fax/e-mail about the date, time and place of opening of Financial Bid. In the event of the specified date being declared a holiday for NRDA., The Financial Bid will be opened on the next working day.

7.2.17 The unopened tender of the tenderer who are found unresponsive or who are found not qualified in the technical evaluation and mockup evaluation shall be returned unopened to tenderer.

7.3 **OPENING OF FINANCIAL TENDERS**

7.4.1 NRDA will open the envelope marked „Financial Tender" (including „Modifications pursuant to Clause 20), in presence of the Tenderers (found qualified in the technical evaluation) or their representatives who choose to attend on the date intimated to such Tenderers.

7.4.2 Tender prices, the total amount of each Tender, any discount, „modifications of Financial Tender and such other details, as NRDA may consider appropriate will be announced during the opening of the Financial Bid.

7.4.3 The Tenderers or their representatives who are present shall sign attendance sheet evidencing their attending their bid opening.

7.4 Examination of Financial Tender and Determination of Responsiveness of Financial Tender.

8. **(a)** NRDA reserves full rights to reject any or all the tenders without assigning any reason, and to seek any further information from the tenderers. The selection shall be at the entire discretion of NRDA and the NRDA's decision in this respect shall be final and binding. Further NRDA reserves right to split the contract in two or more parts. This shall be at the entire discretion of NRDA and NRDA's decision in this matter shall be final and without appeal.

(b) The competent authority on behalf of NRDA does not bind himself to accept the lowest or any other tender, and reserves to himself the authority to reject any or all of the tenders received without the assignment of a reason. All tenders in which any of the prescribed conditions is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer, shall be summarily rejected.

9. **Tenders shall be valid for 90 (Ninety) days from the last date of submission of the tender. NRDA will not be responsible for any costs or expenses incurred by Tenderers in connection with the preparation or delivery of Tenders. If any tenderer withdraws his tender before the said period or issue of letter of acceptance/intent, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the NRDA, then the NRDA shall, without prejudice to any other right or remedy, be at liberty to forfeit entire amount of Earnest Money as aforesaid.**

10. The intending tenderers are advised to send their queries to NRDA either by post or by email to ceo@nayaraipur.com, cee@nayaraipur.com and eee1@nayaraipur.com 7 days prior to submission date.

11. Clarification/ amendments, if any shall be posted on website only.

12. Period for completion of work as mentioned above at Para 1 is inclusive of rainy season.

13. Approved hard copy of the standard document is available in the office of the employer and could be seen on any working day during office hours at the following address:-

Chief Engineer, NRDA

Near New Rakhi Police Station,

Naya Raipur

14. The intending tenderers are advised to cross check the downloaded version of the tender document with the hard copy available with NRDA.

15. In case of any discrepancy between the downloaded tender and the approved hard copy, the approved hard copy shall hold good for contractual as well as legal purposes.

16. Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders, as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the

accommodation they may require and in general, shall themselves at their own cost obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect the execution of work and shall incorporate the cost of such effects while quoting the tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at his own cost all materials tools & plants, water, electricity, access facilities for workers and on all materials tools & plants, water, electricity, access facilities for workers and on all other services required for executing the work unless otherwise specifically provided in the contract documents. Submission of tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and local conditions and other factors having a bearing on the execution of the work.

17. Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.

18. The successful tenderer shall be required to execute an agreement on a non judicial stamp paper of appropriate value with the Engineer-in-charge in the Proformas annexed to the tender document, within 7 days of the issue of letter of acceptance/ award by the NRDA. The cost of non judicial stamp paper shall be borne by contractor. In the event of failure on the part of the successful tender to sign the agreement within 7 days, the entire earnest money will be forfeited and tender shall be cancelled.

19. The successful tenderer, upon issue of letter of acceptance, in addition to execution of an agreement on a non judicial stamp paper of appropriate value, shall also be required to furnish an irrevocable Performance Bank Guarantee of requisite amount to the Engineer-in-Charge in the Performa annexed to the tender document, within 7 days of the issue of the letter of acceptance /award of Tender by the NRDA. In the event of failure on the part of the successful tenderer to furnish the Performance Bank Guarantee within 7 days, the earnest money will be forfeited and tender shall be cancelled.

20. This Notice Inviting Tender shall form a part of the contract document. In accordance with clause 1 of the contract, the letter of acceptance/ award shall be issued in favour of the successful tenderer/ contractor. After submission of the performance guarantee, by the contractor, the General arrangement drawings and other details for commencement of work shall be issued. The contract shall be deemed to have come into effect on issue of communication of letter of acceptance of the tender. On such communication of acceptance, the successful Tenderer/Contractor shall, within 7 days from such date, formally sign the agreement consisting of:-

    a) PART ONE of the Tender documents along with detailed NIT as issued to the contractor at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto and

    b) PART TWO of the Tender document i.e. “General conditions of contract duly modified / corrected to the extent as specified under PART ONE (though not issued to the contractor but always available for inspection on written demand at the office of the officer inviting tenders specified under Schedule F of PART ONE of the Tender Document) and deemed to have been consulted, inspected, understood and considered by the tenderer before quoting and submitting his tender.

    c) Agreement signed on non-judicial stamp paper of appropriate value as per prescribed proforma of tender documents.

21. GCC is available as a standard NRDA Publication and can also be downloaded free of cost from the NRDA web site under title “General conditions of contract” for Contractors in construction Contracts” However contractors are advised to refer to PART ONE of the tender document carefully and thoroughly for corrections/ modifications in the “General conditions of contract” Standard is also available for inspection in the office of the Engineer in charge on written demand from contractors. Link site http:// nayaraipur.com/documents/gcc.pdf

22. While submitting the tender the contractor shall clearly and legibly write his full mailing address including PIN code, Telephone / Fax Numbers / e-mail address etc for communication purposes and shall inform the Engineer in Charge about any change from time to time in his postal / mailing address. The communication shall be dispatched only at the contractor's such latest informed address and NRDA shall in no way be responsible for non-receipt of correspondence by the contractor.

23. It is found that the contractor has misrepresented that facts or has attempted to secure or has secured the work by misrepresenting the facts or by submitting false or forged documents then the Entire Earnest Money submitted by the contractor and or the Performance Guarantee and/ or the Security Deposit as the case may be, shall be liable to be absolutely forfeited and such contractor / individuals shall also be liable to be prosecuted for cheating / forgery / fraud etc as per law.

24. Bill of quantities must enclosed with tender document, the rate shall be quoted against each item separately in figures as well as in words

25. During price Tender evaluation, the Employer will correct arithmetical errors on the following basis:

    a) if there is a discrepancy between words and figures, following procedure shall be followed:
        i. the unit price which correspond to the total price for the item worked out by the Tenderer shall be followed;
        ii. If the total price of an item is not worked out by the Tenderer or it does not correspond with the rates written either in words or figures then the rate quoted by the Tenderer in words shall be taken as correct.
    b) 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 shall prevail and the total price shall be corrected;
    c) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
    d) The unit wise amounts will be rounded to the nearest rupee
    e) The tendered rates of items against which no rate or price is entered by the tenderer will be taken as zero and the price of the same shall be deemed to have been covered by the rates/amount quoted in other items.

26. The tender document shall be written legibly and free from erasure, overwriting or conversion of figure. Any correction where unavoidable shall be made by crossing out, rewriting and attestation by the tenderer.

27. All royalties be paid by the contractor as also all tolls, duties, local and other levies including sales tax, insurances & workman compensation act etc.

28. Contractor will be bound to follow CG Model rules relating to its water supply & sanitation in labour camp.

29. The contractor shall pay not less than the minimum wages to labours engaged by him on the work.

30. Department reserves the right to take up the work departmentally or to award any work on contract in the vicinity without prejudice to the terms of contract.

31. If the rate quoted by the lowest (L1) of the tenderer is considered unbalanced (in relation to the Department's estimate of cost of work to be performed under the contract) by the CEO, NRDA, then tenderer shall submit detail price/rate analysis of major items of the work within 7 days of such notice so as to demonstrate the internal consistency of these price/rate(s) with his quoted price/rate(s). After evaluation by tender sanctioning authority CEO, NRDA may require the tenderer to submit additional Security upto 5% of the estimated cost put to tender for the performance of the agreement in the shape of F.D. receipt in favor of the CEO, NRDA before signing of the agreement, which shall be refunded along with the normal S.D. after Completion of work. If he fails to complete the work or leave the work in complete, this 5% additional SD, shall also be forfeited by the department, & the agreement shall be terminated and action shall be taken in accordance of relavent contract clause of the agreement.

32. Important Instructions to Tenderers :The tenderers who have down loaded the tender documents from the web site, should read the following important instructions carefully before actually quoting the rates & submitting their tender on the tender document downloaded from the web site:

a) The tenderer should see carefully & ensure that all the pages of PART ONE (NRDA F-1) of the tender document including schedule of quantities of items of work (NRDA F-1 Schedule-A) has been down loaded properly & completely.
b) The printout of the downloaded tender document shall be taken on A-4 size plain white paper only & the printer settings shall be dept to ensure that the downloaded document is printed in the same manner and pattern / setting as appearing on the web site & there is no change in the formatting, number of pares etc.
c) The tenderer should ensure that no page in the down-loaded tender document is missing and all pages in the down-loaded tender document as printed are legible & clear & are printed on a good quality paper.
d) The tenderer should ensure that every page of the down-loaded tender document is signed by tenderer himself.
e) The tenderer should ensure that the down loaded tender document is properly bound and wax sealed before submitting the same in the envelope. Loose / Spiral binding shall be liable to be rejected.
f) In case of any correction/ addition / alteration/ omission in the downloaded tender document vis a vis that in the **Standard DRAFT Tender Document** available in the office of NRDA, it shall be liable to be rejected.
g) The tenderer shall furnish a declaration to this effect that no addition/ deletion/ corrections have been made in the downloaded tender document being submitted by him and it is identical to the tender document appearing on the Web-site and with the **Standard DRAFT Tender Document** available in the officer of the office inviting the tenders.

Chief Executive Officer,
Near DKS Bhawan,
Raipur 492 001 Chhattisgarh
Phone No (0771) 4066011, 4268643.

Signature of Contractor……..... Signature of NRDA……..……

NAYA RAIPUR DEVELOPMENT AUTHORITY

Tender document for Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur

(Following Three-Envelope Tender Procedure)

Schedule – A

Price tender

To be submitted in ENVELOPE-3

NIT no., 37/ST-LED-II/ELECT/CE(E)/NRDA/2013-14, Raipur, dated: 19.07.2013

Issued by: Chief Executive Officer,
Naya Raipur Development Authority (NRDA)
Near Old Mantralaya Mahanadi Dwar
Raipur 492 001, Chhattisgarh
Tel: (0771) 4066011, Fax: (0771) 4066188,
E-mail: ceo@nayaraipur.com

Tender Document Contains

(a) Only schedule "A" and Section-I of schedule "D" are to be filled & singed by the tenderer
(b) All the certificates as per pre qualification criteria shall be appended with relevant forms of schedule"D"

1. PART ONE (NRDA F-1)-(Attached herewith, to be submit along the tender)

Part (A)

a) Press Notice for Short Term NIT

b) Detailed Short Term NIT

Part (B)

a) Schedule-A

(i) Cost Abstract

(ii) Bill of Quantities

b) Schedule-B –NIL

c) Schedule-C –NIL

d) Schedule-D

Section-I..... Technical tender forms

(i) Letter of Technical Tender

(ii) Tenderer's Information Sheet

(iii) Annual Turnover

(iv) Specific Construction Experience

(v) Declaration

(vi) Check list for Technical tender evaluation

Section –II .....Scope of work

Section –III..... Technical specifications of work

Section –IV..... Special Conditions of Contract

Section –V..... List of approved makes.

Section –VI..... Drawings

e) Schedule-E

f) Schedule-F

2. PART TWO (NRDA F-2/3))-Standard form (Not Attached herewith, and not to be submitted along the tender)
Important note: - Link site http:// nayaraipur.com/documents/gcc.pdf

1. General Guidelines
2. Tender
3. General rules and directions
4. Conditions of contract
5. Clauses of contract
6. Model rules relating to labour, water supply and sanitation in labour camps safety code
7. N/A
8. Contract forms
   (a) Draft Format for Performance Security
   (b) Earnest Money Deposit Form (Bank Guarantee)
   (c) Format of Contract Agreement
   (d) Draft Format for Performance Guarantee for Water Proofing and Anti-termite Works
   (e) Indemnity Bond
   (f) Indenture Bond
   (g) Notice for Appointment of Arbitrator
9. Proforma of schedules (Schedule 'A' to Schedule 'F')

NAYA RAIPUR DEVELOPMENT AUTHORITY (NRDA) RAIPUR, CHHATTISGARH

Document details

Name of work : **"Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur".**

Name of Tenderer : _____

_____

Details

(a) Cost of tender document : Rs ----------

(b) EMD : Rs ----------.

Signature of Tenderer

Date:_____

SCHEDULE– D

Section-I
Technical Tender Forms

Schedule-D
Section I - Tender Forms Technical

This Section contains the forms which are to be completed by the Tenderer and submitted as part of his PART ONE (NRDA F-1).

Table of Forms

(i) Letter of Technical Tender

Date: _____

Tender Package No.:_____

NIT No.: _____

To:

Chief Executive Officer,

NRDA, Near DKS Bhawan,

Raipur 492 001,

Chhattisgarh.

Ref for NIT no:----------

Subject: Name of the work:- ----------

Dear Sir,

I/We, the undersigned, declare that:

(a) I/We have examined and have no reservations to the Tender Document, including Addendum if any, minutes of meeting, clarification to the queries etc.

(b) I/We offer to execute the subjected under in conformity with the Tender Documents and the addendums.

(c) I/We have satisfied ourselves as to the location of the site and working conditions, examined the requirements of NRDA and have obtained all the information necessary for the successful and timely completion of the work.

(d) I/We have submitted the Earnest Money Deposit as specified in the tender document which will not bear any interest and shall be subjected to forfeiture on following defaults.

(i) if we withdraw our Tender during the period of tender validity as specified in Detailed NIT para 9 or

(ii) if we fail to:

- furnish a Performance Security in accordance with Detailed NIT Para 22 or
- sign the Contract in accordance with Detailed NIT Para 21; or
- accept the correction of its Tender Price pursuant to Detailed NIT Para 28.

(iii) if we have given the false documents in support of qualification with the technical tender.

(e) My/Our Tender shall be valid for a period of 90 days from the date fixed for the tender submission deadline in accordance with the Tender Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(f) If my/our Tender is accepted, we commit to obtain a Performance Security in the amount as specified in the tender document for the due performance of the Contract and sign the agreement;

(g) I/We are not participating, as Tenderers, in more than one Tender in this Tendering process, in accordance with the Tender Document;

(h) My/our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the Contract, has not been declared ineligible by NRDA, Raipur;

(i) I/We understand that this Tender, together with your written acceptance thereof included in your letter of acceptance, shall constitute a binding contract between us, until a formal Contract is prepared and executed;

(j) I/We understand that you are not bound to accept the lowest evaluated tender or any other tender that you may receive.

(k) I/We hereby pay the Earnest Money Deposit of required amount in the form of a demand draft on a nationalized bank (----------Bank Name and address) and operatable at Raipur in favour of the 'Chief Executive Officer, NRDA, Raipur' for the said amount and is attached.

(l) I/We hereby declare that, the entire work including Addendum/ Corrigendum, if any, shall be completed in all respect within the time limit specified in the NIT.

(m) I/We here by authorize the Employer to get all bank guarantee verified and got confirmed from concerned Bank.

Signature: ----------

Signed by: ----------(Name)

Designation: ----------

For and on Behalf of --------(Name of Tenderer)

Date:

(ii)Tenderer's Information Sheet

Tenderer's Information		
Tenderer's legal name		
Tenderer's legal address		
Tenderer's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	Name:	Address:
	Telephone : Fax :	E-Mail:
Tenderer's details of Incorporation	Place of incorporation/ registration:	Year of incorporation:
Attached are copies of the following original documents. ❑ 1. Articles of incorporation or constitution of the legal entity named above. ❑ 2. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law.		

Details of the office closest to Raipur (if available)

1.	Address of Office	
2.	Telephone :	Contact :
3.	Fax :	E-Mail :

Signature of Tenderer

Date:_____

(iii) Annual Turnover

Annual Turnover Data for the Last 3 Years			
Year	**Amount and Currency**	**Exchange Rate if any**	**INR Equivalent**
2008-09			
2009-10			
2010-11			
Average Annual Turnover for the last 3 years in INR			

All Tenderers are requested to complete the information in this form

The information supplied should be the Annual Turnover of the Tenderer in terms of the amounts billed to clients for each year for contract in progress or completed, converted to INR at the rate of exchange at the end of the period reported.

As a proof of the above, the contractor shall submit the copies of the balance sheet for last three years along with audited profit & loss statement duly signed by the charted accountant.

Signature of Tenderer

Date:_____

(iv) Specific Construction Experience

Fill up one (1) form per contract.

Details of Contract			
Contract No . . . . . of	Name of work		
Award Date		Completion Date	
Role in Contract	❑ Contractor	❑ Sub-contractor	
Total Contract Amount			INR
Employer's Name Address Telephone/Fax Number E-mail			
Description of the work executed			

Note: Attach copies of work order and satisfied completion certificates in support of each quoted experience. The completion certificate should be signd by the officer not below the rank of concerned Executive Engineer in case of Government department or in the rank of General Manager in case of public sector/private sector as the cases may be.

Signature of Tenderer

Date:_____

(v)DECLARATION

(*TO BE SIGNED BY THE TENDERER SUBMITTING THE TENDR ON DOWNLOADED TENDER DOCUMENT*)

I/We hereby declare and certify that:

1. I/We are submitting the tender in the tender document downloaded by me /us from the website & we certify that there is no change in formatting, numbering of pages etc. In the downloaded documents.
2. I/We are submitting the tender in the tender document which is exactly similar and identical to the one available on the website and also as available with the officer inviting tenders.
3. I / We have no made any modifications / corrections / additions / omissions etc in the tender documents downloaded from web by me / us.
4. I / We have checked that no page in the downloaded tender document is missing and all the pages as per web site are available & that all the pages of tender document submitted by us are clear & legible.
5. I / We have signed (with stamp) all the pages of the tender document before submitting the same.
6. I / we have wax sealed the tender documents properly before submitting the same.
7. I / We have submitted the application for issue of tender documents on the prescribed format separately along with the cost of tender documents and also the attested Xerox copies of the eligibility documents prescribed for respective work in the NIT.
8. I / We have read carefully & understood the entire Tender document including important instructions to the tenderers submitting the downloaded tender.
9. In case at any stage whatsoever at a later date it is found/ revealed that there is a difference in our downloaded tender documents from the original **Standard DRAFT Tender Document**, NRDA shall have the absolute right to take any action as deemed fit without any prior intimation to me / us.
10. In case at any stage whatsoever at a later date it is found that there is difference in our downloaded tender document from the Standard DRAFT Tender Document, we clearly understand that our work shall be liable to be cancelled and Earnest Money/ Performance Guarantee / Security deposit etc all are liable to be forfeited by NRDA and in such an eventuality I / We shall have no right or claim for any damages / compensation from NRDA on this account. Further in such case I / We may also be debarred by NRDA for further participation in the tendering in the concerned NRDA & be removed from the approved list of contractors of NRDA.

Dated…… **(TENDERER)**

(SIGNATURE WITH SEAL/ STAMP)

Signature of Contractor……... Signature of NRDA……..……

(vi) CHECK LIST FOR TECHNICAL TENDER EVALUATION

Name of the Agency:

S. No	Document	Details	Enclosed at annexure Page No	
			From	To
1	Tender Document Cost	**Downloaded from NRDA Website Details of DD** Amount Name of the Bank & Branch Date D.D no & Photo copy attached — Yes / No		
2	Earnest Money Deposit (EMD)	Amount Form of EMD — **DD** Issuing Bank & Branch No & Date Photo copy attached — Yes / No		
	Contractor Registration Certificate	Class in which registered Name of Department Registration Number & Date Validity **Notarized** — **Yes/No**		
4	Commercial Tax Certificate	Registration Number: Name of the Office **Notarized** — **Yes/No**		
5	Average Annual Turnover in Lacs (For the Financial	2008-2009		

Signature of Contractor……..... Signature of NRDA……..……

Name of the Agency:

S. No	Document	Details		Enclosed at annexure Page No	
				From	To
	year2008-09,2009-09,2010-11)	2009-2010			
		2010-2011			
		Charted accountant certificate in original or photo copy duly notorized can be submitted			
6	Details of the projects/works completed as pre-qualification criteria	Name of the Work			
		Work Completed	**Yes/No**		
		Cost of the Project			
		Certificate Enclosed	**Yes/No**		
		Notarized	**Yes/No**		
		Name of the Work			
		Work Completed	**Yes/No**		
		Cost of the Project			
		Certificate Enclosed	**Yes/No**		
		Notarized	**Yes/No**		

Note: The above check list only provides for those documents which are mandatory for the tender pre-qualification criteria. Tenderers are required to append, other documents also with the technical tender as required in the detailed NIT or elsewhere in the PART ONE (NRDA F-1).

Signature of Tenderer

Date:_____

NAYA RAIPUR DEVELOPMENT AUTHORITY

Tender document for the work of Design, Supply, Installation, Testing and Commissioning of Street Light Poles and High Mast Lighting system at Naya Raipur

(Following Three-Envelope Tender Procedure)

Schedule – A

Price tender

To be submitted in ENVELOPE-3

NIT No 37/ST-LED-II/ELECT/CE(E)/NRDA/2013-14, Raipur, **Dated: 19.07.2013**

Issued by: Chief Executive Officer,
Naya Raipur Development Authority (NRDA)
Near DKS Bhawan,
Raipur 492 001, Chhattisgarh
Tel: (0771) 4066011, Fax: (0771) 4066188,
E-mail: ceo@nayaraipur.com

Tender Document Contains

(a) Only schedule "A" and Section-I of schedule "D" are to be filled & singed by the tenderer
(b) All the certificates as per pre qualification criteria shall be appended with relevant forms of schedule"D"

1. PART ONE (NRDA F-1)-(Attached herewith, to be submit along the tender)

Part (A)

a) Press Notice
b) Detailed NIT

Part (B)

a) Schedule-A
   (i) Cost Abstract
   (ii) Bill of Quantities
b) Schedule-B –NIL
c) Schedule-C –NIL
d) Schedule-D
   Section-I..... Technical tender forms
   (i) Letter of Technical Tender
   (ii) Tenderer's Information Sheet
   (iii) Annual Turnover
   (iv) Specific Construction Experience
   (v) Declaration
   (vi) Check list for Technical tender evaluation
   Section –II .....Scope of work
   Section –III..... Technical specifications of work
   Section –IV..... Special Conditions of Contract (NIL)
   Section –V..... List of approved makes.
   Section –VI..... Drawings
e) Schedule-E
f) Schedule-F

2. PART TWO (NRDA F-2/3))-Standard form (Not Attached herewith, and not to be submitted along the tender)
   Important note: - Link site http:// nayaraipur.com/documents/gcc.pdf
   1. General Guidelines
   2. Tender
   3. General rules and directions
   4. Conditions of contract
   5. Clauses of contract
   6. Model rules relating to labour, water supply and sanitation in labour camps safety code
   7. Sketch of cement Godown
   8. Contract forms
      (a) Draft Format for Performance Security
      (b) Earnest Money Deposit Form (Bank Guarantee)
      (c) Format of Contract Agreement
      (d) Draft Format for Performance Guarantee for Water Proofing and Anti-termite Works
      (e) Indemnity Bond
      (f) Indenture Bond
      (g) Notice for Appointment of Arbitrator

9. Proforma of schedules (Schedule 'A' to Schedule 'F')

NAYA RAIPUR DEVELOPMENT AUTHORITY (NRDA) RAIPUR, CHHATTISGARH

Document details

Name of work : **"Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur".**

Name of Tenderer : _____

_____

Details

(a) Cost of tender document : Rs ----------

(b) EMD : Rs ----------.

Signature of Tenderer

Date:_____

SCHEDULE– D

Section-II

Scope of work

Works Requirement

This section contains the brief idea of scope of work, supplementary information drawings etc. regarding the work to be executed under instant tender, may vary as per site requirement. In case of any change the decision of Engineer-in-charge will be final and binding to the contractor.

Section-A : Site Information

1. SITE INFORMATION

1.1 Work Site

1.1.1 The project site is on Road no 2, 4-Extn, 5, 7, 9-B, 11 and 13 located in the Naya Raipur.

1.1.2 The Contractor shall plan his works keeping in view restriction of approach and availability of space and time.

1.2 GENERAL CLIMATIC CONDITIONS

1.2.1 The area in which the work lies is mostly plain terrain.
1.2.2 The highest and lowest temperatures in general range from 48 degree Celsius to 8 degree Celsius.
1.2.3 Summer season is from April to June and winter season is from November to March.
1.2.4 The mean average annual rainfall in the area over a five-year period is of the order of 1065 mm, a good portion of which is concentrated during July to mid September, when about 75% of the annual rainfall occurs.
1.2.5 Naya Raipur experiences extreme climatic conditions and Bidders must acquaint themselves about the same before submitting the Bid. The Employer shall in no way be responsible on this account.

The above site information is being made available to Bidders in good faith and Bidders are advised to obtain relevant information, as may be considered necessary by them, before quoting for the bid. No claims whatsoever on account of any discrepancy in the above information shall be admissible to Bidders.

Section-B : Scope of Work

1. Objective:-

The objective of the contract is to design, supply, erection, installation, testing and commissioning of LED street lights and High Mast on above mentioned Roads and Junctions of Naya Raipur as per stipulated standards and within the time stipulated by the Contract along with power supply infrastructure development. In full recognition of this objective, and with full acceptance of the obligations, liabilities and risks which may be involved, the Contractor shall undertake the execution of the Works.

2. **SCOPE OF WORKS**

The work under this contract shall be carried out in accordance with the various documents constituting the contract and shall consist of various salient items for design, supply, erection, installation, testing and commissioning of LED street lights and High Mast along with development of Infrastrucutre with a total street length of approx. 40.62 kms and 4 nos. High Mast.

The broad scope for the proposed work shall be

(i) Supply, installation, testing and commissioning of LED streetlight systems with all fixtures, fittings and related works. Details of the work site are given below:

Sr No	Particulars	Road No.2	Road No. 4-Ext	Road No 5	Road No 7	Road No 9-B	Road No 11	Road No 13
1	Length of road	Appox 10.69 km	Appox 2.83 km	Approx 2.9 Km	Approx 3.4 Km	Approx 2.43 Km	Approx 1.8 Km	Approx 3.05 Km
2	Carriageway	Dual carriageway	Dual carriageway	Dual carriageway	Dual carriageway	Dual carriageway	Dual carriageway	Dual carriageway
3	Road Width	100 mtr	100 mtr	100 mtr	60 mtr	60 mtr	60 mtr	60 mtr

Sr No	Particulars	Road No.2	Road No. 4-Ext	Road No 5	Road No 7	Road No 9-B	Road No 11	Road No 13
4	Main Carriageway width	7.5 mtr	7.5 mtr	7.5 mtr	7.5 mtr	7.5 mtr	7.5 mtr	7.5 mtr
5	Median	20 mtr	5 mtr	5 mtr	5 mtr	5 mtr	5 mtr	5 mtr
6	Pole to pole distance	35 mtr	35 mtr	35 mtr	35 mtr	35 mtr	35 mtr	35 mtr
7	Mounting Height	10 mtr	10 mtr	10 mtr	10 mtr	10 mtr	10 mtr	10 mtr
8	Layout of poles	both end of median	On Road side both end	On Median	On Median	On Median	On Median	On Median
9	street light pole bracket	Single Over Hang	Single Over Hang	Double Over Hang	Double Over Hang	Double Over Hang	Double Over Hang	Double Over Hang

Location of High Mast will be given during execution of work.

(ii) Installation of 63 KVA 3 Star Distribution Transformers, oil type RMU & Distribution Box.

(iii) Fencing with fabrication of gate for distribution transformer substation.

(iv) Installation of GSM base LED Street Light automation system with supply of software.

(v) Design of LED Street Light for proposed Road at Naya Raipur shall be carried out on following Illumination parameters:

a. Average illumination level for main carriageway must be 30 lux Average and at junction point average illumination level must be 50 lux.

b. Average illumination level for service road & reserve area should be within 50-75% of illumination level (lux) of main carriageway.

c. Maintenance factor to be considered as 0.90

d. Uniformity factor = minimum illumination level/ average illumination level should be: 0.4

e. Traverse Uniformity factor = minimum illumination level/ maximum illumination level should be: 0.33.

f. Design should be such that glare is minimum so that driver feel comfort while driving.

g. Design submitted by the bidder must clearly show the median, main carriageway, shoulder. Design must make through dialux software. All file of the generated output must be submitted in soft copy as well as hard copy. IES file of the specified light product must be submitted in soft copy for verification purpose. Any error or overwriting shall not be acceptable. (Mandatory)

h. The design criteria shall be fulfilled. The light product, driver current, lumen output, input wattage and other relevant details in design shall be considered for technical evaluation of the rest criteria. If any deviation found in parameter of driver current, lumen output, input wattage of specified light product in the type test reports from design data; the test report will not be accepted.

i. Within 15 days of award of work the approved tenderer shall submit detailed drawings showing the LED Street Light pole location, High Mast location, Pole/High Mast foundation details, cable movement, feeder pillar position etc.

(vi) Supply, installation, testing and commissioning of various items as described in the BoQ for LED Street Light & High Mast and as per approved drawing including all accessories, feeder pilar and heat resistant flexible cables for final connections and terminations.

(vii) The period of defect liability shall be 24 months after successful commissioning except LED fixture in complete. The defect liability period of LED fixture in complete shall be 5 year only.

(viii) The Contractor will be required to rectify any deficiencies which are attributable to defects in the workmanship or quality of materials, Plant or equipment during the Contract Period and defect liability period.

(ix) The records maintained by the contractors shall be produced periodically to the Engineer-in-charge for proper monitoring as desired by NRDA.

b) The tenderer should provide the facility in conformity with the relevant codes, rules and regulations.

(x) The tenderer should ensure that they provides all the documentation including general arrangement drawing wiring diagrams and instructions for installation and operation of the lighting fixtures.

(xi) The Tender will have to provide their engineer's in pre commissioning checks and tests and commissioning of the lighting fixtures.

(xii) As Build Drawings

(a) The Contractor will supply four hard copies & softcopy of the as built drawings of completed work.

(b) The cost of preparing all such items of work shall be deemed to have been **included in the respective rates/ prices quoted by the Contractor in the "Bill of Quantities."**

(xiii) The price quoted shall include all the activities as mentioned in the scope of work, in addition to contingencies required for the above scope of work.

3. ENVIRONMENTAL CONSIDERATIONS

All provisions and conditions contained in the Bid documents and other statutory provisions regarding environmental protection, safety & health shall be strictly complied with and shall be incidental to work.

4. STANDARDS

(1) Equipment, materials and systems shall be designed, manufactured and tested in accordance with the latest issue of International and/or National codes and standards. The Contractor shall submit copies to the NRDA of all codes and standards used for the work.

(2) Reference to standards or to materials and equipment of a particular manufacturer shall be regarded as followed by the words "or equivalent". The Contractor may propose alternative standard materials, or equipment that shall be equal to or better than those specified. If the Contractor for any reason proposes alternatives to or deviations from the specified standards, or desires to use materials or equipment not covered by the specified standards, the Contractor shall apply for the consent of the NRDA. The Contractor shall state the exact nature of the change, the reason for making the change and relevant specifications of the materials and equipment in the English language. The decision of the NRDA in the matter of quality will be final.

SCHEDULE– D
Section-IV
Special Conditions of Contract

Special Conditions of Contract

1. GENERAL

The Special Conditions of Contract are to be read in conjunction with General Conditions of Contract. If there are any variations or discrepancies or conflicting provisions, the provisions in Special Conditions shall take precedence over the provisions in the General Conditions of Contract.

All additional facilities/equipment/ office etc to be provided by the contractor, as mentioned in the tender, document outside the BOQ shall not be paid separately, and shall be deemed to have been included in the rates quoted by the contractor.

2. ACCESS

The Contractors are to verify the work site details including:-

a) Access,
b) Availability of water supply and electrical energy,
c) Space for dumping stores and materials and
d) Space for erection of site office,

The Contractors are deemed to have catered for all contingencies connected with the site, access, water & electricity.

3. SUPPLY OF WATER

Water will not be supplied by NRDA and the Contractor shall make his own arrangements. NRDA will give recommendatory letter to the concerned authority if so requested by the Contractor. However, NRDA shall be in no way responsible for obtaining permission and no claim on account of this will be entertained.

4. ELECTRIC SUPPLY

(a) Electric power both for construction and lighting shall not be made available to contractor. Contractor shall arrange at his own cost power with necessary switch boards, energy meter etc. and shall be responsible for their maintenance.

(b) Further distribution by the Contractor at his cost shall be done as per approved layout. He shall provide required clearances for overhead lines to facilitate easy movement of heavy machinery such as cranes etc. These shall be shifted and rerouted at Contractors cost during execution of work if the same are found to obstruct any other work of any agency working at site or requires shifting due to unforeseen reasons.

(c) On completion of the work the Contractor shall remove all wiring installed by him and make good to the satisfaction of Engineer if any disturbance or damage is done.

(d) The Contractor shall employ an Electrical Agency as approved by the Engineer for carrying out this work.

(e) The Contractor has to keep alternative arrangement ready at his own cost for any failure/interruption of electric power that takes place and under no circumstances can this be deemed to be reason for any consequential delay in the works.

(f) Any disputes in sharing of power obtained directly/ indirectly from CSPDCL with other agencies shall be resolved by the contractor at his risk and cost. NRDA shall not be responsible or a party for such disputes.

5. DEFECT LIABILITY

The Contractor shall be responsible for rectification of defects, during the defect liability period as per clause 17 of GCC after the certified date of completion by the NRDA. This period shall be known as Defects Liability period as defined in CL. No. 17 of the General Conditions of Contract. Subsequent to the taking over of the works and after it has been in use, its removal/correction of defects would be the responsibility of the Contractor. Any defects or failures during this period shall be rectified by Contractor within one week of intimation in writing. If the same is not carried out in the stipulated time, NRDA shall have the right to get it repaired departmentally or through any other agency, entirely at the risk and costs of the Contractor as detailed in the GCC clause. No. 17.

6. SAMPLES

6.1 Material

(a) The Contractor shall furnish to Engineer for approval, with reasonable promptness and with reasonable time for consideration, adequate numbers of samples of all the materials to be used in the work, irrespective of whether material/product is from approved list given in tender. He shall permit and account for all costs in his quotation toward supply, testing, examination at site or at any approved place by the Engineer. The choice of approval of materials rests with NRDA unless otherwise specified.

(b) All material samples shall be delivered to the Engineer's office at the Contractor's cost. Each sample shall be in duplicate and properly labelled as under-

- Name of Project
- Name of Contractor
- Name of Product
- Name of Manufacturer
- Item reference of BOQ
- Date of Submission

(c) Samples shall be accompanied with technical specifications/ catalogues/ test results of manufacturer.

(d) In case the Contractor intends to keep an approved sample in his possession, he shall submit additional set of samples for Engineer's approval.

6.2 **Standards of Acceptability**

(a) In order to establish the standards of acceptability for materials and finishes, the Contractor shall finish in all respect a mock up for one span which include 2 no pole foundation, laying of HDPE pipe between these foundation. The material used in this shall be as approved and special attention shall be paid to establish the workmanship and finishing standards to be achieved for the project.

(b) The Contractor shall give notice in writing in this respect and shall obtain approval through Engineer in Charge from the CE NRDA. Approval should be taken well in advance so as not to delay execution of work.

7. TESTING OF MATERIALS IN OTHER LABORATORY

As a valedictory measure, 10 % (ten percent) of the samples shall be sent for testing in one of the following laboratory:-

i) Chief Engineer (PWD) Laboratory, Raipur
ii) National Institute of Technology, Raipur
iii) Govt. Engineering College, Raipur
iv) B.I.T., Durg
v) Sriram Test House N. Delhi
vi) National Test House N. Delhi

7.1 In case, certain testing facility for typical/ special materials are not available in Chhattisgarh, then it can be tested at a recognized laboratory anywhere in India.

7.2 All testing charges for the above shall be borne by the Contractor. The charges i.e. travelling, boarding & lodging of Inspecting officer shall also be borne by the contractors as per class I officer of Govt of CG. In case, the testing charges demanded by the testing authorities is not paid by the Contractor within 15 (fifteen) days, then the same will be paid by NRDA with due recovery from the Contractor's bill for the project.

8. CRECHE FACILITIES FOR THE CHILDREN OF CONSTRUCTION LABOURER

Contractor undertakes to provide creche facilities for the children of construction labour through a volunteer agency within one month from start of work. The facility is open to children of construction labourers employed by the Contractor. In case the Contractor fails to provide this facility within stipulated time, following charge shall be levied on the Contractor.

Range of Contract Amount	**Amount of Creche fund**
Upto Rs. 50 lacs	Nil
Above Rs. 50 lacs to Rs. 5 Crores	Rs. 50000/-
Above Rs. 5 Crores	Rs. 5 lacs.

8.1 The amount shall be recovered if such facility is not provided by the Contractor from running account bills in one or more instalments but not exceeding 6 (six) instalments.

8.2 If the facility is provide after 3 months 50% of the amount shall be refunded to the contractor, after 6 month 25% will refunded.

9. SUBMISSION OF DETAILED BAR/ PERT CHART OF COMPLETION

The Contractor shall, within the stipulated time in Tender, submit to the Engineer for his approval a detailed programme covering-

a) Descriptive note explaining sequence of various activities.

b) Network (PERT/ CPM), bar chart.

c) Programme for supply of working drawing.

d) Phased requirements of plant and equipment to be deployed by the Contractor.

10. Method of Working

After Contract award and before starting Work at the site, Contractor, NRDA's representative/ Engineer shall together make a thorough survey of the grounds where Work under this Contract will occur and areas to be used as access ways to the Work areas. Contractor shall list, and photograph, if Contractor desires, existing conditions not requiring alterations, shall note discrepancies between Drawings and existing conditions, and shall designate areas of storage and routes of access agreed upon by NRDA.

The Contractor shall, within the stipulated time in Tender, submit to the Engineer for his approval the following information,

a) A general tentative plan of construction plant and equipment for the execution of work within time period stipulated in schedule.

b) Layout and details of temporary works that the Contractor wants to carry out to fulfill his obligation under the contract.

c) Indication of shuttering system to be followed.

11. Project Monitoring

11.1 Within 7 (seven) days the Engineer shall give their approval to proceed with the work, with or without modification. However acceptance of programme and method of working as submitted by the Contractor or with any modification there to in the opinion of the Engineer, shall not relieve the Contractor of any of his contractual obligation.

11.2 All these programmes and plans submitted by the Contractor and approved by the Engineer shall become part of the contract.

11.3 The acceptance of programmes as submitted by the Contractor or with any modification thereto in the opinion of the Engineer, shall not relieve the Contractor of any extension of time unless delay, if any, is expressly sanctioned by the Engineer.

11.4 **Construction Photographs-**

A General: Contractor will provide construction photographs taken, developed, printed, and mounted by a recognized commercial photographic studio or reputable photographer acceptable to Owner, in the number and type and at construction stages enumerated below:-

(i) Before Starting Work: Have photographs taken at site from different points of view sufficient in number to show site (and conditions at existing structures) but not fewer than 25 photographs.

(ii) During Progress of the Work: Have not fewer than 10 photographs taken at least once a week from points of view (both inside and outside), as necessary to show progress of construction and site development for each part of the Work. Co-ordinate taking photographs with utility Work and back filling.

Photograph each buried utility line before back filling. During later stages of the Work, have photographs taken from suitable locations inside the building showing the progress of various stages of the Work, such as piling, centering, reinforcement, water proofing, concreting, etc. Size of photographs will be 125 mm X 250mm. Photographs shall be supplied with negatives/ CD to the Engineer. Each photograph shall be attached with date of photograph and location of work. These photographs shall be from location as fixed by the Engineer at start of work

12. QUARRY RELATED DEDUCTIONS

The royalty for Minor minerals used in the work like murrum, stone metals, sand, rubble etc. will be levied as per prevailing practice in PWD of Chhattisgarh and shall be recovered suitably through R.A./ Final bill and will be kept in deposit. The above royalty charges kept under deposit shall be refunded as soon as the Contractor submits relevant NOC from Collector, Raipur, Chhattisgarh.

13. CONTRACTORS ALL RISK POLICY (C.A.R. POLICY)

The successful Contractor shall take out a C.A.R. policy from any approved company by IRDA India. Chhattisgarh Govt., administered by Directorate of Insurance. The policy so obtained shall cover the entire period of construction (including all extensions) and also shall cover the defects liability period. The policy shall be for the total contract amount including cost of free supply material by NRDA, if any. All amounts/ charges towards premium etc. on this account shall be borne by the Contractor.

14. INDEMNITY BOND

The Contractor shall require to execute an Indemnity Bond for satisfactory performance of the entire project on stamp paper of Rs.100/- (Rupees Hundred only) in the format approved by the NRDA. This Indemnity Bond shall remain in force for the Defect Liability period after completion of the project to be furnished in contract form E of GCC.

15. ACCIDENTS

Should any accidents, fatal or otherwise occur, a detailed report about the same shall be made promptly by the Contractor to the Engineer. The Contractor should at all times during execution of work keep the NRDA fully indemnified against all risks, claims, litigations and financial burdens arising out of all incidental operations on work and accidents.

16. TRAFFIC

The Contractor shall have to make all necessary arrangements for regulating traffic day and night during the period of construction and to the entire satisfaction of the Engineer. This includes the construction and maintenance of diversion, if necessary, at no extra cost to the NRDA. The Contractor shall provide necessary caution boards, barricades, flags and lights, watchmen etc. so as to comply with the latest Motor Vehicle Rules and Regulations and for traffic safety. The Contractor shall be responsible for all claims for the accidents which may arise due to his negligence whether in regulating traffic, in stacking

materials on the road or by any other reason. The contractor must comply with the following:-

A. General: Plan and control use of site and access to site in co-operation with Owner and other contractors working at site to minimise disruption of use of other facilities; portions of buildings and site areas affected by this Contract and to remain in use; and the work of other contractors.

B. Temporary Access Drives: Construct on the premises as necessary, and maintain in good usable condition; remove when no longer needed. Until permanent improvements have been completed, when necessary to prevent excessive dust, periodically water temporary unpaved access roads.

C. Construction Site Access: Use most direct route from public streets as agreed to by Owner. Construction traffic elsewhere on Owner's property is prohibited.

D. Driveways Between and Around Combustible Storage Piles: Maintain at least 15 feet wide and free of accumulation of rubbish, equipment, and materials.

F. Access for Fire-Fighting Equipment: Maintain.

G. Access: Refer to other sections for requirements to keep access to site and buildings open to Owner, other contractors, and fire-fighting equipment.

H. Use of Streets and Sidewalks on Public Property: Make arrangements with authorities having jurisdiction for use. Restrictions shall be those of the Municipal Authorities. Be solely responsible for adherence.

J. Roadways, Driveways, and Walkways: Where outside indicated Contract limit on Owner's property and on public property, keep open to pedestrian and vehicular traffic at all times. When temporary closing of a roadway, driveway, or walkway is absolutely unavoidable, provide alternative access routes. Such temporary closings shall be approved by Owner in each case and shall be for the shortest possible time. Strictly adhere to requirements of governmental authorities having jurisdiction.

K Parking: Owner will issue temporary parking permits for use by construction personnel and will make available, at the location shown. Construction personnel shall not park in any other location on Owner's property, even when bearing permits. Access to allocated parking spaces shall be by most direct route from public streets. Construction personnel shall not drive vehicles elsewhere on Owner's property and shall take the most direct pedestrian way along walks and roadways (not on lawns) from parking lot to construction site.

L Barricades and Signs: Should barricades or directional signs for traffic control be necessary, prepare and install such signs and barricades of approved size, colour, and lettering or other markings. Remove signs when no longer needed, or at Substantial Completion, whichever is latest.

M. Restricted Use of Premises: Enforce Contract requirements, local ordinances and Owner's instructions pertaining to signs, fires, smoking, trucking, parking, and other use of premises.

N. On-Site Storage:-

1 General: Extent of Work and site area available limits amount of on-site material and equipment storage. Do not unnecessarily encumber job site with excess materials or equipment and means of delivery of materials, equipment, and supplies, removal of rubbish, and, hours during which deliveries may be made. Determine, and take into

account in the Work, limitations on storage space and of times, rates, and means of deliveries to and removals from the job site whether such limitations are imposed by laws, rules, ordinances, or physical conditions. Owner will not pay extra amounts due to such limitations. Co-ordinate arrangements for delivery and storage of materials.

2 Paved Areas: Do not use paved areas on Owner's property to stockpile excavated materials or to store construction materials except where shown. Use of paved areas on public property is subject to requirements of authorities having jurisdiction, and arrangements for such use are solely Contractor's responsibility.

3 Protection and Repair: Protect roadways, walks, and other permanent site improvements, and access ways subject to damage. Satisfactorily repair improvements and surfaces damaged during construction operations, or remove damaged improvements or surfaces and provide new acceptable improvements or surfaces. Except where new Work is required, return areas used for temporary access to original condition.

17. ALIGNMENT AND BENCH MARKS

The alignment of the work to be carried out under the contract shall be marked on the ground as per the drawing and as per the instructions of the Engineer. For the purpose of facilitating the work, the series of temporary bench marks on masonry pillars will have to be established. These pillars will be constructed along with the alignment and such other locations as may be initiated by the Engineer. The temporary bench-marks shall be established for the work line-out and its connections to other proposed roads in Naya Raipur using the DGPS instrument and Total Station software. All expenses involved in the process of marking alignment on ground, checking the alignment, constructing masonry pillars in establishing bench marks thereon, shall be borne by the Contractor. It will be responsibility of the Contractor to ensure that the masonry pillars so constructed are not damaged during the period of work in progress.

18. PREVENTION OF MOSQUITO BREEDING AT CONSTRUCTION SITE

The Contractor shall on the respective construction site install mosquito proof and accessible water storage tanks or to cover/protect the present water storage tanks properly. The Contractor shall periodically give larvaecidal treatment to water storage tanks, sites of water stagnation, water collection.

Any expenditure that may be incurred by NRDA to ensure that the above conditions are fulfilled by the Contractor will be debitable to Contractor's account and will be recovered from the bills of the Contractor from time to time.

19. INSPECTION OF SITE AND SUFFICIENCY OF THE TENDER

If the NRDA is not in a position to deliver to the Contractors the site of the Contract work for any reason whatsoever at the agreed time, delaying the commencement of the contract work, or part thereof not beyond 50 % (fifty percent) of contract period for completion, such omissions of the NRDA shall not be breach of any its obligations under the contractor and the Contractor shall not be entitled to claim from the NRDA for loss or damage, if any, caused thereby, but

shall be entitled to a reasonable extension of the period agreed for the completion of contract work. If the contractor shall be obstructed in the execution of the work by any person other than an agent or servant of the NRDA, the Contractor shall exclusively deal with such set by the due process of law but shall not be entitled to attribute thereby the beach of any obligation under the contract to the NRDA compensation for damage or loss, if any, thereby suffered but shall be entitled to an appropriate extension of period agreed for the completion of the contract work, provided that the contractor has reported to the NRDA every such act of obstruction with particular soon after its occurrence and the NRDA has after enquiry found the same to be substantially true and has determined the duration of such obstruction.

20. PROGRESS OF WORK

The Contractor shall carry out the work as per the programme approved by the Department from time to time. He will also not be allowed to proceed with the work in a scattered manner.

21. ENGINEER

21.1 Engineer for this project shall be the Engineer or the person nominated or appointed by NRDA from time to time and shall include any person duly authorised by them.

21.2 Engineer shall be responsible for the execution of the project with regards to management and supervision. Instructions issued by the Engineer to the Contractor shall be deemed to be the Employer's instructions in respect of-

1. Day to day supervision including material testing using ISO formats proforma of which should be got approved from Engineer.
2. Approval of material and workmanship using ISO formats proforma of which should be got approved from Engineer.
3. Matter of urgency involving safety or protection of person or property.
4. Monitoring progress of work using System Application of Projects (SAP). (Refer 3.5 hereunder).
5. Interpretation of drawings
6. Interpretation of specifications
7. Issue of additional drawings
8. Certification of measurements and bills and issue of certificates accordingly for interim and final bills.

22.3 Engineer shall hold fortnightly progress meetings at site for evaluation and execution of works. The Contractor shall assist in providing revised programmes, cash flow charts in the format required by Engineer/ NRDA.

22.4 The Engineer shall coordinate works at site of all agencies appointed by the Employer.

22. EXCAVATED OBJECTS

All the materials obtained during the process of excavation shall remain the property of the NRDA and shall be disposed off as instructed by the Engineer. The Contractor is supposed to use the selected materials for filling. All operations including loading, unloading, transportation of materials where required with all leads and lifts and handling

them and leveling at disposal site etc., shall be included in the quoted cost and no extra payment whatsoever shall be made to the Contractor on the account.

23. AS BUILT DRAWINGS

The Contractor shall during the course of execution, prepare and keep updated a complete set of 'as- built' drawings recording all works on the blue prints, which shall be corrected daily, if necessary, to show each and every change from the Contract Drawings as a approved working drawings, shop drawings and the exact 'as-built' location, sizes and kinds of work etc. This set of drawings shall be kept on the site and shall be used for record purposes. Changes recorded shall be countersigned by the Engineer and the Contractor. Copies of 'as-built' drawings shall be supplied to the CE), NRDA/ and the Engineer on request.

The Contractor shall submit complete 'as-built' drawings on reproducible tracings and ammonia prints 10 (ten) sets in form of hard copies and Compact Discs 2 nos. for building work and all services as directed by the Engineer within 30 (thirty) days of the completion of entire work by using AutoCAD facility. Maintenance manuals and original warranties shall be submitted at the time of submitting the As-built drawings. In case the Contractor fails to submit complete 'as-built' drawings as aforesaid [in form of hard copies [10 (ten) sets] and Compact Discs [2 (two) nos.], he shall be liable to pay a sum equivalent to 0.1 percent of the value of work subject to maximum of Rs.10 lakhs (Rupees ten lac only) or as may be fixed by NRDA and this decision shall be final and binding. Pre-final & Final Bill shall not be released until all the as-built drawings are submitted & approved.

24. ENGINEER'S SITE OFFICE

Deleted

25. TRANSPORTATION

Deleted

26. PROVIDING COMPUTER & OTHER EQUIPMENTS AT SITE OFFICE

Deleted

27. TELEPHONE CONNECTION

Deleted

28. TIME SCHEDULE FOR COMPLIANCES

The tenderers should please note the following time schedule for various compliances and follow the same:

a) The Initial Security Deposit shall be paid within 15 (fifteen) days of receipt of Letter of Acceptance.

The Contractor should construct the site office within 1 (one) month of date of work order. The site office should be as per relevant clause in the tender document.

The CAR policy and Labour license shall be taken by the Contractor within 1 (one) month from the date of work order.

29. APPROVAL OF ENGINEER

The foundation strata as well as steel reinforcement provided in all RCC members shall be got approved from the NRDA/ Engineer or his authorised representative. At every stage of work, approval of the Engineer shall be taken by the Contractor. Before starting any work like concreting, laying of DWC HDPE pipe, cables, Pole erection and installation of feeder pillar etc. detailed information of the work in the prescribed proforma shall be given to the Engineer and his approval shall be taken by the Contractor. It is the responsibility of the Contractor to get all the hidden measurements like foundation work, reinforcement, etc. recorded before covering the same. All the measurements shall be taken jointly by NRDA's representative and the Contractor's authorized representative and then only the measurements will be forwarded by the Engineer, who will forward it for payment to Chief Executive Officer, NRDA through Chief Engineer, NRDA and directions on any matter whether mentioned explicitly or otherwise.

30. PERMISSION FOR CONSTRUCTION OF SITE OFFICE/ GODOWN/ LABOUR HUTS:

The Contractor shall be permitted to construct temporary structures such as site office, godown, labour huts, Engineer site office, etc. on the land of NRDA within 1 Km radius of site.

The Contractor will have to submit requirement of land for Godown/ Labour Camp/ Batching Plant etc. with logistic layout in Technical Bid. The land shall be provided to the Contractor on Lumpsum lease rent of Rs. 100/- (Rupees Hundred only) per year with Lease Agreement as per prevailing NRDA format. However the Contractor shall require permission of NRDA for erecting site office, labour huts. In the event the Contractor fail to remove site office/ godown and labour huts from the land immediately after construction is over, NRDA will charge rent as per the rules prevalent at the time. No final bill payment shall be made, unless the site is cleared by the contractor in all respects.

The Contractor shall number the structures and display name of the Company, period for which permission is granted, etc. at such approved sites. No final bill payment shall be made unless the site is cleared in all respects by the Contractor.

31. CONDITIONAL TENDER

The Tenderer shall note that the clarifications shall be obtained in the pretender meeting and the tender should be submitted without any conditions, whatsoever. Clarifications given to the various tenderers in the pre-tender meeting would be summarized by NRDA and would be issued to every tenderer as "Minutes of Pre-Tender Meeting". The same will be binding on all the tenderers irrespective of whether they have attended the pre-tender meeting or not. The Minutes of the Pre-Tender Meeting would form part of the Contract Agreement and the Tenderers should submit the Financial Offer taking into consideration the same. The Tender submitted with conditions would be summarily rejected.

32. SITE ORDER BOOK& OTHER BOOKS REQUIRED

The Engineer will maintain Site Order Book at the site of work. The Contractor or his authorized representative shall sign all the instructions received therein, in token of having received the same and shall comply with them forthwith.

All other books of record at site shall have to be maintained as required in the CPA Code of works.

33. POUR CARD SYSTEM

Pour card system/RFI system to be introduced for approval of individual activity. Format to be got approved from engineer before start of work

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34. CLEANING Of SITE

a) All water which may accumulate on the site during the progress of the works or in trenches and excavation shall be removed from the site to the satisfaction of the Engineer at the Contractor's cost. Site shall be maintained free from rubbish. Proper stacking of scaffolding material, shuttering material bricks/ brickbats, steel pieces, etc. needed for work on day to day basis shall be organized in proper stacks. Heaps of material lying around in unplanned manner and disorderly fashion shall not be permitted. Engineer's decision in this matter shall be final.

b) The Contractor shall not, at any time, do cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to Employer, tenants or occupiers of other properties near the site and to the public in general. The Contractor shall install mosquito proof and accessible water storage tanks for construction and drinking water.

c) The Contractor shall periodically give largasidal treatment to water storage tanks, sites of water stagnation, water collection.

d) Prior to handing over the contractor shall appoint Professional Cleaning Agency to clean the building works prior to handing over. The Agency shall have minimum 5 (five) years prior experience in the hospitality industry and shall be appointed with the prior approval by the Engineer.

e) Any expenditure that may be incurred by NRDA to ensure that the above conditions are fulfilled by the Contractor will be debitable to Contractor's account and will be recovered from the running bills of the Contractor from time to time.

f) Cleaning: Remove staining or reactive materials from new surfaces immediately during course of the Work.

g) Debris: Remove hazardous accumulations of debris promptly, at least daily.

h) Dust: Confine dust producing operations during painting and finishing. Vacuum immediately after completion.

i) TRASH DISPOSAL

j) General: Keep new buildings and site free from accumulations of waste materials.

k) Removal: Remove cartons, crates, wrappings, lunch trash, and other trash from each room daily. Provide trash receptacles on each floor of each building and in convenient locations on the site.

l) Burning: Do not burn trash or other materials on Owner's property.

m) EXCESS MATERIAL: General: Remove excess materials, including demolished materials, excess earth, and excess building materials from Owner's property and dispose of legally.

n) Clean: Keep paved drives on Owner's property and public streets and alleys clean, by cleaning daily, or more often if necessary, of earth and debris spillage from trucking involved in construction operations.

35. FENCING

During the construction, care shall be taken so that, areas around are not polluted and where required Hessian cloth shall be tied around, while work is in progress. Further, it is obligatory on the part of the Contractor to fence the area allotted and earmarked by NRDA for labour camp, batching plant of the Contractor within a month of issuance of work order. The temporary fencing shall be provided in the area as directed by Engineer using vertical blinds using corrugated GI sheets about 3m high with necessary metal frame work and staging to cordon off the view of the premises. The Contractor shall maintain the fencing properly throughout the construction period.

36. WATCH AND WARD

The Contractor shall make necessary watch and ward arrangement for a period of three months from the date of total completion of work. No claim shall be paid to the Contractor towards the watch and ward during this period.

Protection General Requirements:

a) **Laws:** Comply with applicable laws, ordinances, rules, regulations, and orders of authorities having jurisdiction for safety of people and protection of property from damage, injury, or loss.

b) **Responsibility:** Be solely responsible for initiating, maintaining, and supervising safety precautions and programs concerning Project security, but obtain Owner's approval of methods to be used and location of safeguards. Submit to NRDA, through Engineer, drawings and written description of methods and devices Contractor intends to use and do not begin Work at the site until such means and methods are mutually agreed on by Owner and Contractor.

c) **On Public Property:** In addition to other means used in the interest of safety or security, comply with the requirements of governmental agencies having jurisdiction

d) **Safeguards:** Erect and maintain, as required by conditions and progress of the Work, necessary safeguards, for safety and protection, including temporary fences, guards, railings, barricades, canopies, lighting, shoring, directional and danger signs, signals, and other warnings against hazards.

e) **Security:** Protect and secure the site, new materials and equipment from theft and damage by whatever reasonable means are effective. Use methods such as the following, singly or together: locks, fences, signs, patrols, radio, alarms, locked storage on-site, and off-site warehousing.

f) **Wall Closures:** Unless other acceptable means are provided, provide temporary closures for openings in walls along adjoining to make the building and site secure. Secure temporary closures when Work is not in progress using suitable means such as dead bolts inaccessible from the public side or locks or padlocks construction master keyed in accordance with Section, “Finish Hardware."

g) **Entrances:** Do not block entrances to premises to remain in use or in any way inhibit access to them.

h) **Design Live Loads:** Do not permit placing materials or equipment on new to exceed design load of structure or endanger structure or people.

i) **Trenches:** Do not permit trenches to remain open for prolonged periods without adequate board covering or fencing.

j) **Broken Glass:** Be responsible for glass broken during construction period; at completion, replace broken glass.

k) **Weather Protection:** During construction, provide protection against weather (rain, wind, storms, frost, or heat), and maintain work, materials, apparatus, and fixtures free from damage. At end of each workday, cover new work likely to be damaged.

l) **Dust**: Take precautions necessary to keep Work under this Contract and adjoining property reasonably free of dust.

m) **Protection of Construction Materials:** Refer to other specification sections for specific requirements.

n) **Materials Hoist:** Do not permit transporting of people on materials hoisting facilities.

o) **Removals:** Except for fences, remove temporary construction and protection specified in this section promptly when no longer needed and when removal is approved.

p) Maintain temporary fences until date of Substantial Completion, unless approval is obtained for earlier removal; then remove the temporary fence.

q) **Damaged Site Improvements:** Repair and restore to condition at beginning of construction, or better, existing site improvements, such as pavements, curbs, buildings, fences, lawns, plantings, and lighting which are not to be removed under this Contract but are damaged or defaced by Contractor's operations, except where new Work is required by the Contract.

r) **First Aid Equipment:** Provide at the site. Also provide continually available trained and qualified personnel to render first aid when needed.

s) **Emergency Signs:** Provide signs posted at telephones listing telephone numbers of emergency medical services, physicians, ambulance services, and hospitals.

37. MOBILISATION PERIOD

This clause shall be read in continuation of Clause No 10 (B) (ii) of GCC. No mobilization advance shall be given by NRDA.

38. METHOD OF CARRYING OUT THE WORKS

The Contractor shall, within 15 (fifteen) days of receipt of the Employer's order to commence work under respective clause of General Conditions of Contract submit for his approval a detailed programme and statement with drawings and diagrams showing how he proposes to carry out the works based on the tender programme. The statement shall describe the methods to be employed in carrying out the works, the Constructional Plant and temporary works which the Contractor intends to supply or use and shall include a list, classified into trades of labour force envisaged. The programme shall give the estimated dates on which the various sections of the works will commence together with the estimated date of completion and estimated output so that the whole of the works may be completed within the Contract Period.

a) In addition, the Contractor shall submit to the Engineer drawings and full particulars of Temporary Works he intends to construct at least 8 (eights) days before he intends to commence such works. The Engineer may require modifications to be made if he considers the proposals to be insufficient and the Contractor shall give effect to such modifications at his own cost but shall not be relieved of his responsibility for the sufficiency thereof.

b) The Contractor shall prepare a detailed survey of existing services on the site which he shall clearly mark up on a drawing for the approval by the relevant service authorities prior to commencement of the works.

c) The Contractor is to progress the works thoroughly and to take such action as is necessary in order to ensure that the approved programme is strictly adhered to in all its stages. The Contractor shall submit detailed programmes of the various sections of the works as and when required by the Engineer, the Contractor shall take all precautions and cover all contingencies to ensure that adequate spare equipment and materials are available at all times to ensure completion of this work in accordance with the agreed programme.

d) The acceptance of programmes as submitted by the Contractor or with any modification thereto, in the opinion of Engineer, shall not relieve the Contractor of his responsibility to complete the work within period specified in as per Annexure 'A' unless extension of time limit is expressly sanctioned under respective clause of standard General Conditions of Contract or Special Conditions of Contract.

e) The Contractor shall prepare the CPM programme on computer and the same to be monitored by proper installation of PC and printer facilities at the site.

f) The bills shall be on computer and the programme will incorporate the deductions of Mobilisation Advance and other items.

39. CONTRACTOR RESPONSIBLE FOR SUFFICIENCY OF MEANS EMPLOYED

The Contractor shall take upon himself the full and entire responsibility for the sufficiency of plant, centering, scaffolding, timbering, machinery, tools or implements and generally for all means used for the fulfilment of the Contract. In the event of any of these means proving insufficient, the Contractor is still fully and entirely responsible for the sufficiency of these means notwithstanding any previous approval or recommendation that may have been given by the Engineer.

40. DRAWINGS

The Contractor will receive from the Engineer, 2 (two) prints of the tender drawings listed hereof, together or thereafter with any further drawings issued for Road and Electrical System. Working drawings shall be progressively issued as per the approved construction schedule submitted by the contractor & approved by NRDA.

41. STANDARDS

In various places throughout this specification and the bills of quantities, reference is made to the standards, specifications and byelaws issued by the Indian Standard Institutions and other similar organizations. These references shall in every case be deemed to include the latest edition or issue of such standards, specifications and byelaws including all revisions, amendments and addendum subsequently issued. Where materials are not specified and standard exists in respect of such materials, then the materials shall in all respects comply with

relevant and current I.S.I. In such cases where I.S.I. do not exist, the best manufacturers' specification shall be followed; in absence of all these, Engineer's instruction shall be followed.

42. SUPERVISORY STAFF (As per clause 36 (i) of schedule F of the tender)

The Contractor shall engage on the work a qualified and experienced Engineers, Supervisor, capable of managing and guiding the work properly as detailed in Cl 36(i) of schedule F of the tender Form F-1. This supervisor shall be authorized by the Contractor in writing to receive the orders issued by the Engineer from time to time. The Contractor shall be responsible for carrying out these orders promptly.

43. FIRE PRECAUTIONS

The Contractor shall comply with fire regulations of the controlling authority in force at the site of the works relating to the precautions to be taken against fire hazards.

44. USE OF SITE

The Contractor shall not use any portion of the site for purpose not connected with the works without the prior written approval of the Engineer. He shall maintain permanent and site access roads free of spillage and shall not interfere with the flow of traffic. Also same shall apply to terraces and other developed areas. This clause shall be read in conjunction with clause no. 15 of the Special Conditions of Contract.

45. SAFETY ENGINEER

The Contractor shall employ and depute at site on full time basis a fully qualified Safety Engineer(s) who shall be responsible to ensure observance of safety precautions and measure required to be taken at site. Further he shall make sure stipulations laid down in safety code as provided in GCC.

46. QUALITY ASSURANCE MANUAL AND SAFETY MANUAL

Successful tenderers will be required to submit Quality Assurance Manual and Safety manual made as per applicable specification for various items of work and get the same approved from Engineer before start of work and the adhere the same during actual execution of work.

i. Quality Assurance Manual (QAM)-

A quality assurance manual constituting a base document outlining quality policy of the agency, procedures, name of action, compliance, acceptance criteria and documentation etc. Shall be prepared by the successful tenderer and submitted to the Engineer for approval within 15 (fifteen) days from the date of receipt of work order. The QAM shall be prepared in such a way that it follows all the applicable specifications. The document shall generally cover aspects listed below, but not limited to the same.

Scope of work

a) Planning for items to be executed including method statement and resource deployment both physical and financial.
b) Identification of all parties involved in QA and their inter-relationship.
c) Execution plan of Quality System giving reference - standard - frequency and acceptance criteria.
d) Levels of cross checking/ verification in case of multiple verifications/ controls, including systems of inspection and audit, wherever applicable.
e) Organization of personnel, responsibilities and lines reporting for QA purpose.
f) Testing and statistical analysis.
g) Inspection reports at the end and during defect liability period/ maintenance period.
h) Items to be covered for maintenance manual,
i) Check list viz. Forms and formats.

ii. Inspection of Works at Factory/ Workshop

For any visits that maybe necessary for the purpose of performance of testing, inspection of factory made goods/ equipments, at a location other than the site ,or Raipur, the actual cost of travel (to & fro airfare/ train A/c 1st class), boarding & lodging, local transport & per diem (per person per day) costs at the rate of Rs. 3000 (Rupees three thousand only) for any visit made by officials from NRDA/ PMC/ Architect/ Consultant (maximum 3 (three) persons per instance), shall be borne by the Contractor. Such visits may be necessary for the inspection of transformers, RMUs, GSM base street light automatic control system, cable, pipes, lighting fixtures and DBs etc. that require inspection prior to shipping from the place of its manufacture. Any other item which is required to be tested before being processed/ fabricated in the factory, such visits shall require the prior written approval from the NRDA.

47. QUALITY ASSURANCE SYSTEM

A quality assurance procedure covering all aspects of the work shall be adopted for this work to ensure the desired quality. Details of the procedure shall be decided by mutual consultation between the Engineer and the contractor at the start of the works.

a) The contractor shall submit within the time stipulated by the Engineer in writing, the details of actual methods that would be adopted by the contractor for the execution of any item as required by the Engineer at each of the locations, supported by necessary detailed drawings and sketches including those of the equipment and machinery that would be used, their locations, arrangements for conveying and handling materials etc., and obtain prior approval of Engineer well in advance of starting of such item of work.
b) The Engineer reserves the right to suggest modifications or make complete changes in the methods proposed by the contractor, whether accepted previously or not, at any stage of work, to obtain the desired accuracy, quality safety and progress of work which shall be binding on the contractor and no claim on account of such change in method of execution will be entertained by the Employer so long as Specifications of the items remains unaltered.

c) The Contractor shall furnish within the period of 15 (fifteen) days a detailed programmed schedule using PERT/ CPM technique in quadruplicate including the date of actual start, the monthly progress expected to be achieved and the anticipated completion date of each major item of work to be done by him, also indicating, plant and machinery and material procurement schedule.

d) The schedule is to be such as is practicable of achievement towards the completion of the whole work in the time limit and of the particular items, if any, on the due date specified in the contract and shall have the approval of the Engineer. No revised schedule shall be operative without such acceptance in wiring. The Engineer is further empowered to ask for more detailed schedule or schedules say weekly for any item or items, in any case of urgency of work as will be directed by him and the contractor shall supply the same as and when asked for.

e) The contractor shall furnish sufficient plant, equipment and labour as may be necessary to maintain the progress schedule. The working and shift hours for operations to be done under.

f) Further, the contactor shall submit the progress of work in forms and statements etc. at periodical intervals in the form of progress charts, forms, statements and/ or reports as may be approved by the Engineer.

g) The contractor shall maintain proforma, charts, details regarding machinery, equipment, labour, materials, periodical returns thereof as may be specified by the Engineer.

48. EQUIPMENT MAINTENANCE MANUAL

The Contractor shall mention the list of machinery procured at site for the work in this manual. This manual shall also reflect the name of the manufacturer, age of machinery and the agency entrusted with the maintenance work of the machinery listed in the manual.

49. MINIMUM PLANTS, EQUIPMENTS AND SHUTTERING

Sr. No	Particulars	Quantity
1	Mechanical Mixer Machine	1 nos.
2	JCB	1 Nos.
3	**Vibrators**	
A	Electric with low noise	1 Nos.
B	Petrol (Stand by)	1 Nos.
C	Needles – 20	2 Nos.
4	Bar Bending Machine up to 40mm dia.	1 No.
5	Bar cutting Machine up to 40mm dia.	1 No.
6	Material Hoist	As per requirement
7	Curing Pumps	2 Nos.
8	Pan mixer of not less than 0.5 Cum	2 Nos.
9	Minimum shuttering material to be provided by the contractor (Good quality steel plates inc steel propos etc.)	2 sqm

Note : The details referred to herein above are only for the purpose of quantitative assessment. The specifications & qualitative aspects of the shuttering material shall be in

accordance with the BOQ & Technical specifications. The details are to be provided with in 15 days after award of contract.

50. SUBMITTALS:

Unless otherwise specified or directed by NRDA, the Contractor shall submit to NRDA for his review and approval all Co-ordinated services drawings, shop drawings, samples, materials lists, equipment date, instruction manuals, record documents, manufacturers' equipment manuals, design calculations for proprietary items of work, technical submittals, and other information required by the Contract Documents. Submittals and their contents including deviation shall be properly prepared, identified, and transmitted as provided herein or as the Owner may otherwise direct. Except for record documents and instruction manuals for operation and maintenance, submittals including deviation shall be approved before the material or equipment covered by the submittal is delivered to the site. The contractor shall furnish an authority if required from material suppliers.

51. PLANT, MACHINERY AND SHUTTERING

The contractor is required to submit details of plants and machineries to be deployed by him in a Proforma indicating all details such as make, year of manufacture, registration etc be submitted. The details are to be provided with in 10 days after award of contract.

52. SUB-CONTRACTORS

All **specialised** works will be carried out by licensed (where applicable) sub contractors approved by NRDA.

i. It may be noted that the contractors will have to submit credential of the selected contractors to NRDA for approval.
ii. It may further be noted that even if the contractor has in house licensed subcontractors for these works, they will have to select and engage contractors with prior approval of NRDA.
iii. All specialists, merchants, tradesmen and other agency executing any work or supplying and fixing any goods which items have been included in the Schedule of Quantities and/ or Specifications or for Extra/ Substituted items of works, who may be nominated or selected by the Engineer/ Contractor are hereby declared to be Sub-contractors employed by the Contractors. No nominated Sub-contractor shall be employed on or in connection with the works against whom the contractor shall make reasonable objection or (save where the Engineer and contractor shall otherwise agree) who will not enter into a contract provided:
    1. That the nominated sub-contractor shall indemnify the Contractor against the same obligations in respect of the sub-contractor as the contractor is under in respect of this contract.
    2. That the nominated sub-contractor shall indemnify the Contractor against claims in respect of any negligence by the Sub-contractor, his servants or agents or any misuse by him or them or any scaffolding or other plant, the property of the Contractor or under any Workmen's Compensation Act in force.
    3. That the nominated sub-contractor shall submit his bills to the Contractor.
    4. That the Contractor shall make payment to the nominated Sub-Contractor within 3 (three) days of the Contractor's receipt of the payment from NRDA against the Engineer certificates of payment

providing that before any Certificate is issued, the Contractor shall upon request, furnish to the Engineer proof that the nominated sub-contractor's accounts included in previous certificates have been duly discharged in default whereof NRDA may pay the nominated Sub-contractors upon a certificate of the Engineer and deduct the amount thereof from any sums due to the Contractor. The exercise of this power shall not create privity of contract as between NRDA and Sub-Contractors.

5. The Engineer in his absolute discretion may recommend payment to the nominated Sub-Contractor directly by NRDA and deduct the amount thereof from any sums due or which may become due to the Contractor or recover the same amounts from the Contractor.
6. No Labor contracts shall be permitted.
7. Prior approval of the Sub-contractor by the NRDA is mandatory.
8. Required 2 No. of contractors as choice would be of NRDA
9. Further sub-contracting/ sub-letting of the work shall not be permitted.
10. NRDA shall not permit under any circumstances Assigning, Transferring or Subletting of entire work or substantial part of work to be executed under this contract. If the Contractor attempts or assigns, transfers and sublets the entire or substantial work, the contract shall be terminated by the NRDA without prejudice to any right or remedy which shall have accrued or shall accrue thereafter to the NRDA.
11. The Contractor shall not be permitted to give power of attorney for executing the work to any other agency or person on their behalf. The power of attorney for executing the work shall only be given to regular employee of the agency with prior approval of NRDA.

iv. ESSENTIAL CONDITIONS FOR ELETRICAL WORKS:-

1. The Sub-contractor for carrying out the electrical works under the contract should strictly be in accordance with the above criteria.

2. All above referred works will have to be carried out under the supervision of Engineer.

3. Power supply distribution scheme given in tender document is only for guideline purpose. However, successful agency will be responsible for obtaining necessary sanctions to over all power supply distribution scheme, from CSPDCL/ applicable local authority and Engineer before starting execution of work. No extra charges will be paid for obtaining necessary approvals/ sanctions to power supply distribution scheme sanctioned by concerned power supply authority CSPDCL/ applicable local authority, successful agency will have to take up and complete the work accordingly.

4. Successful agency will have to obtain the required approvals to the total electrical works such as, LT distribution, etc from CSPDCL/ applicable local authority/ concerned power supply authority, Electrical Inspector, authority or any other statutory body at their own cost before starting execution of the work and the original sanctions obtained should be submitted to NRDA's concerned Electrical Division before execution of the work. Any statutory cost for obtaining the approval will be reimbursed on production of original receipts.

5. The electrical works under the scheme should be carried out strictly in Co-ordination with the concern CSPDCL/ applicable local authority and necessary approvals should be obtained from time to time.

6. Activity Bar Chart and the makes of material should be submitted for electrical works for necessary approvals from the competent authority from NRDA before execution

of the work and work should be started only after the approvals.

7. It will be the agency's responsibility to obtain the following listed documents from CSPDCL/ applicable local authority. Electrical Inspector authority and other concerned Statutory Body towards completion of the work at their own cost, without which work will not be treated as completed.

a) Sanction papers for the total external electrification works along with BOQ of material, demand note for supervision charges, if any.

b) Charging permission of the installation.

c) Inspection report of the various equipments & material supplied under the electrification work certified by CSPDCL/ applicable local authority and NRDA authorities.

d) Manufacturers test certificates and guarantee certificates in original for all the equipments and material supplied for execution of electrification work under the scheme.

e) As Built drawings as stated Volume I showing all the details and certified by CSPDCL, Electrical Inspector authority (along with soft copy).

f) Earth test report for the total installation.

h) Work completion report from CSPDCL/ applicable local authority for the total electrification work should be submitted.

i) Separate guarantee should be submitted to NRDA against the electrical works carried out under the scheme, for a period of 24 (twenty four) months including defects liability period in order to avoid any inconvenience under the scheme and also to attend any defects in installation during this period.

k) All material & equipments to be supplied under this contract shall be offered for inspection at the manufacturing place. No material shall be supplied by the agency without the clearance from the Engineer.

9. The total electrification work under the scheme will have to be carried out as per the terms & conditions mentioned in various sections of the Tender Document.

10. Electrical works under the contract will not be treated as completed unless and until above listed activities are completed by successful agency.

53. **Subject** work is strictly to be completed within stipulated work completion period and in accordance with the activities listed below completely as per the directives from Engineer. The charges and the expenses for completing the following listed activities should be included in the quoted offer and no separate payments against this will be made.

1. Successful agency will have to obtain and submit the Contractor All Risk Insurance Policy (CAR) in original within 1 (one) week from date of work order from Director of Insurance, Government Insurance Fund, Raipur, Chhattisgarh. The Contractors All Risk (CAR) Policy as said above shall be inclusive of insurance coverage under workman's compensation insurance policy for all workmen employed by contractor to complete the works covered under present contract. Further the contractors All Risk Policy period completely as stated in the tender. In case of time period extension (If any), it is essential that, premium of CAR policies should be timely paid by agency in order to ensure the continuity of CAR policy without any break in the same, suitable action will be taken against defaulters as per General Conditions of Contract unless and until the Contractors All Risk Policy as stated in above

manner is submitted to the office of Engineer no payments will be released against any work executed.

2. Obtaining necessary scheme sanctions in detail towards execution and completion of subject work in all respect, from concerned CSPDCL/ applicable local authority. This activity includes required co-ordination and follow-up with concerned CSPDCL/ applicable local authority for obtaining necessary scheme sanctions. The scheme sanction should be inclusive of specifications and required layout and other drawings etc. completely as per the requirement.

   The payment towards the supervision charges of CSPDCL/ applicable local authority shall be paid directly to CSPDCL/ applicable local authority on behalf and in the name of NRDA by the agency.

   The original scheme sanctions along with original certified drawings, specification details, quotations, payment receipt against supervision charges etc. should be submitted to the Engineer.

   The supervision charges paid in the name of NRDA as mentioned above shall be reimbursed on submission of original payment receipts.

3. If required, preparation and submission of execution drawing in co ordination with concerned planning authority of NRDA by engaging Govt. approved Surveyor for confirmation and marking of proposed cable routes, location of control pillar, existing services along the proposed route under the present contract as per the sanctioned scheme obtained from CSPDCL Reports and marked computerized plans duly certified by surveyor in 3 sets of should be submitted after carrying out the details survey as mentioned above.

4 Obtaining necessary road/ soil/ footpath etc. cutting permission for cable trenching from concern authorities like NRDA/ CSPDCL/applicable local authority/ RMNN/ PWD etc. as applicable along the approved route and submit the approval in original along with the drawings and permission to Engineer.

   The charges required for obtaining the approvals and permission as mentioned above should be directly paid on behalf and in the name of NRDA by the agency.

   The charges paid in the name of NRDA as mentioned above shall be reimbursed on submission of original payment receipt to the Engineer

5. Preparation and submission of shop/ execution drawing to Engineer for approvals. Submitting list of Makes of various items and material to be used under present contract for approvals.

   The Contractor or his qualified engineer having updated technical knowledge for execution of the subject work should invariably remain present and co-ordinate during every inspection and testing programme at manufacturers works, similarly during every joint site visits and when required.

7. After supply of material at site, all the documents such as delivery challan, excise gate pass, material test report (in original), etc. should be submitted to Engineer for obtaining installation clearance.*

   The complete work under the present contract shall be carried out with required supervision, stage-wise inspection from concerned authority of CSPDCL/ applicable local authority & Electrical Inspector authority in co-ordination with

Engineer complete with required power shutdowns. The record of all inspection and shutdowns shall be submitted to Engineer.

8. The execution work of cable trenching/ foundation for poles/ foundation of feeder pillar/excavation and trenching in all types of surfaces rocks, soils etc. shall be carried out as per approved route plan by using appropriate tools and machines in close co-ordination with concerned authorities from NRDA, CSPDCL/ applicable local authority, etc. completely as per the requirement so as to avoid the damages to the existing services.

9. Obtaining clearance certificate from concern authority of NRDA, RNN, PWD, CSPDCL/ applicable local authority, etc. as applicable, towards completion of re-surfacing work of cable trenches, excavated surfaces and removal of debris and submission of this clearance certificate in this regard obtained from concerned authorities to Engineer.

* In absence of activity No. 1 & 15 above, the payment towards cable trenches erection and installation will not be released.

10. Arranging and carrying out pre & post testing and commissioning of the completed installation in presence of Engineer, his representative and the representative of any other statutory authorities like CSPDCL/ applicable local authority & Electrical Inspector etc. as required.

11. Excess saving statement as per final execution of work, item wise measurement break up in detail and escalation claim as applicable along with detail calculations and copies of confirmed indices etc. to be submitted to Engineer.

It is mandatory to complete all the activities listed above from Sr. No. 1 to 11 for releasing the final payment.

54. Following conditions are the essential conditions of contract for carrying out and completing the subject work in all respect within stipulated time period. The successful agency will be responsible for completing the same as per the directives of Engineer. The charges and expenditure if any required for completing the same should be including in the quoted offer, and no separate payments against this will be made.

1. The contractor shall visit the site to access the actual quantum of work and period required for completing the same before quoting the offer.

2. Scheme specifications and quantity of the material to be used for the subject work under the contract and specified in the tender document is only for guideline purpose. However it will be the responsibility of the successful agency to obtain the measurements and specifications in detail of each and every item before starting the execution of work and complete the work in accordance with the approvals, clearances obtained for the same. All cost required for completion of work as per statutory approval, shall deemed to have included in the offer quoted.

3. The foundation and excavation for feeder pillar and control pillar, grouting of frames in wall/ ground etc, are require to be carried out by the agency, and cost for the same shall be include in the offer quoted.

4. It will be Agency's responsibility to obtain necessary sanctions and permissions by paying necessary charges towards;

a) Obtaining necessary scheme sanctions and permissions for completing the subject work in all respect from any concerned statutory authority.

5. The successful agency will be completely responsible for accidents occurred if any during the execution of work as well as during 24 (twenty four) months defect liability period under this contract. It will also be the responsibility of agency, for making police complaints against any thefts and accidents etc. under intimation to NRDA.

6. Charges against following listed activates should be included in the quoted offer itself and no separate payments will be made against same.

a) Arranging and carrying out the material inspecting at respective manufactures unit as stated in Annexure - I.

b) Arrangements for performing site visits and other connected activities as and when required by Engineer or his representative.

c) Carrying out necessary co-ordination and follow up with concern authorities for obtaining necessary sanctions and permissions as required towards completion of work in all respects.

d) Appointing Govt. approved surveyor for carrying out site survey and preparation of computerized shop drawing, Execution drawing, As built drawing etc. with soft copy.

e) Any other incidental charges required towards completion of work in all respect.

5. Bills submitted against the executed and completed works at site, will be processed further by Engineer, after necessary scrutiny and verification.

55. The services/ tasks/ works as referred to under clauses shall be suitably applicable to all Utility services executed by the contractor, whether specifically mentioned herein above or no.

56. **<u>Safety, Security and Protection of the Environment</u>**

The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein:

(a) have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons,

(b) provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others, and

(c) take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

57. **<u>HANDING OVER PROCESS:-</u>**

The handing over process shall be based on a performance comprising individual activities. The process shall be approved by the Engineer.

58. EROSION AND SEDIMENTATION CONTROL

i. **General:** Prevent pollution of land, air, and water; control erosion, washout, and surface runoff of earth and stockpiled materials. Preclude sedimentation in general and especially in existing on-site and public storm-water system and public right of way.
ii. **Procedures:** Perform erosion, sedimentation and temporary storm-water control. Follow procedures stipulated in local laws and regulations and as shown on Site work drawings.
iii. **Maintenance:** Maintain controls in place until permanent controls are functioning. Remove when no longer needed.

59. NOISE AND VIBRATION CONTROL

Noise and Existing Building Structure Vibration Generated by Construction Procedures, Equipment, Tools, and Operations: Keep to minimum practicable during demolition and removal from building and site, including loading and removing storage containers. Equipment generated noise levels shall not exceed the following in decibels:-

1. Concrete mixer: 85
2. Concrete pump: 82
3. Crane: 83
4. Materials elevator: 85
5. Pumps: 76
6. Generators: 78
7. Compressors: 81
8. Pneumatic tools: 86
9. Saws: 78
10. Vibrators: 76
11. Other tools: 85

i. Operation of Air Hammers, Compressors, and Reciprocating Equipment: Not permitted inside existing buildings unless specifically approved in writing by Owner.
ii. Laws: Comply with applicable noise control laws, ordinances, and regulations.
iii. Acoustical Enclosures: Stationary equipment may be enclosed to produce required sound attenuation subject to continued maintenance of such enclosures to ensure that specified sound levels are not exceeded.
iv. Violations: Where field sound measurements reveal sound levels exceeding those specified, cease operating such equipment and repair or replace it with equipment that complies with the sound levels specified.
v. Cutting and Drilling Concrete: Use only rotary or core drilling for holes through concrete. Do not use impact tools to cut or otherwise remove concrete or to install inserts.
vi. Power-Activated Tools: Not permitted in or immediately adjacent to existing buildings, except with Owner's written approval in each specific case, except where such use is specifically specified.

60. EXISTING CONDITIONS

i. Contractors Examination of Site:-

1. By executing Contracts, Contractor and subcontractors represent that they have:

a. Visited the site and made due allowances for difficulties and contingencies;

b. Compared Contract documents with existing conditions and informed themselves of conditions to be encountered, including work by others, if any, being performed; and

c. Notified Architect of ambiguities, inconsistencies, and errors they have discovered within Contract documents or between Contract documents and existing conditions.

2. Failure to visit the site and become familiar with conditions shall not relieve Contractor or a subcontractor from furnishing materials or equipment or completing the Work in accordance with Contract documents at no additional cost.

3. Contractor or subcontractors will not be given extra payment for Work related to conditions they can determine by examining the site and Contract Documents.

4. Contractor or subcontractors will not be given extra payment for work related to ambiguities, inconsistencies, or errors within Contract documents, or between Contract documents and existing conditions, when such ambiguities, inconsistencies, or errors are known to Contractor or subcontractor before Contract execution unless Contractor or subcontractor has notified Architect in writing of such condition before execution of Agreement Between Owner and Contractor.

ii. Make use of public property and make arrangements for that use. No extra compensation will be paid due to costs associated with using public property.

iii. Access by Contractor to portions of Owner's property beyond the actual area of Work under this contract is denied, except where necessary to perform the Work, and then only with specific written approval in each case. Refer to other sections for additional requirements.

iv. Contractor shall accept the site in the condition in which they exist at the time Contractor is given access to begin the Work.

v. Damage caused by Contractor to existing structures, grounds plants, pavements, utilities, work by others, fixtures, or furnishings, shall be repaired by Contractor and left in as good condition as existed before the damaging, unless such existing work is shown to be removed or replaced by new Work.

vi. Immediately upon entering the site for purposes of beginning Work, locate general reference points and take such action as is necessary to prevent their destruction; lay out Work and be responsible for lines, elevations, and measurements, and Work executed under this Contract. Exercise proper precautions to verify figures shown on Drawings before laying out Work. See Section "Field Engineering" for additional requirements.

vii. Contractor and each subcontractor, before starting work, shall verify governing dimensions at the premises, including floor elevations, floor-to-floor heights, and column locations and shall examine adjoining Work on

which Contractor's or subcontractor's Work is in any way dependent. No "Extra" or additional compensation will be allowed on account of differences between actual measurements and dimensions shown. Submit differences discovered during the Work to Architect for interpretation before proceeding with associated Work.

viii. Employment of local labour shall be given priority wherever possible. However,

ix. this shall not in anyway affect/ dilute the Contractors obligations listed within the Tender document.

61. LAMINATION OF DRAWINGS

All drawings issued to site shall be kept in lamination condition.

62. Handing Over:

At the time of handing over after completion of work, all the equipment, spare including standby equipment etc. must be in good working order as were taken over before commencement of defect liability period.

63. Penalties for failure to achieve the functional guarantees during Defect liability Period

In case of failure to deliver the required quality of work, liquidated damages shall be imposed for such failure to meet the performance criteria, as described below. The Employer will be entitled to recover any such damages from the security deposits of the contractor or any other sun due to him. However, the contractor shall be allowed to take up routine/ periodical maintenance as per IS guidelines, with prior permission of the Authority.

i. Non redressel of any complaint or instruction given in writing by NRDA within 48 hours: Penalty @ Rs. 6000.00 for each such complaint.

64. ORDER OF PRECEDENCE

In case of any discrepancy between the items mentioned in the BoQs/Specifications/Drawing, the Order of precedence should be as follows:

i. Item details as mentioned in the BoQs, read along with the specification shall prevail. However in case of conflict specification shall hold good.

ii. Drawings.

Signature of Tenderer
Date :

For
Chief Executive Officer,
NRDA, Near Old Mantralaya Mahanadi Dwar,
Raipur 492 001, Chhattisgarh.
Date :

SCHEDULE– D
Section-V
List of approved makes

"NRDA" APPROVED MAKE LIST FOR ELECTRICAL WORK

S. No.	MATERIAL		MAKE
1	**Distribution Transformers**		As approved vendor of CSPDCL
2	**RMU**		Schneider/ L & T/ Siemens/ ABB/CROMPTON
3	**L.T. Panels**	:	Schneider/ L & T/ Siemens/ ABB/C&S/ARROW/LOTUS/CPRI Approved vender
4	**MCCB**	:	L & T/ Schneider/ Siemens/ Legrand / ABB/C&S
5	**Connectors**	:	Elmex/ Connect well/ Raychem/ Andrew Yule
6	**MCB**	:	L & T/ ABB/ GE/ Schneider/ Legrand/ Andrew Yule/C&S
7	**Capacitors**	:	Epcos/ PUCAT/ Areva/ Unistar
8	**Wires**	:	Finolex/ Polycab/ RR Cables/ Gloster
9	**HRC**	:	L & T/ Schneider/ Standard/ ABB/C&S
10	**Power Switch (upto 32A)**	:	L & T/ C&S/ Schneider/ Siemens/ ABB
11	**Cable Jointing kit:**		Densons/Raychem/3M
12	**LED Lighting Fixture**	:	Philips/ WIPRO/ BAJAJ/SHREDER/THORN
13	**LED**		Osram/ Philips/Cree/NISHIA
14	**APFC type electronic ballast**		Intellux / Atco / Vossloh / Philips / Wipro
15	**LT Cable**	:	Finolex/ Universal/ Polycab/ Prime-cab/ Gloster/ CCI/HAVELLS
16	**Octagonal Pole**		Bajaj/TransRail/Valmount
17	**DWC Pipe**		C-Rex / Tirupati/Reliance
18	**Automatic Street Light Control System**		Schneider/ L & T/ Siemens/ ABB/CROMPTON/Philips/Bajaj
19	**11 KV Cable**	:	Universal/ Polycab/ Prime-cab/ Gloster/ CCI

Note:- Wherever makes have not been specified for certain items conform to **IS**, the same shall be as per BIS and as per approval of NRDA.

SCHEDULE– E

Reference to General Conditions of contract.

SCHEDULE-E

Reference to General Conditions of contract.

Name of Work : "Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur.".

Estimated cost of work		: Rs 1563.35 **Lacs**
(i)	Earnest Money	: Rs. 15.64 **Lacs**
(ii)	Performance Guarantee	: 5% of tendered value
(iii)	Security Deposit	: 5% of tendered value

SCHEDULE– F

General Rules & Directions

SCHEDULE-F

GENERAL RULES & DIRECTIONS : Officer inviting tender

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3:	See below

Definitions:

2(v)	Engineer-in-Charge	**Executive Engineer (E), NRDA or Any Officer Appointed by CEO, NRDA**
2(viii)	Accepting Authority	**Chief Executive Officer, NRDA**
2(x)	Percentage on cost of materials and Labour to cover all overheads and profits:	15 %
2(xi)	Standard Schedule of Rates	**CG SoR with Updated Amendments**
2(xii)	Department	Naya Raipur Development Authority

Clause 1

(i)	Time allowed for submission of Performance Guarantee from the date of issue of letter of acceptance	**7 days**
(ii)	Maximum allowable extension beyond the period provided in (i) above	**7 days**

Clause 2

Authority for fixing compensation under clause 2 — **CEO, NRDA**

Clause 2A

Whether Clause 2A shall be applicable — **No**

Clause 5

Number of days from the date of issue of letter of acceptance for reckoning date of start — **15 days**

Mile stone(s) as per table given below:-

To be submitted by the tendered on award of work

Sl. No.	Description of Milestone (Physical)	Time allowed in days(from date of start)	Amount to be with-held in case of non achievement of mile stone
1.		**NA**	
2.		**NA**	
3.		**NA**	
4.		**NA**	
5.		**NA**	

Time allowed for execution of work — **8 months including Rainy Season**

Authority to decide:

(i) Extension of time **CEO, NRDA** (Engineer in Charge or Engineer in Charge of Major Component in case of Composite Contracts, as the case may be)

(ii) Rescheduling of mile stones **Chief Engineer (Engineering)**

Clause 6, 6A

Clause applicable - (6 or 6A) **6A**

Clause 7

Gross work to be done together with net payment /adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment **Rs 40 Lakhs**

Clause 10A **All the materials as per contract.**

1. ……. 2. ……. 3. ……

4. ……. 5. ……. 6. ……

Clause 10B(ii)

Whether Clause 10B (ii) shall be applicable **No**

Clause 10C

Component of labour expressed as percent of value of work **Not Applicable**

Clause 10CA **Not Applicable**

Sl. No.	Material covered under this clause	Nearest Materials (other than cement, reinforcement bars and the structural steel) for which All India Wholesale Price Index to be followed	Base Price of all Materials covered under clause 10 CA*
1.			
2.			
3.			
4.			

* Base price of all the materials covered under clause 10 CA is to be mentioned at the time of approval of NIT.

Clause 11

Specifications to be followed for execution of work — **Tender specification attached with Tender document, CPWD, MOSRTH, CPHEEO and relevant IS Specifications.**

Clause 12

12.2. & 12.3 Deviation Limit beyond which clauses 12.2 & 12.3 shall apply for subjected work…… **25%**

12.5 Deviation Limit beyond which clauses 12.2 & 12.3 shall apply for foundation work…… **25%**

Clause 16

Competent Authority for deciding reduced rates. — **Chief Engineer (Engineering), NRDA**

Clause 18

List of mandatory machinery, tools & plants to be deployed by the contractor at site:-

1. JCB 2. Vibratory Roller 3. Concrete Mixers

4. Chain pulley crane 5. Needle/ plate Vibrator 6. Needle Plate

9. ……

Clause 36 (i)

Requirement of Technical Representative(s) and recovery Rate

Sl. No.	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical/ Technical Representative)	Minimum Experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36(i)	
						Figures	Words
1.	Graduate Engineer	Civil/ Electrical	Project Manager	5	1	2000/day	Two thousand per day
2.	Diploma Engineer	Civil	Site Engineer	2	1	1000/day	One thousand per day
3.	Diploma Engineer	Electrical	Site Engineer	2	1	1000/day	One thousand per day

Assistant Engineers retired from Government services that are holding Diploma will be treated at par with Graduate Engineers.

Clause 42

(i) (a) Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of C.G.S.O.R — Not Applicable

(ii) Variations permissible on theoretical quantities:

(a) Cement

For works with estimated cost put to tender not more than Rs. 5 lakh. — 3% plus/minus.

For works with estimated cost put to tender more than Rs.5 lakh. — 2% plus/minus.

(b) Bitumen All Works — 2.5% plus & only & nil on minus side.

(c) Steel Reinforcement and structural steel sections for each diameter, section and category — 2% plus/minus

(d) All other materials. — Nil

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

Sl. No.	Description of Item	Rates in figures and words at which recovery shall be made from the Contractor	
		Excess beyond permissible variation	Less use beyond permissible variation
1.	Cement	NA	NA
2.	Steel Reinforcement	NA	NA
3.	Structural Sections	NA	NA
4.	Bitumen issued free	NA	NA
5.	Bitumen issued at stipulated fixed price	NA	NA

NAYA RAIPUR DEVELOPMENT AUTHORITY

Tender document for Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur.

(Following Three-Envelope Tender Procedure)

TENDER DOCUMENT (PART ONE)

(Item Rate)

NIT no. 37 ~~/NOB complex/CE (E)/NRDA/2011-12, Raipur. Dated: /ST-LED-II/ELECT/CE(E)/NRDA/2013-14, Raipur, Dated:~~ 19.07.2013

Issued by: Chief Executive Officer,
Naya Raipur Development Authority (NRDA)
Near DKS Bhawan,
Raipur 492 001, Chhattisgarh
Tel: (0771) 4066011, Fax: (0771) 4066188,
E-mail: ceo@nayaraipur.com

Tender Document Contains

(a) **Only schedule "A" and Section-I of schedule "D" are to be filled & singed by the tenderer**
(b) **All the certificates as per pre qualification criteria shall be appended with relevant forms of schedule"D"**

1. PART ONE (NRDA F-1)-(Attached herewith, to be submit along the tender)

Part (A)

a) **Press Notice**

b) **Detailed NIT**

Part (B)

a) Schedule-A

(i) Cost Abstract

(ii) Bill of Quantities

b) **Schedule-B –NIL**

c) **Schedule-C –NIL**

d) **Schedule-D**

Section-I..... Technical tender forms

(i) Letter of Technical Tender

(ii) Tenderer's Information Sheet

(iii) Annual Turnover

(iv) Specific Construction Experience

(v) Declaration

(vi) Check list for Technical tender evaluation

Section –II ……...Scope of work

Section –III..... Technical specifications of work

Section –IV..... Special Conditions of Contract (NIL)

Section –V..... List of approved makes.

Section –VI..... Drawings

e) **Schedule-E**

f) **Schedule-F**

2. PART TWO (NRDA F-2/3))-Standard form (Not Attached herewith, and not to be submitted along the tender)

Important note: - Link site http:// nayaraipur.com/documents/gcc.pdf

1. **General Guidelines**
2. **Tender**
3. **General rules and directions**
4. **Conditions of contract**
5. **Clauses of contract**
6. **Model rules relating to labour, water supply and sanitation in labour camps safety code**
7. **Sketch of cement Godown**
8. **Contract forms**
   (a) Draft Format for Performance Security
   (b) Earnest Money Deposit Form (Bank Guarantee)
   (c) Format of Contract Agreement
   (d) Draft Format for Performance Guarantee for Water Proofing and Anti-termite Works
   (e) Indemnity Bond

(f) Indenture Bond

(g) Notice for Appointment of Arbitrator

9. Proforma of schedules (Schedule 'A' to Schedule 'F')

NAYA RAIPUR DEVELOPMENT AUTHORITY

Tender document for Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur.

(Following Three-Envelope Tender Procedure)

Schedule – A

Price tender

To be submitted in ENVELOPE-3

NIT no. 37/ST-LED-II/ELECT/CE(E)/NRDA/2013-14, Raipur, **Dated: 19.07.2013**

Issued by: Chief Executive Officer,
Naya Raipur Development Authority (NRDA)
Near DKS Bhawan,
Raipur 492 001, Chhattisgarh
Tel: (0771) 4066011, Fax: (0771) 4066188,
E-mail: ceo@nayaraipur.com

Abstract of Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur.

Sr. no.	Description of Items	Amount in INR
A	Street Lighting of City level Roads	
B	Cable work for street Light and High Mast	
C	High Mast	
D	LT Supply System	
	Total Amount in INR	

Schedule for Design, Supply, Installation, Testing and Commissioning of LED Street Lights and High Mast Lighting system along with power supply infrastructure development at Naya Raipur.

S.No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
1	2	3	4	5	6(4x5)
A	**Street Lightning**				
1	Designing and providing suitable M-20 RCC foundation size 600x600x2000 mm for 10 meters of high GI octagonal pole including steel reinforcement (minimum 90kg per cum), form work, embeding 2 nos 50mm dia PVC pipe for cable entry in each foundation, excavation disposal of surplus soil and curing etc. as required.(0.75 cum per pole)	cum	870		
2	Supply of hot dipped galvanized (in single dip to average 70 micron) **octoganal pole** made of 4mm thick steel plate having base plate 275x275x16mm, window and flush cover with locking arrangement at suitable height from base for cable termination block, pole suitably reinforced with welded steel section at window cut section to make the strength of pole unaffected, including template and anchor plate 270x270x3mm with 4 nos 750mm long, 24mm dia foundation bolts (EN8 grade).				
a	10 metre high, minimum dia 184mm at bottom and 75mm at top	Each	1160		
3	**Erection of GI octogonal pole** on existing cement concrete foundation having grouted bolts and nuts, aligning in true vertical position as required.				
a	10 metre high	Each	1160		
4	Supply and fixing following **decorative street light pole bracket** on existing pole made out of aHot dip GI "A" class pipe welded to 300 mm long MS pole canopy of suitable dia at a angle of 102.50 including having MS triangular stiffner of size 150 X 50 X 5 mm thick, making arrangement for tightening the bracket with pole by providing suitable size heavy duty nuts and bolts in canopy, painting with one coat of approved steel primer etc. as required.				
a	Single Over Hang 1.50 metre Long Decorative	Each	770		
	Double Over Hang 1.50 metre Long	Each	390		
5	Supplying, installation, testing and commissioning of following 230/250 volts **LED street light fitting** with LED, gear box, igniter, capacitor with IP 65 protection on pole bracket complete but without lamp as required.				
a	not more than 215 watt	Each	1550		

S.No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
1	2	3	4	5	6(4x5)
A	**Street Lightning**				
6	Design, Fabrication, Supply, Erection, Testing and commisioning of Powder coated, Weather Proof Double door type **Feeder pillar** fabricated out of 14 guage CRCA sheet steel in cubical, free standing, dust and vermin proof, with reinforcement of suitable size angle iron, channel, T -iron or flats as required. Feeder pillar shall be treated with all anti-corrosive process before painting as per specification. Feeder Pillar shall be suitable for 415V, 3-Phase, Four wire, 50 Hz supply complete with earth bus and lifting hooks as required in case of large panels.Approval shall be taken for each panel before fabrication. (All hardwares like nuts and bolts used shall be Galvanized and Zinc passivated)	Set	14		
	INCOMER				
	1No. 4 Pole 100A TPN MCCB (35 KA)				
	1No. 100A FP Contactor, AOM switch & Timers for 24 Hrs. setting				
	Metering & Indication				
	1 set of phase indicating lamps				
	BUS-BAR				
	1 Set of 100A TPN Aluminium Bus Bar with colour coded PVC Sleeves				
	OUTGOINGS				
	6 Nos. 32A FP MCB				
7	GPRS Based Remot Control Unit housed inabove proposed feeder pillar	Set	14		
8	Earthing with G.I. earth pipe 3.0 mtr long, 40 mm dia including accessories with charcoal Sand or bentonide powder as required.	Set	1160		
	SUB TOTAL (A)				

S.No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
	(B) Cable work				
1	2	3	4	5	6(4x5)
1	Supplying and laying **double wall HDPE** pipe having corrugation on the outer wall and plan surface on inner wall in ground below road, path etc at a depth not less than 60 cm including excavation, dismantling of road if required and refilling the trench etc. as required.				
a	40 mm	mtr	54000		
	90 mm	mtr	1650		

S.No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
	(B) Cable work				
2	Supplying and laying following sizes one number PVC insulated, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade in existing RCC/ HUME/ STONEWARE/ METAL pipe as required.				
a	4 x 16 sq. mm. (pole to pole & feeder pillar to pole)	mtr	37900		
	3.5 x 25 sq. mm. (pole to pole & feeder pillar to pole)		19900		
b	3.5 x 50 sq. mm. (feeder pillar to pole)	mtr	1800		
c	3.5 x 70 sq. mm. (transformer to feeder pillar)	mtr	105		
	3.5 x 95 sq. mm. (transformer to feeder pillar)	mtr	0		
3	Supplying and making **end termination** with brass compression gland and aluminum lugs for following size armoured aluminum conductor power cable of 1.1 KV grade as required.				
a	4 x 16 sq. mm. (pole to pole)	Each	84		
b	3.5 x 50 sq. mm. (pole to pole)	Each	42		
c	3.5 x 70 sq. mm. (transformer to feeder pillar)	Each	10		
	3.5 x 95 sq. mm. (transformer to feeder pillar)		10		
4	Supplying, fixing and **cramping** suitable size and all type **aluminium ferule/ lugs** to following size 1.1 KV grade power cable core/ lead, pressed with high pressure cramping tool including connection to switch gear/ MCCB etc as required.				
a	4 x 16 sq. mm. (pole to pole)	Each	9280		
b	3.5 x 50 sq. mm. (pole to pole)	Each	800		
c	3.5 x 70 sq. mm. (transformer to feeder pillar)	Each	50		
d	3.5 x 95 sq. mm. (transformer to feeder pillar)	Each	50		
5	Supplying and making **straight through joint** with **heat shrinkable joint kit** including aluminium ferrules for following size of PVC insulated and PVC sheathed / XLPE aluminum conductor cable of 1.1 KV grade as required.				
a	3.5 x 50 sq. mm. (pole to pole)	Each	0		
b	3.5 x 70 sq. mm. (transformer to feeder pillar)	Each	0		
	3.5 x 95 sq. mm. (transformer to feeder pillar)	Each	0		

S.No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
	(B) Cable work				
6	Supply and drawing following sizes of FR PVC insulated **copper conductor, single core cable** in the existing surface/ concealed, steel/ PVC conduit as required.				
a	3x1.5 sq.mm. (from Pole Junction box to Light fitting)	mtr	17050		
7	Horizontal drilling: Horizontal directional drilling along roads for laying XLPE LT, UG cable, for communication cable along with suitable HDPE Duct at various locations as pointed out by departmental officers, includes Survey of site information collection regarding underground utilities, sensing of utilities by sensing equipment, pit making, pilot drilling, pre-reaming pulling HDPE duct of suitable size in single roll, pulling LT UG cable through installed HDPE duct, providing barricades and necessary signal lights, closing of pits with excavated earth including cost of HDPE pipe, consolidating pit are, including road restoration/supervision departments, cost of all materials, labour, conveyance, hire charges etc. complete preparation of pit by excavated soil/ hard morum & refilling compacting surface as it is position / horizontal drilling across road for cable laying propose with disturbing present installation as per instruction, Guide line Detail technical specifications as per direction of Engineer in charge.	mtr	200		
	SUB TOTAL (B)				

S.No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
C	**High Mast Work**				
1	**2**	**3**	**4**	**5**	**6(4x5)**
1	Supply, erection, testing & commissioning of High Mast Lighting system (as per CP3-TRT/1996 of ILE,UK) consisting of totally hot dip galvanised by single dip method high mast, lantern, carriage suitable for upto 12 nos. Luminiares, mast-head assembly, 2 nos. Aviation obstruction Neon lights, double drum type self sustaining winch, integral power tool (winch motor with control circuit), hot dip galvanised heavy duty pipe Lightning Finial, suitable ropes and Cement concrete foundation of M-20 grade complete as required. The mast is constructed from M.S. plate (as per BS-EN 10025) cut & folded to form a polygonal section, telescopic jointed and welding as per BS-5135. The complete work shall be supervised and certified by the manufactures for satisfactory supply, erection, testing & commissioning of high mast.				
a	20 Mtr HM (in 2 section)	Each	4		

2	Supplying, installation, testing and commissioning of following 230/250 volts metal halide wide beam Flood light luminaires with weather-proof gear box, igniter, capacitor with IP 66 protection on Wall surface/ building parapet/ pole bracket complete but without lamp as required. (for High mast only)				
a	1 x 400 Watt (t)	Each	48		
3	Supplying, fixing, testing and commissioning of following 230/250 volts metal halide lamp in existing lighting luminaries fixed on pole/ wall/ roof etc as required.				
a	400 Watt (BT)	Each	48		
	SUB TOTAL (C)				

S. No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
	(D) Transformer Installation & 11 KV Cable laying				
1	**2**	**3**	**4**	**5**	**6(4x5)**
1(a)	Supply, Installation, Testing & Commissioning of floor mounted RMU comprising of 2 nos. 12 kV, 630 A LBS for loop in and loop out to form ring main system and 1 no fuse unit shall controlled distribution transformer complete with accessories, hard wares etc. as required for completeness as per attached specification/ drawing, CSPDCL standards and direction of EIC.	No.	7		
1(b)	a. Supply, Installation, Testing & Commissioning of floor mounted RMU comprising of 3 nos. 12 kV, 630 A LBS for loop in and loop out to form ring main system and 1 no fuse unit shall controlled distribution transformer complete with accessories, hard wares etc. as required for completeness as per attached specification/ drawing, CSPDCL standards and direction of EIC.	No	5		
1(c)	a. Supply, Installation, Testing & Commissioning of floor mounted RMU comprising of 3 nos. 12 kV, 630 A LBS for loop in and loop out to form ring main system complete with accessories, hard wares etc. as required for completeness as per attached specification/ drawing, CSPDCL standards and direction of EIC.		1		
2	Supply Installation, testing & commissioning of 11/ 0.433 KV, 63 KVA **distribution transformer** with out tap changer, Al wound, oil cooled suitable for outdoor use with required fittings, accessories,both side cable terminal box, hardwares etc. as required for completeness as per attached specification/drawing, CSPDCL standards and direction of EIC.	Nos	13		

S. No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
	(D) Transformer Installation & 11 KV Cable laying				
1	**2**	**3**	**4**	**5**	**6(4x5)**
3	Design, Fabrication, Supply, Erection, Testing and commisioning of Powder coated, Weather Proof outdoor type Double door type LT DB fabricated out of 14 guage CRCA sheet steel in cubical, free standing, dust and vermin proof, with reinforcement of suitable size angle iron, channel, T -iron or flats as required. LT DB shall be treated with all anti-corrosive process before painting as per specification. Feeder Pillar shall be suitable for 415V, 3-Phase, Four wire, 50 Hz supply complete with earth bus and lifting hooks as required in case of large panels.Approval shall be taken for each panel before fabrication. (All hardwares like nuts and bolts used shall be Galvanized and Zinc passivated)	Set	13		
	INCOMER				
	1No. 4 Pole 100A TPN MCCB (35 KA)				
	Metering & Indication				
	1 set of phase indicating lamps				
	BUS-BAR				
	1 Set of 100A TPN Aluminium Bus Bar with colour coded PVC Sleeves				
	OUTGOINGS				
4	3 Nos. 40 A FP MCB				
	Supplying and laying following sizes one number XLPE, steel armoured, aluminium conductor power cable of 11 KV grade in existing **masonry open duct** as required.				
	Single Runs 3 core 50 sqmm	Mtrs	130		
	Single Runs 3 core 70 sqmm	Mtrs	15000		
	Supply, installation, glanding, terminating, testing & commissioning of **1.1kV grade XLPE Al cable** in readymade trenches with clamping materials, ferrules, tags, accessories, hardwares, earthing etc as required for completeness, as per attached specification/ drawing, CSPDCL standards and direction of EIC				
5	Single Runs 3.5 core 95 sqmm	Mtrs	150		
6	Supply, installation, testing & commissioning of **cable termination kits** of push on/ heat shrinkable type for indoor/ outdoor terminations of 11 KV, XLPE AL Cable of following size complete with double compression gland, lugs, tags, accessories, hardwares etc. as required for completeness as per attached specification/ drawing, CSPDCL standards and direction of EIC.	Nos.			
	3 core 50 sqmm		26		
	3 core 70 sqmm		26		

S. No.	Item Description	Unit	Quantity	Rate in Rs.	Amount in Rs.
	(D) Transformer Installation & 11 KV Cable laying				
1	**2**	**3**	**4**	**5**	**6(4x5)**
7	Supply, installation, testing & commissioning of **cable termination kits** of cast resin compound type for indoor/ outdoor terminations of 1.1 KV, XLPE Al Cable of 3.5C X 95 sqmm complete with double compression gland, lugs, tags, accessories, hardwares etc. as required for completeness and as per attached specification/ drawing, CSPDCL standards and direction of EIC.	Nos	56		
8	Supply of all materials, installation, testing and commissioning of **GI pipe electrode** as per IS: 3043 comprising of 40mm dia, 2.9mm thick, 3m long class A GI pipe with flange, 16nos. 12mm dia through holes buried in a pit. The scope shall cover excavation in all kinds of soil and rock, filling the pit with equal proportion of salt and charcoal in layers of 300mm depth, 150mm wide alround the pipe from bottom upto a depth of 300mm below the masonary chamber, refilling by excavated soil free from rock and shark edges; provision of watering arrangement with GI funnel and wire mesh be enclosed in a brick masonary chamber of 400mm x 400mm x 400mm with removable RCC cover on top. The connection from the flanges of the pipe shall be established by 50mm x 6mm GI strip using 12mm dia GI hardwares. The work shall be carried out with accessories, hardware etc as required for completeness and as per attached specification/drawing, CSPDCL standards and direction of EIC.	Nos.	65		
9	Supply, running and terminating of GI materials as **earth continuity conductor** to earth all the metallic parts/ neutral of transformer/ lightning arrestors, control room equipments to earth electrodes with accessories, hardwares etc. as required for completeness, as per attached specification/ drawings, CSPDCL standards and direction of EIC.				
	i) 50mm x 6mm strips	mtrs	130		
	ii) G.I wire of size 8 SWG to 4 SWG	Mtrs	165		
10	Construction of plinth for transformer, RMU and LTDB in RCC construction for installation of transformer, associated RMU, LTDB including excavation, laying of PCC, neatly dressed, plastered, supply of all materials as required for completeness, as per attached specification/ drawing, CSPDCL standards and direction of EIC.	Cm	52		
11	**Yard fencing (7x4 meter)** with chain link mesh conform ISI 2721/1989 size (75 x75)mm & 8mm gauge of chain link wire with 4 mm thick GI Wire on top & bottom of mash, on main bracket of Angel (65 x65 x 5 mm) & bracing with Angel (50x50x6mm) of 2.5 m long 3.m with bracket gate & murrom, gravel filling all on A class civil work Construction with accessories, hardwares etc. as required for completeness, as per attached specification/ drawing, CSPDCL standards and direction of EIC.	Rmt	242		
	SUB TOTAL (C)				

Signature of Tenderer
with Seal

SCHEDULE– D
Section-III
Technical Specification of Works

The broad design specifications for the works are provided in this section of document, but the general specifications for all works are provided in Notice Inviting tender

INDEX

1. SPECIFICATIONS OF OCTAGONAL POLES

This specification determines the requirements of the octagonal poles in respect of design, manufacture, testing and supply of Galvanized Poles, Base Plate and Bracket Arms for use in Street Lighting.

1.1 SCOPE :

This specification covers tapered octagonal single piece columns of required mounting height. Octagonal poles shall be of flanged type to be fixed on the foundation bolts. Possible loading configurations for different types of octagonal poles are indicated in respective GA drawings. The octagonal poles shall be designed for 180 Km/Hr. Maximum wind speed

1.2 GENERAL STANDARDS :

(a) Design:

The polygonal pole structure shall be designed to sustain basic wind speed of 50 m/sec, with 3 sec gust and measured at a height of 10 meters. The safety factor for wind load in ultimate limit state shall be taken as 1.5. The structure shall conform to IS 875-Part3:1987 relating to wind load on structures and also conform to BSEN 40-1:1992 relating to general construction. The top loading i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole and the same shall meet the requirement of BSEN 40-3:2000, pr EN-40-3-3.

The grade of steel used shall be S-355 as per BSEN-10025 or equivalent Indian Standards. Manufacturing of poles shall be done out of Manufacturer supplies straight sheet to eliminate deformity due to decoiling of rolls.

For the Design of Octagonal Poles, the Structural Calculation Details, confirming the suitability as per standards, shall be produced by the successful tenderer.

(b) Pole Shaft:

The pole shaft shall have octagonal cross section and shall be continuously tapered with single longitudinal welding. There shall not be any circumferential welding. The welding of pole shaft shall be done by submerged arc welding process. The Octagonal pole shafts shall be provided with the rigid flange plate of suitable thickness with provision for fixing four foundation bolts. The base plate shall be fixed by welding to the pole shaft at two locations i.e. from inside and outside. Bending of the sheet into polygonal shape shall be done through a CNC controlled, Laser aligned single blade bending process. Foundation accessories will be as per IS 1367.

(c) Door Opening:

Polygonal poles shall have door of approximate 500 mm length at the elevation of 1500 mm from the base plate. The door shall be vandal resistance and shall be weather proof to ensure safety of inside connections. The door shall be flush with the exterior surface and shall have suitable locking facility. The door cutting shall be with smooth finish performed with CNC cutting machine. The pole shall be adequately strengthened at the location of the door to compensate for the loss in section. The pole shall be additionally reinforced with a welded steel section, so that the section at door is unaffected and undue bucking of the cut section is prevented.

(d) Material

Octagonal Poles HT Steel Conforming to grade S355JO. Base Plate Fe 410 conforming to IS 226 / IS 2062. Test Certificates from the Steel Manufacturer for the above to be produced by the successful tenderer.

(e) Pole sections

The Octagonal Poles up to the length of 10 meters shall be in single piece with single longitudinal welding joint. There shall not be any circumferential weld joint.

(f) Galvanization:

All components of the columns and brackets shall be hot dip galvanized after completion of fabrication. No further touching up, finishing or modification shall be done after galvanizing. The overall length of each section/bracket shall be immersed in one dipping operation.

The galvanizing coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale or blister nor be removable while handing or packing.

There shall be no impurities in the zinc nor additives to the smaller bath which could have a deleterious effect on the zinc coating.

Before pickling, all welding, drilling, cutting, binding etc. must be completed and all grease, paint, varnish, oil, welding slag etc. completely removed. All protuberances, which should affect the life of the galvanizing should also be removed.

During pickling each article shall be completely immersed in one dip. Care shall be taken to WEIGHT OF ZINC COATING.

The poles shall be single dip, hot galvanized as per IS: 2629/IS 2633/IS 4759 standards with minimum coating thickness of 85 microns.

(g) Base Flange:

The base plate shall be fabricated from steel plate free from laminations and mounted on RCC Foundation laid as per the approved drawing

(h) BRACKETS :

The bracket shall be hot dip galvanized after fabrication. The bracket shall be manufactured as per the3 GA drawing and with best workmanship. The bending of the pipes shall be without any kinks/visible marks. Arms shall be symmetrical.

(i) ELECTRICALS

The octagonal pole shall be provided with a door flush with the pole surface without any projection. Required door reinforcement shall be determined by the manufacturer. Inside the door a suitable plate shall be welded for mounting 6A, MCB and neutral link. Three core 2.5 sq.mm copper wires shall be run for each luminaire individually.

(j) FACILITIES FOR TESTING

The manufacturer shall offer the purchaser or his authorized representative all the testing facilities required either at the works or in the vicinity thereof.

(k) DRAWING AND TECHNICAL DATA :

At the time of tendering the manufacturer must submit a detailed drawing for each column type offered.

I. Overall length
II. Base diameter across flats.
III. Top diameter across flats.
IV. Wall thickness of column erections
V. Flange base dimensions to include side length, thickness, slot sizes and anchor bolt fixing centres
VI. Door dimensions, corners radius and height above ground level
VII. Dimensions of cable entry slot (and for rooted columns the depths below the ground level).
VIII. Dimensions and section of door reinforcement
IX. Dimensions of anchor bolts, nuts and washers
X. Weight (KG) of each galvanized pole including flange base but excluding anchor bolts.

(l) FOUNDATION :

The design of foundation for pole shall be submitted along with the bid and detailed drawing of foundation indicating the size of template, foundation bolts etc. shall be enclosed.

2. HIGHMAST – TECHNICAL SPECIFICATION:

2.01 Structure:

The High Mast shall be of continuously tapered, polygonal cross section, at least 20 sided, presenting a good and pleasing appearance and shall be based on proven In-Tension design conforming to the standards referred to above, to give an assured performance, and reliable service. The structure shall be suitable for wind loading as per IS 875 Part - III 1987. The mast dimensions shall be as per enclosed datasheet.

2.02 Construction:

The mast shall be fabricated from special steel plates, conforming to BS-EN10025, S355 grade cut and folded to form a polygonal section as stated at 2.01 above and shall be telescopically jointed and welded.

The welding shall be in accordance with BS.5135/AWS. The procedural weld geometry and the workmanship shall be exhaustively tested on the completed welds. The mast shall be delivered in sections of effective length at site. Thus mast shall be supplied sections & each section shall be fabricated out of individual plates duly folded and welded. There shall be only one longitudinal seam weld per section. Sections fabricated out of multiple plates or with more than one weld shall not be accepted. At site the sections shall be joined together by slip-stressed-fit method. No site welding or bolted joint shall be done on the mast.

The minimum over lap distance shall be 1.5 times the diameter at penetration. The dimensions of the mast shall be decided based on proper design and design calculations shall be submitted for verification. The mast shall be provided with fully penetrated flange, which shall be free from any lamination or incursion. The welded connection of the base flange shall be fully developed to the strength of the entire section. The base flange shall be provided with supplementary gussets between the bolt-holes to ensure elimination of helical stress concentration. For the environmental protection of the mast, the entire fabricated mast shall be hot dip galvanised, internally and externally, having a uniform thickness As per BSEN ISO-1461. The galvanizing has to be done by single dipping method only for better adhesion and life.

2.03 Foundation

The foundation of the complete High Mast Unit shall be RCC foundation suitable for the soil where the High Mast Unit is proposed to be installed complete with the required foundation bolts. The soil, at that proposed location should be tested by the bidding company, at its own cost and the design of the proposed foundation with its foundation bolts should be prepared and certified by a registered structural engineer / consultant having atleast 15 years experience and should be got approved from the Civil Department of desired local engineer college before the execution of the foundation. The curing of the foundation must be done very thoroughly as per standard practice. The cured foundation should be got certified by a licensed structural engineer / consultant having at least 15 years experience. These certificates should be given in original to the Engineer - in charge.

2.04 Capping

The capping section of the top pulley assembly unit should be of hot dipped galvanized MS material and shall contain the pulleys for stainless steel wire ropes and power cable and it must be ensured that the electrical cables and stainless steel wire ropes are completely separated before passing over their respective pulleys. The pulley-asembly should be protected by a suitable weather - proof cover.

2.05 Door Opening:

An adequate door opening shall be provided at the base of the mast and the opening shall be such that it permits clear access to equipment like winches, cables, plug and socket, etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weatherproof door, provided with a heavy-duty double internal lock with special paddle key. The door opening shall be carefully designed and reinforced with welded steel section, so that the mast section at the base shall be unaffected and undue buckling of the cut portion is prevented. Size of door opening shall not be more than 1200 x 250 mm to avoid buckling of the mast section under heavy wind conditions.

2.06 Dynamic Loading for the Mast:

The mast structure shall be suitable to sustain an assumed maximum reaction arising from a wind speed as per IS 875 (three second gust), and shall be measured at a height of 10 metres above ground level. The design life of the mast shall be a minimum of 35 years.

2.06.1 Fabrication:

A fabricated Lantern Carriage shall be provided for fixing and holding the flood light fittings and control gearboxes. The Lantern Carriage shall be of special design and shall be of steel tube construction, the tubes acting as conduits for wires, with holes fully protected by grommets. The Lantern Carriage shall be so designed and fabricated to hold the required number of flood light fittings and the control gear boxes, and also have a perfect self balance. The Lantern Carriage shall be fabricated in two halves and joined by bolted flanges with stainless steel bolts and nyloc type stainless steel nuts to enable easy installation or removal from the erected mast. The inner lining of the carriage shall be provided with protective PVC arrangement, so that no damage is caused to the surface of the mast during the raising and lowering operation of the carriage. The entire Lantern Carriage shall be hot dip galvanized after fabrication.

2.06.2 Junction Box.

Weather proof junction box, made of Cast Aluminium shall be provided on the Carriage Assembly as required, from which the inter-connections to the designed number of the flood light luminaries and associated control gears fixed on the carriage shall be made.

2.07 Raising and lowering mechanism:

For the installation and maintenance of the luminaries and lamps, it shall be necessary to lower and raise the Lantern Carriage Assembly. To enable this, a suitable Winch Arrangement shall be provided, with the winch fixed at the base of the mast and the specially designed head frame assembly at the top.

2.07.1 Winch:

The winch shall be of completely self sustaining type, without the need for brake shoe, springs or clutches. Each driving spindle of the winch shall be positively locked when not in use, by gravity activated PAWLS. Individual drum also should be operated for fine adjustment of lantern carriage. The capacity, operating speed, safe working load, recommended lubrication and serial number of the winch shall be clearly marked on each winch. The gear ratio of the winch shall be 53: 1. However, the minimum-working load shall be not less than 750 kg. The winch shall be self-lubricating type by means of an oil bath and the oil shall be readily available grades of reputed producers.

The winch drums shall be grooved to ensure perfect seat for stable and tidy rope lay, with no chances of rope slippage. The rope termination in the winch shall be such that distortion or twisting is eliminated and at least 5 to 6 turns of rope remains on the drum even when the lantern carriage is fully lowered and rested on the rest pads. It should be possible to operate the winch manually by a suitable handle and by an integral power tool. Operation of the winch with manual handle shall be independent of the power tool. Winches with manual operation through the power tool shaft shall not be accepted. Individual drum operation of the winch shall be possible. A double drum winch shall have 2 drums and two worm gears independent in operation for increased safety. It shall be possible to remove the double drum after dismantling, through the door opening provided at the base of the mast. Also, a winch gearbox for simultaneous and reversible operation of the double drum winch shall be provided as part of the contract. The winch shall be type tested in presence of a reputed Institution and the test certificates shall be furnished before supply of materials. A test certificate shall be furnished by the Contractor for each winch in support of the maximum load operated by the winch.

2.07.2 Head Frame:

The head frame, which is to be designed as a capping unit of the mast, shall be of welded steel construction, galvanized both internally and externally after assembly. The top pulley shall be of appropriate diameter, large enough to accommodate the stainless steel wire ropes and the multi-core electric cable. The pulley block shall be made of non corrodible material, and shall be of die cast Aluminium Alloy (LM-6). Pulley made of synthetic materials such as Plastic or PVC is not acceptable. Self-lubricating bearings and stainless steel shaft shall be provided to facilitate smooth and maintenance free operation for a long period. The pulley assembly shall be fully protected by a canopy galvanized internally and externally. Close fitting guides and sleeves shall be provided to ensure that the ropes and cables do not dislodged from their respective positions in the grooves. The head frame shall be provided with guides and stops with PVC buffer for docking the lantern carriage.

2.07.3 Stainless Steel Wire Ropes:

The suspension system shall essentially be without any intermediate joint and shall consist of only non-corrodible stainless steel of AISI 316. The stainless steel wire ropes shall be of 7/19 constructions, the central core being of the same material. The overall diameter of the rope shall

not be less than 6 mm. The breaking load of each rope shall not be less than 2400kg. giving a factor of safety of over 5 for the system at full load as per the TR-7 referred to in the beginning of this specification . The end constructions of ropes to the winch drum shall be fitted with talurit. The thimbles shall be secured on ropes by compression splices. Two continuous lengths of stainless steel wire ropes shall be used in the system and no intermediate joints are acceptable in view of the required safety. No intermediate joints/terminations, either bolted or else, shall be provided on the wire ropes between winch and lantern carriage.

2.08 Electrical System, Cable and Cable Connections:

A suitable terminal box shall be provided as part of the contract at the base compartment of the high mast for terminating the incoming cable. The electrical connections from the bottom to the top shall be made by special trailing cable. The cable shall be EPR insulated and PCP sheathed to get flexibility and endurance. Size of the cable shall be minimum 5 core 2.5 / 4.0 sq mm copper. The cable shall be of reputed make. At the top there shall be weather proof junction box to terminate the trailing cable. Connections from the top junction box to the individual luminaries shall be made by using 3 core 1.5 sq. mm flexible PVC cables of reputed make. The system shall have in-built facilities for testing the luminaries while in lowered position. Also, suitable provision shall be made at the base compartment of the mast to facilitate the operation of internally mounted, electrically operated power tool for raising and lowering of the lantern carriage assembly. The trailing cables of the lantern carriage rings shall be terminated by means of specially designed, metal clad, multipoint plug and socket provided in the base compartment to enable easy disconnection when required.

2.09 Power Tool for the Winch:

A suitable, high-powered, electrically driven, internally mounted power tool, with manual over ride shall be supplied for the raising and lowering of the lantern carriage for maintenance purposes. The speed of the power tool shall be to suit the system. The power tool shall be single speed, provided with a motor of the required rating. The power tool shall be supplied complete with a suitable control arrangement so that the operation of the mast can be done at a safe distance. The capacity and speed of the electric motor used in the power tool shall be suitable for the lifting of the design load installed on the lantern carriage.

The power tool mounting shall be so designed that it shall be not only self supporting but also aligns the power tool perfectly with respect to the winch spindle during the operations. Also, a handle for the manual operation of the winches in case of problems with the electrically operated tool, shall be provided. There shall be a separate torque limiting device to protect the wire ropes from over stretching. It shall be mechanical with suitable load adjusting device. The torque limiter shall trip the load when it exceeds the adjusted limits. There shall be suitable provision for warning the operator once the load is tripped off. The torque limiter is a requirement as per the relevant standards in view of the overall safety of the system. Each mast shall have its own power tool motor.

2.010 Lightning Finial

One number heavy duty hot dip galvanised lighting finial shall be provided for each mast. The lightning finial shall be minimum 1.2 M in length and shall be provided at the centre of the head frame. It shall be bolted solidly to the head frame to get a direct conducting path to the earth through the mast. The lightning finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.

2.011 Aviation Obstruction Lights:

Medium intensity LED aviation obstruction light similar to neon spiral type fitted in a weather- proof box on body unit of Aluminium alloy shall be supplied. The cover of the light will be glass with rubber gasket (IP55 protection). High Luminosity flashing red light emitting diodes having life of 11 years. Power consumption 10 to 15 Watts, 230V AC, 50HZ, 90 candela. LED#s are mounted on fire retardant epoxy printed circuit board in five series - parallel circuits.- 1 Set

Make- Binay Opto Electonics Pvt. Ltd./Bajaj Electricals Ltd/ Philips.

2.012 Lightning protection

Lightning protection shall be provided on the top of the high mast. Lightening arrester shall be connected to 2nos. of Earth electrode.

2.013 Earthing Terminals:

Suitable earth terminal using 12 mm diameter stainless steel bolts shall be provided at a convenient location on the base of the Mast, for lightning and electrical earthing of the mast.

2.014 Earthing System

The mast shall be provided with lightning protection system comprising of an Earthing system as follows:
40 mmdia, 2.5 meters Long G.I Pipe with bricks enclosures and cover - 4Nos.
35mm X 6mm G.L straps for interconnection of stud at mast
2nos.earh electrodes for lightening arrester and 2Nos. earth electrodes for earthing system of high mast lighting system.

2.015 Feeder Pillar:

Each mast shall be provided with a feeder pillar fabricated out of 14 SWG CRCA sheet and finished with two coates of red oxide primer and Gray enamel paint of shade 631 of IS-5. The feeder pillar shall comprise of incoming MCB Isolator, Copper wiring, suitable timer and contactor to switch on the luminaries at a pre-set time. There shall be suitable control arrangement to change the direction of rotation of the power tool-motor. Feeder pillar shall be mounted on suitable foundation near to the mast. At this feeder pillar a space is required for separate CSPDCL metering arrangement.

2.016 Incoming Power Cable

A cable of size 4 x 16 sq.mm Aluminium conductor, Armoured cable for power supply (max 10 M) and 3 x 2.5 sq.mm Copper conductor Armoured cable for motor supply shall be provided from feeder pillar to the base compartment of the high mast. Cable shall be taken to the base compartment of the high mast through the provision made in the foundation.

2.017 Applicable standards :

The following standards will be applicable :
(a) IS 875 (Part 3) – 1987 updated till date : Code of practice for Design loads (other than earth quakes) for building and structures.
(b) BE EN 10025/DIN 17100 : Grades of M.S. Plates.
(c) BS ISO 1461 : Galvanising , (d)BS 5135 / AWS : Welding
(d) TR No. 7 1996 of ILE, UK : Specifications for Mast and foundation.

2.018 TOOL BOX:

A tool box of sheet steel containing a set of general and special purpose tools is to be supplied along with high mast.

3. TECHNICAL SPECIFICATION FOR EARTHING SYSTEM

3.01 EARTHING SYSTEM

All equipment of the lighting system shall be earthed as per relevant Indian Standards. General specifications of earthing for pole, SLFP & equipments are given below.
Each pole shall be earthed using 1 no. 40mm dia., 3 m long GI Pipe. The connections between the earthing stud inside pole and the electrode shall be done with 25X6 GI strips.
SLFPs and equipments each shall be earthed with 2 nos. - 40mm dia., 3 m long GI pipe. The connections between the earthing stud and the electrode shall be done with 25X6 GI strips.

3.02 Specifications for Earthing

The entire earthing of the equipment to be supplied and erected shall be carried out strictly in accordance with the latest IS-3043 / IER/ IEC 60034.

3.02.1 Earth electrodes for L.T. system: - Main earth electrodes 40 mm dia 2.9 mm thick 3.00 m long GI pipe providing with 12 mm dia through holes, 150 mm intervals staggered along with the main

electrode, the main electrode shall be coupled to a 19 mm dia GI pipe of suitable of length at one end through a reducing socket of size 40 mm x 19 mm size. The other end of 19 mm dia GI pipe is required to be provided with a funnel with wire mesh, GI check nuts, GI nut washers etc.

3.02.2 A suitable pit of 200 mm diameter to be dug all round the main electrode, the pit shall be filled with alternate layer of coal or charcoal and salt in 150 mm thick layers up to the entire length of the main electrode.

3.02.3 An inspection chamber of size 300 mm x 300 mm x 300 mm size in CC 1:3:6 with 150 mm thick side walls, 100 mm thick at bottom shall be provided. The inspection chamber shall be covered with MS or CI frame and cover. The cover shall be hinged to the frame and provided with padlocking arrangements. Inspection chamber frame and cover shall be finished with anticorrosive primer and numbered.

3.02.4 fault clearing time for sizing earthing conductor shall be as per latest IS / I.E. rules and plant earthing system shall be designed such that overall earthing resistance is less than one ohm. The Bidder shall measure the soil resistivity at site.

3.02.5 Testing of Earthing System: Employer may ask to carry out earth / continuity tests, earth resistance measurements and other tests in presence of him which in his opinion are necessary to prove that the system is in accordance with design, specifications, Indian Code of Practice and Indian Electricity Rules. Contractor shall have to bear the cost of all such tests.

3.02.6 The street lighting poles shall be earthed with 40 mm dia 3 mtr. long GI pipe or 20 mm dia GI rod buried in earth with necessary double GI earthing No. 8 SWG complete erected and connected to the street light poles.

3.02.7 For earthing of the feeder pillars, one no. earth pit shall be provided for each feeder pillar. The earth pit shall be complete with 40 mm dia, 3 mtr. Long earth pipe, watering pipe, wire mesh, funnel charcoal, slat etc. as per IS 3043. the feeder pillar shall be earthed at two points from the pit with 8 SWG GI wires.

4. LT XLPE POWER CABLES :

The scope of this specifications covers design, manufacturer, inspection, testing at works, packing and forwarding of 1100 V grade LT XLPE Power cables

4.01 STANDARDS :

The cables offered shall conform to the latest revision of relevant Indian Standard Specifications. Some of these standards are list below :

Sr.No	Indian standard specification no.	Title
1	7098	XLPE insulated electrical cables for working voltages upto 1100 V
2	8130	Conductors for insulated electric cable and flexible cords.
3	5831	PVC insulation & sheath of electric cables.
4	3975	Mild steel wires, strips and tapes for armouring of cables.
5	2633	Methods of testing weight, uniformity of coating, thickness on hot dip galvanized articles
6	3961	Recommended current rating for cables, PVC insulated and PVC sheathed.
7	1753	Aluminium conductors for insulators cables.

4.02 PRINCIPAL PARAMETERS

4.02.1 the LT XLPE power cables shall be used outdoors, directly buried through pipes / duct for street lighting works and its power supply arrangement.

4.02.2 The cable shall meet the requirements of IS specifications listed above and the general technical requirement detailed below :

4.03 GENERAL TECHNICAL REQUIREMENT :

4.03.1 The cables shall be brand new. It shall be suitable for laying through double wall corrugated high density polyethylene pipes.

4.03.2 All the LT XLPE power cables shall be 1100 V grade with aluminium conductor, XLPE insulated, inner sheathed, armoured and over all PVC sheathed.

4.03.3 The construction of the conductors shall be stranded for aluminium cable. Conductors of nominal area of 25 sq.m shall be circular. Those above may be circular oval shaped.

4.04 The core insulation shall be with XLPE compound applied over the conductor by extrusion duly and shall conform to the type A compound of IS 5831.

4.05 The **inner** sheath shall be applied over the laid up cores by extrusion and shall be of XLPE confirming to the requirements of type ST1 PVC compound. The extruded inner sheath shall be of uniform thickness of 0.5 mm upto 16 sq.mm 0.8 mm upto 120 sq.mm. & 1.0 mm above 120 sq.mm conductor size.

4.06 The armouring shall be by single round galvanized steel wires for cable diameter upto 13 mm and galvanized steel strips for cables diameters above 13 mm.

4.07 The **outer** sheath of the cables shall be applied by extrusion and shall be of PVC compound. Suitable chemicals shall be added to the PVC compound of the outer sheath to protect the cables against rodent and termite attack.

4.08 The dimensions of the insulation armour and outer sheath material shall be governed by IS specification.

5. CABLE LAYING :

This is to define the requirements for the installation, testing and commissioning of the cabling system.

5.01 **CABLE LAYING :**

The cable laying shall be from supply point to the feeder pillar panel and from feeder pillar panel to street lighting poles. The cable from supply point up to the feeder pillar and from feeder pillars to the lighting poles shall be laid underground through suitable size double wall corrugated high density polyethylene pipes. The trench shall be at least 0.9 mtr. Deep and 0.4 mtr. Wide. At road crossings, the cable shall be laid in 100 mm dia RCC hume pipe of NP-2 class. The trench shall be carried in all type of soils hard murum/ hard rock / soft soil / Tar road / WBM road, which is included in the slope of work. No extra payment will be provided on account of any change in site conditions. Cables as far as possible shall be laid in complete, uncut lengths from one termination to the other. All cables will be identified close to their termination point by cable numbers as per cable schedule. Cable numbers will be punched on aluminium straps (2mm thick) securely fastened to the cable and wrapped around it.

Alternatively cables tags shall be circular in construction to which cable numbers can be conveniently punched. Each underground cable shall be provided will identity tags of lead securely fastened every 30 m. of its underground length with atleast one tag at each end before the cables enters the ground. In unpaved area, cable trenches shall be identified by means of markers as per standard drawing. These posts shall be placed at location of changes in the direction of cables and at intervals of not more than 30 m. and at cable joint locations. All temporary ends of cables must be protected against dirt and moisture to prevent damage to the insulation.

5.02 TERMINATION :

All XLPE cables upto 1.1 KV grade shall be terminated at the equipments by means of compression type cable glands of aluminium. They shall have a screwed nipple with conduit electrical threads and check nut. Cable leads shall be terminated at the equipment terminals by means of crimped type solder less connectors as manufactured by M/s Dowel Electro Works or approved equivalent.

5.03 TESTING :

Before energizing, the insulation resistance of every circuit shall be measured from phase to phase and from phase to ground.

6. Specification of HDPE Pipes:

6.01 The DWC high density polyethylene pipe having corrugation on outer wall and plain inner wall shall confirm to IS-14930 part – I & II amended upto date.

6.02 The pipe shall be ISI marked.

6.03 Contractor has to arrange inspection of pipe at manufacturer's premises to carry out necessary tests contained in IS-14930 part-I & II (compression test, impact test, banding test etc.).

6.04 Job includes (laying of pipe item No. 1/SH 4) accessories like HDPE snap fit coupler with required No. of neoprene `O' rings in order to make water/damp proof joint.

6.05 Contractor has to produce test report of anti rodent test, toxicity test of pipe from Govt. approved test house.

7. STREET LIGHTING FEEDER PILLAR (SLFP)

7.01 The contractor shall have to get the control panels fabricated from the vendor having type test certificate from CPRI for 31 MVA short circuit rating upto 400 amp. for cubical panels. The copy of the type test certificate shall also have to be produced failing which feeder pillar shall not be accepted.

7.02 Angle iron legs shall be suitably shaped at the bottom for anchoring in concrete base.

7.03 SLFP shall be suitable for 415 V, 3 phase, 4 wire, 50 Hz supply and shall be outdoor type with canopy and shall be free standing floor type.

7.04 SLFP shall be provided with incoming & outgoing MCCB / MCB of appropriate rating and in desired quantity depending on total no. of circuits in use. Outgoing shall have at least one spare circuit all the time.

7.05 SLFP shall be made up of CRCA sheet steel and shall be dust and vermin proof providing a degree of protection of IP 55. The thickness of sheet steel enclosures shall be 2 mm minimum.

7.06 The feeder pillars shall be provided with ventilation window covered with wire net in double fold from inside. The window shall be provided on both the side panels of feeder pillars.

7.07 The feeder pillars shall be provided with a danger notice plate as per IS standard.

7.08 Interconnections of the various mountings on the feeder pillar shall be done using PVC insulated copper conductors, or solid strips with PVC taping/sleeving of appropriate sizes. Termination shall be made such that local heating is avoided, suitable lugs shall be used for connections.

7.09 Busbars will be made up of aluminium, colour coded for easy identification and of appropriate size.

7.010 Doors shall be provided with all round neoprene gaskets. The incomer switchgear shall have interlocking mechanism so as to prevent opening of the door when the switch is ON and to prevent closing of the switch when the door is not fully closed. However, a device for bypassing the door interlock shall be provided to enable the operation of the switch with the door open, when necessary, for examination / maintenance.

7.011 All accessible live connection/metals shall be shrouded and it shall be possible to change individual fuses, switches, from the front of the boards/panels without any danger of contact with live parts.

7.012 Adequate interior cabling space and suitable removable cable gland plate (min. 3 mm thickness) plates shall be provided for bottom entry of cables through glands. Necessary number of glands to suit the required cable sizes shall be provided. Cable glands shall be double compression type made of chrome-plated brass.

7.013 Every SLFP will have LED type 'SUPPLY ON" indicating lamps. Indicating lamps shall be of the clustered LED type and low watt consumption. Lamps shall be provided with series resistors.

7.014 Earth bus of 50x6 GI flat with zinc plated bolts and nuts shall be provided in the bottom of the panel.

7.015 The SLFP shall be provided with individual labels with equipment designation / rating. Also the boards shall be provided on the front with a label engraved with the designation of the SLFP. Labels shall be made of non-rusting metal or 3 ply lamicoid or engraved PVC.

7.016 Internal wiring of the panel shall be done using flexible copper cables of appropriate sizes. All the wires shall be numbered and ferrules shall be provided for easy identification.

7.017 Proper clip-on stud type terminals of appropriate rating shall be provided for termination of incoming as well as outgoing cable inside the SLFP.

7.018 Inside the door of lighting panels a single line circuit diagram / description shall be fixed for ready reference.

7.019 Painting: All sheet steel enclosures of panels will be chemically cleaned rinsed, phosphated & dried. After the treatment steel surfaces will be given two coats of primer & finished grey enamel paint or powder coating of shade 631 of IS - 5. Coating thickness shall be minimum 50 microns.

8. CABLES TAGS AND MARKERS

8.01 Each cable and conduit run shall be tagged with numbers that appear in the cables and conduit schedule.

8.02 The tag shall be of aluminum with the number punched on it and securely attached to the cable conduit by not less than two turns of 20 SWG GI wire conforming to IS: 280. Cable tags shall be of rectangular shape for power cables and of circular shape for control cables.

8.03 Location of cables laid directly underground shall be clearly indicated with cable marker made of galvanized iron plate.

8.04 Location of underground cable joints shall be indicated with cable marker with an additional inscription "Cable Joint".

8.05 The marker shall project 150 mm above ground and shall be spaced at analysis interval 30 metres and at every change in direction. They shall also be located on both sides of road and drain crossings.

8.06 Cable tags shall be provided on all cables at each end (just before entering the equipment enclosure), on both sides of a wall or floor crossing and on each duct/ conduit entry. Cable tags shall be provided inside the switchgear, motor control centers, control and relay panels, etc., wherever required for cable identification, such as where a number of cables enter together through a gland plate.

8.07 The price of cable tags and markers shall be included in the installation rates for cables/ conduits quoted by the contractor.

8.08 Specific requirements for cabling for cabling, wiring, ferrules as covered in respective equipment section shall also be complied with.

9. CABLE LUGS

Solder less crimping of terminals shall be done by using corrosion inhibitory compound. The cable lugs shall suit the type of terminals provided. Crimping tool used shall be of approved design and make.

10. CABLE TERMINATIONS AND CONNECTIONS

10.01 The termination and connection of cables shall be done strictly in accordance with cable and termination kit manufacturer's instructions, drawing and/ or as directed by the Owner.

10.02 The work shall include all clamping, fittings, fixing, plumbing, soldering, drilling, cutting, taping, heat shrinking (where applicable), connecting to cable terminal, shorting and grounding as required to complete the job.

10.03 The equipment will be generally provided with un-drilled gland plates for cables/ conduit entry. The Contractor shall be responsible for drilling of gland plates, painting, and touching up. Holes shall not be made by gas cutting.

10.04 The Contractor shall tag/ferrule the control cable cores at all terminations, as instructed by the Owner. In panels where a large number of cables are to be terminated and cable identification may be difficult, each core ferrule may include the complete cable number as well. Spare cores shall be similarly tagged with cable numbers and coiled up.

10.05 All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively closed.

10.06 If the cable-end box or terminal enclosure provided on the equipment is found unsuitable and requires modification, the same shall be carried out by the Contractor with the approval of the Owner.

11. MCCB

The MCCBs provided in these boxes shall conform in all respects to the relevant IS: 2516 (Pt-I&II)/1977 and REC specification No.18/1981 (revised) or its latest revision as applicable.

a) REQUIREMENT OF MCCBs:

The moulded case circuit breakers should comprise of a switching mechanism, an effective extinguishing device and a tripping unit contained in a compact moulded case cover made of high strength, heat resistance and flame retardant thermo-insulating materials. They should comprise of a spring assisted quick make/ quick break type independent manual trip free mechanism rendering it easy to manually operate the MCCBs and capable of clearly indicating "TRIPPED", "ON" AND "OFF" positions from the position of the operating handle. The contact tips should be made of a suitable alloy having high arc resistance and a long electrical and mechanical life needing no replacement. The breakers should be designed with a common trip bar to break and make all the three phase together even when fault occurs on any of the phases. The breakers should provide protection against sustained overloads and short circuits through thermal-magnetic/ fully magnetic releases. These MCCBs along with terminal blocks are intended to be housed in the distribution boxes made out of sheet steel of 2mm gauge. The assembly of the MCCBs and the terminal blocks should be compact, reliable from operation point of view and safe to the operating personnel. As already mentioned earlier, the MCCBs should be fully maintenance free.

b) TECHNICAL PARTICULARS OF MCCBs:

The LT MCCBs should have inverse current/ time characteristics suitable for protection of 315KVA, 11.0.4KV Distribution Transformers against sustained over-loads and short circuits for following operating conditions:-

i	Rated Operating Voltage	3 Phase 415 Volts AC 50 cycles with neutral solidly grounded system
	Rating	100 Amps
iii	No. of Poles	4
iv	Duty	Un-interrupted
v	Maximum ambient temperature	47^{o}C in shade
vi	Minimum ambient temperature	4^{o}C in shade
vii	Average altitude	A maximum of 1000 meter
viii	Maximum humidity	Frequently approaches saturation point

c) TIME/CURRENT CHARACTERISTICS:

The circuit breakers shall have time/current characteristics suitable for following operating conditions:

Multiple of normal current rating	Tripping time
1.1 times	After 4 hours
1.2 times	Less than 50 minutes
1.3 times	Less than 30 minutes
1.4 times	Less than 10 minutes
2.5 times	Less than 1 minute
6 times	Less than 40 mili-seconds
12 times	Less than 40 mili-seconds

Time/ Current characteristic of the Circuit Breaker (MCCB) shall be tested in accordance with Clause-7.7.2.3 (b) (2) of IS: 2516-(Pt-I&II) Sec.I/1977 and the test shall be made with all the three phases loaded.

For time/ current characteristic, the reference calibration temperature of the MCCBs shall be 40^{o}C and durance, if any, upto 50^{o}C operating temperature in the enclosure shall not exceed 10% of the value indicated above in Clause (I) above.

The MCCBs shall be calibrated and adjusted in the factory itself for the desired time/ current characteristic. The MCCB should have the following maximum resetting time under overload & short circuit conditions:-

- Overload conditions - 3 minutes
- Short Circuit conditions - Instantaneous

d) RATED SHORT CIRCUIT BREAKING CAPACITY:

The rated short circuit breaking capacity of the MCCBs shall be 35 KA. The short circuit breaking capacity test as specified above shall be based on short circuit tests carried out at 0.4 Power Factor (lagging). For the purpose of these tests, the following operating sequence shall be followed: -

Break-3 minutes itnerval-Make-Break-3 minutes interval-Make-Break.

12. LED Street Lighting Luminaries

12.1 General Requirement

Supply of LED streetlight Luminaire with power consumption of not more than 215W ±5 Watt for 35 meter pole to pole spacing complete with single piece high pressure die cast aluminum housing with supplier mark / name engraved / emborssing on the die cast housing to allow traceability till life of fixture (Stickering / printing is not acceptable) and adhering to the following specifications:

i. The housing should be single piece high pressure die cast should be open-able at the pole top using clips and no screws should be used to fix cover with housing

ii. The luminaire should be suitable for side-entry road light poles with a typical pole diameter of 40-60mm.

iii. The fixture shall be designed so as to have lumen maintenance of at least 70% at the end of 50,000 hours (L70) and L90 of > 1,00,000 hour at design temperature of 35 degree C.

iv. The luminaire should be operable with auto adjustable 120 – 300 V supply Voltage using the same driver.

v. Power Factor of the electronic driver should be at least >0.95 and with THD<15%,

vi. The luminaire should throw the perfect amount of uniform light with exactly the desired intensity along with better light control.

vii. The luminaire to be provided with heat resistant toughened flat/curved glass.

viii. The Luminaire shall employ individual optical lens for the each of the LED's to ensure better uniformity of light distribution.

ix. The fixture should be impact resistant with suitable protection by using cover for driver and LED's, confirming to minimum IK08 impact resistance specifications.

x. The fixture should have double-wall construction with silicone gasket and with breather designed for IP66 ingress protection without using any glue to prevent breakdown of the water and dust proof seal

xi. Heat dissipation should be managed through a built-in external heat-sink. The luminaire shall deliver more than 85 Lumen/Watt, (+5%) Color Rendering Index of minimum 70(+5%) with cool white light output.

xii. The luminaries should be provided with option of dimming function to enhance energy saving if required.

xiii. Max LED Junction Temperature 150 Deg C rating for better capacity to handle heat.

xiv. **Make of LED'**: Philips, Cree, Nichia, and Osram.

12.2 Electrical Specification

	Electrical specifications	
	Electrical ratings of the proposed luminaries product for the following criteria:	
i)	**Voltage range or rating: on single phase**	**120 V to 300 V**
ii)	**System lumen's per watt (+/-5%)**	**>85**
iii)	**Frequency range (+/-5)**	**50Hz**
iv)	**Power factor:**	**>/= 95**
vi)	**Colour temperature**	**>/=5000K to </= 7000**
vii)	**CRI**	**>70%**
viii)	**Life Expectency**	**50000 hrs with 70% Lumens**
ix)	**Total Input wattage to the fittings including driver losses**	
	For 35 meter spacing	**</=215 Watt ± 5%.**
x)	**Protection level**	**IP66**
	Surge Protection : Differential level	**4.5 KV**
	Electrical Insulation class	**CLASS I**
Xi)	**Total Harmonic Distortion**	**< 15%**
Xii)	**Operating temperature**	**-5 Deg to + 35 Deg C**

12.3 **Applicable Standards:**

I. LED must comply all the parameters of IES LM 80(Equivalent Indian Standard – IS 16105 – 2011) .
II. LED must comply all the parameters of IES LM 79-08(Equivalent Indian Standard – IS 16106 – 2011).
III. The luminaire shall conform to IEC 60598 standard, CLASS I, For Luminous efficiency and light output, Photometry Test of the Luminair IS 10322 TC, IEC60598 TC.

IV. The driver should comply with

a. EN61347-1: general and safety requirements
b. EN61347-2-13: particular requirements for DC or AC supplied electronic control gear for LED modules
c. EN62384: DC or AC supplied electronic control gear for LED modules. Performance requirements
d. EN 61000-3-2 Limits for harmonic currents emissions
e. EN 55015 : Limits for Radio disturbance characteristics of electrical equipements

V. Lighting level should be as per the requirement of IS 1944: PART II and the prevalent standards.

12.4 Following data must be submitted along with the technical bid:

1. Life of LED, colour characteristics and other relevant details to be supported by IES LM 80 (Equivalent Indian Standard – IS 16105 – 2011) report and the the LED life should be projected for 6000 burning hours

as per IES TM21-2011. The LM80 certification should be from the manufacturer of LED. The Luminaire supplier must submit

(a) letter from the manufacturer of LED that LED used are from his manufacture.
(b) LED used is the same one as certified by LM 80 reports.

2. Measurement of Luminous flux should be carried out at following temperature –
at 35 ℃, 85 ℃ and 105 ℃.
3. Luminaire Photometric Measurement Data (Luminaire Efficacy, Light Intensity Distribution Diagram, Co-efficient of Utilization curve, Electrical parameters (Test Voltage, Current, Wattage, Power Factor, THD) and efficiency of driver are to be certified by measurements as per IES LM79-08 (Equivalent Indian Standard IS 16106-2011). The test report should be generated by the laboratory of the manufacturer or NABL accredited Labs. The manufactures lab also have NABL accredition.
4. Relevant LED and Luminaire data sheets and Type test certificates indicating compliance to the technical specifications / standards.
5. Lighting design report for the Mock up test conditions indicating the Average illuminance (lux), uniformity, maximum and minimum values. Polar curve of the light fitting indicating the light distribution capability of luminaire should also be attached. Authorization certificate in case the bidder is not a manufacturer.
6. Mounting Instruction sheets.
7. Make of LED, Luminaire and Electronic Driver used.

12.5 **Wiring of the luminaries**

The wires for connection from terminal plate of the pole to the fixtures shall be 1100 V, minimum 3Cx2.5 sq mm PVC insulated, unarmoured having flexible copper conductors. The wires shall conform to the applicable IS.

12.6 TEST:
The following routine tests shall be conducted as per the relevant Indian Standards

a) Insulation resistance of each fixture shall be tested at 500 V.D.C. & the insulation resistances so measured shall not be less than 2 mega ohms between all current carrying parts and ground.
b) Each fixture complete with its proper lamp/lamps shall be shown to operate satisfactorily at its normal voltage and frequency.
c) Each fixture shall be examined visually to ensure that it is complete in all respects and satisfactorily finished.
d) Type and routine test certificates shall be submitted for tests conducted as per relevant standard for the fixture, accessories and work.

13. DISTRIBUTION TRANSFORMERS

13.01. <u>Scope</u>
The specification covers the design, manufacture, testing and inspection before dispatch and delivery of distribution transformers at Naya Raipur. The specification covers oil immersed, naturally air cooled (type ONAN), outdoor type, **three star rating**, three phase, 50 Hz, 11/0.433 KV step down distribution transformers of capacity 63 KVA**.**

13.02. <u>System Particulars</u>:-
The transformers shall be suitable for outdoor installation with following system particulars and they should be suitable for service under fluctuations in supply voltage as permissible under Indian Electricity Rules

13.2.1	Nominal System Voltage	: 11 kV
13.2.2	Corresponding Highest System Voltage	: 12 kV
13.2.3	Neutral earthing	: Solidly earthed
13.2.4	Frequency	: 50 Hz with ±3 % tolerance

13.2.5 Number of Phase : 3

13.03. Applicable Standards

13.3.1 The design, manufacture and performance of the equipment shall comply with all currently applicable statutes, regulations and safety codes. Nothing in this specification shall be construed to relieve the bidder off his responsibilities.

13.3.2 The Distribution Transformers shall conform to IS: 2026 as amended up to date or other International Standards for equal or better performance. Unless otherwise modified in this specification the Distribution Transformers shall comply with the Indian Standard Specification IS 2026 latest.

13.3.3 Unless otherwise specified, the equipment offered shall conform to amended up to date Indian, IEC, British or U.S.A. Standards and in particular, to the following:-

a.	IS 2026(Part I,II,IV)/1997,(Part-III)/1981, (Part-V)/ 1994	Power Transformer
b.	IS: 1180/1989 (Part-1& Part-2)	Outdoor type, Three phase distribution transformers up to and including 100 kVA, 11KV
c.	IS:335/1993(fourth revision)	New insulating oil- Specification
D	IS:2099/1986, IS: 7421-1988, IS:3347 (Part-I /Sec-2)-1979, IS:3347 (Part-I /Sec-1)-1982 amended up to date	Bushing
E	IS 5	Colours for ready mixed paints and enamels.
f.	IS 13730 (Part-27)1996	Specification for particular types of winding wires.
g.	CBIP Publication No.295:2006	Manual on transformers

13.3.4 In case of conflict arising out due to variations between the applicable standard and the standards specified herein the provisions of this specification should prevail.

13.04. Climatic Conditions

(i) Peak Outdoor temperature : 50 ^{0} C Minimum (50 ^{0} C+40 ^{0} C)
(ii) Maximum oil temperature : (50 ^{0} C+35 ^{0} C)
: 85^{0}C under max. temperature & max load condition attainable.
(iii) Maximum relative humidity : 95% (sometime approaches saturation point).
(iv) Minimum relative humidity : 10%
(v) Average No. of thunderstorm days per annum. : 40 days
(vi) Average number of rainy days : 90 days
(vii) Number of months of tropical monsoon conditions. : 3 months
(viii) Average annual rainfall : 125 cm.
(ix) Wing pressure : 100 Kg/m^2
(x) Altitudes not exceeding : 1000 meters.

13.05. Specific Technical requirement:

13.5.1 Standard kVA Ratings:-The standard ratings for transformer shall be 63 kVA.

13.5.2 Nominal voltage ratings:

Primary voltage : 11 kV
Secondary voltage : 0.433 kV

13.5.3 Winding connections:-

i. H.V. Winding : Delta (A)
ii. L.V. Winding : Star (Y)

The neutral of the L.V. winding shall be brought out to a separate insulated terminal. The voltage group shall be Dyn-11.

13.5.4 Temperature Rise:

a. The temperature rise for top oil over an ambient temperature of 50° C should be 35 °C maximum measured by thermometer in accordance with IS 2026.

b. Temperature rise for winding over an ambient temperature of 50° C should be 40° C maximum (measured by resistance method in accordance with IS 2026.

The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise.

13.5.5 No load voltage ratio:-

The no load voltage ratio shall be 11000/433 Volts.

13.06. Taps

No tapings shall be provided for transformers upto 100kVA rating.

13.07 Design & construction:

13.7.1 Core

i. The core shall be stacked type. The core shall be of high grade cold rolled grain oriented (C.R.G.O) annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, and bolted together to the frames firmly to prevent vibration or noise. All core clamping bolts shall be effectively insulated. The complete design of core must ensure permanency of the core losses with continuous working of the transformers.

ii. The grade of core laminations shall be **M4 or better. The value of the flux density allowed in the design and grade of lamination used shall be clearly stated.**
The successful bidder shall be required to submit the manufacturer's test report showing the Watt loss per Kg and the thickness of the core lamination, to ascertain the quality of core materials. The purchaser reserves the right to get sample of the core material tested at any Govt. recognized laboratory.

(iii) The transformer core shall not be saturated for any value of v/f ratio to the extent of 112.5% of the rated value of V/f ratio (i.e. 11 KV/50 due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load condition and should not get saturated. The supplier shall furnish necessary design data in support of this situation.

(iv) Flux density should not be more than 1.55 Tesla for CRGO transformers at the rated voltage and frequency. The value of the flux density allowed in the design shall be clearly stated in the offer along with graph.
No load current at rated voltage and at 112.5% of rated voltage for 25 KVA rating shall not exceed the % (percentage) values given below for different types of core:

KVA Rating	No load current as a percentage of rated full load current	
	At 100 percent Rated Voltage	At 112.5 percent Rated voltage
63	3	6

Test for magnetic balance by connecting the LV phase by phase to rated phase voltage and measurement of an, bn, cn voltages will be carried out.

(v) **Details of Core**:

Particulars	Rating in KVA
	63
No. of steps (Min) for stack core	5 standard steps

13.7.2 Winding:-

i. Materials: Double paper covered / Super enamel covered Aluminium conductor shall be used for HV and LV winding.

ii. Density: Current density for HV and LV should not be more than 1.6 A / sq.mm for aluminium conductor.

iii. L.V. winding shall be in even layers so that neutral formation will be at top.

13.07.3 Losses:

The total losses at 50% & 100% loading for three phase, three star rating 25, 63 & 100 KVA, 11/0.433 kV transformers at rated voltage, frequency and at 75 deg. Centigrade shall not exceed the values indicated as below:

Note: Please refer to the Technical Specification for 3 Star Distribution Transformer given by Bureau of Energy Efficiency (the same is enclosed below as a schedule V).

TABLE – 1

KVA Rating	Voltage Ratio in kilovolts	Losses at 50% loading (Watts) at 75^0C	Losses at 100% loading (Watts) at 75^0C
63	11/0.433	380	1250

Apart from above, Distribution Transformers should conform to minimum requirements of IS 1180 (Part-I):1989 for no load losses etc.

No positive tolerance shall be allowed in the maximum losses given in the table for both 50% & 100% loading values. Bids with higher losses than the above specified values would be treated as non-responsive. In case the actual loss values exceed the above guaranteed values, the transformers shall be rejected at the risk, cost and responsibility of the supplier.

The values guaranteed in G.T.P. for flux density, no load current at rated voltage, no load current at 112.5% of rated voltage and no load loss at rated voltage shall be individually met.

13.7.4 Insulation material & clearances:

(a) **Materials –** Makes of Electrical grade insulating epoxy dotted craft paper, Pressboard of standard make shall be declared in GTP by the bidder. All spacers, axial wedges/runners used in windings shall be made of pre-compressed pressboard-solid confirming to type B 3.1 of IEC 641-3-2. The test reports for all properties as per relevant I.S. amended up to date shall be submitted during inspection.

(b) The minimum electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the windings) should be 30 mm.

(c) **Minimum external clearances of bushing terminals in terminal boxes as per CBIP**

HV	Ph to Ph	130 mm
	Ph to E	80 mm
LV	Ph-to-Ph	25 mm
	Ph to E	20 m

13.7.5 Impendence value:-

The percentage impendence at 75^0C shall be 4.5% for transformers (IS tolerance of ± 10%).

13.7.6 Tank

13.7.6.1 The transformer tank shall be made up of prime quality MS Sheets of rectangular shape. The transformer tank shall be of robust construction. All joints of tank and fittings should be oil tight and no bulging shall occur during service. The tank design shall be such that the core and windings can be lifted freely. The tank plates shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of the lifting lugs provided. Tank inside shall be painted by varnish. Top cover plate shall be slightly sloping; approximately 5 to 10 deg. Towards HV bushing and edges of cover plate should be bent downwards so as to avoid entry of water through the cover plate gasket. The width of bend plate shall be 25 mm min. The top cover shall have no cut at point of lifting lug. The rectangular tank shall be fabricated by welding corners.

13.7.6.2 In rectangular shape tanks, horizontal or vertical joints in tank side walls and its bottom or top cover will not be allowed. In addition the cover of the main tank shall be provided with an air release plug.

Side wall thickness	:	3.15 mm. (min.)
Top and bottom plate thickness	:	5 mm. (min.)

13.7.6.3 Reinforced by welded angle 50x50x5 MM on all the outside walls on the edge of tank to form two equal compartments. The permanent deflection is not more than 5mm up to 750 mm length and 6mm up to 1250 mm length when transformer tank without oil is subject to air pressure of 35 KPa above atmospheric pressure for 30 min. Pressure test shall be performed carefully at the time of 1st stage inspection only to confirm the adequacy of reinforcement angle and gauge of the tank.

13.7.6.4 All welding operations to be carried out by MIG process.

13.7.6.5 Lifting lugs: 2 nos. welded heavy duty lifting of MS plate of 8mm thickness suitably reinforced by vertical supporting flat of same thickness as of lug welded edgewise below the lug on the side wall, up to reinforcing angle. They shall be so extended that cutting of bend plate is not required.

13.7.6.6 Pulling lugs: 4 nos. of welded heavy duty pulling lugs of MS plate of 8mm thickness/ pulling holes in the base channel shall be provided to pull the transformer horizontally on width side up-to 100kVA.

13.7.6.7 Top cover fixing bolts: GI nuts bolts of 3/8" dia. with one plain washer shall be used for top cover fixing spaced at 4" apart. 6mm neoprene bonded cork/ nitrile rubber bonded oil resistance gaskets conforming to type B/C IS 4253 Part – II amended up to date will be placed between tank and cover plate.

13.7.6.8 Vertical clearance: The height of the tank shall be such that minimum vertical clearance up to the top cover plate of 120 mm is achieved from top yoke.

13.7.6.9 Cable Terminal Box : The both HV and LV side cable terminal boxes shall be provided to cover the HV and LV **terminals.**

13.7.7 Heat Dissipation:

13.7.7.1. Heat dissipation by tank walls excluding top and bottom should be 500 W/m^2.

13.7.7.2. Heat Dissipation by fin type radiators of 1.25 mm thickness will be worked out on the basis of manufacturer's data-sheet. Supplier should submit the calculation sheet.

13.7.7.3. For 63 KVA transformers, 2 Nos. Radiators shall be provided only on LV Side and shall be of fin type. They should be fixed at right angle to the sides and not diagonally.

13.7.7.4. **Arrangement for studs provided for fixing of HV bushings shall be covered by terminal box.**

13.7.8 Conservator:

13.7.8.1 **The total volume of conservator shall be such as to contain 10% quantity of the oil. Normally 3% quantity of the total oil will be contained in the conservator. Dimension of the conservator shall be indicated in General arrangement drawing.**

13.7.8.2 Die cast Oil level indicator shall be provided on the side of conservator which will be with fully covered detachable flange with single gasket and tightened with MS Nut/Bolt and will be fixed on the side of rating plate and drain valve.

13.7.8.3 The pipe from the conservator tank connecting to main tank shall be of 30 mm. internal dia. and shall have a slopping plate so that the oil falling from the pipe shall not fall directly on the active job and shall fall on the side walls only. The pipe should project in the conservator so that its end is approximately 20 mm. above the bottom of the conservator. Thus slopping plate should be fitted such that clearance from the yoke/live part of the tap changer is maintained as prescribed i.e. 120 mm. The conservator shall be provided with a filling hole, with cover. In addition the cover of the main tank shall be provided with an air release plug.

Note: Transformer shall be supplied complete with first filling of oil.

13.8.0 Breather:

Breather joints will be screwed type. It shall have die-cast Aluminium body. Make of breathers shall be subject to purchaser's approval. Volume of breather shall be suitable for ***500 gm.*** (minimum) ***of silica gel (crystel size 6 mm).***

13.9 Terminals:

13.9.1 Brass rods of 12 mm dia for H.T. and L.T. with necessary nuts, check nuts and plain thick tinned washers for 63 & 100 KVA ratings.

13.9.2 HT/LT bimetallic connectors shall be provided with transformer.

13.10 Bushing & Connections:

For 11 KV side - 12 KV bushing and for 433 volts side 1.1 KV terminal bushing will be used. Bushings of the same voltage class shall be interchangeable. Bushings with plain sheds as per IS: 3347 shall be mounted on side of the tank and not on the top cover. Only continuous sheet metal pocket shall be provided for mounting of all H.V/L.V. bushings and the same shall not be fixed on pipes. Sheet metal pocket shall be designed in such a way that all HT bushings shall remain parallel and equidistance all through. The inside connections of windings to bushings shall remain within the pocket. Bushings having type tested as per IS:3347 shall only be acceptable.

13.11 Internal connections:

In case of HV winding, all jumpers from windings to bushing shall have cross section larger than the winding conductor (normally 1.5 times). For Aluminium winding L&T, Alkapee Aluminium brazing rods with suitable flux will be used or alternatively joints will be made by using tubular connectors properly crimped at three spots. Aluminium brazing rods to be used for ring forming on other end and nut bolting on HV bushing stud.

LT Star connection will be made by using Aluminium/Copper Flat as per winding material and properly brazed or bolted with the crimped lugs on windings by means of plain or spring washers and lock nuts to the flat. Other end of the conductor is brazed on "L" shape Aluminium/copper flat and flat nut bolted with neutral bushing stud. ALTERNATIVELY, for 63 & 100kVA ratings all the three terminals of LV windings together with terminals for neutral bushing shall be properly brazed and then covered with Aluminium tubular sleeve of suitable length and cross sectional area duly crimped in order to provide sufficient strength to the joint. The star connection should be wrapped with cotton/paper tape.

Firm connection for LV windings to bushings shall be made by brazing with adequate size of "L" shape flat nut bolted with LV Bushing stud. For delta formation on HV side, copper wire having cross sectional area 1.5 times the winding area should be used. SRBP tube /insulation paper should be used for delta connection and on the portion of HV winding joining to HV bushing.

13.12 Tank base channel:

Tank base channels to be fitted across the length of the transformer as follows:

(a) For 25, 63 & 100 KVA Transformer - Two channels of 75x40 mm of length 460 mm.

13.13 Terminal Marking Plates and Rating Plates:

The transformers shall be provided with a plate showing the relative physical position of the terminal and their markings engraved on it. The transformers shall be provided with non-detachable rating plate of Aluminium anodized material fitted in a visible position, furnishing the information as specified in IS:2026. The rating plate shall be embossed/ engraved type but not printed type. The relative position of tapping switch and corresponding voltages may also be shown on the rating plate.

Further, MS plate of size 125x125 mm be got welded on width side of the transformer on stiffener angle. On this plate Name of firm, order No. & Date, Rating, serial number and Date of dispatch should be engraved. Labeling shall be done as per BEE guidelines.

13.14 Fittings:

The fittings on the transformers shall be as under:

1	Rating and diagram plate	1 no.
2	Earthing terminals with crimping lugs.	2 nos.
3	Lifting lugs	2 nos. (for tank)
4	Thermometer pocket	1 no.
5	Oil Indicator on tank	1 no.
6	Platform mounting channel with suitable holes	2 nos
7	HT & LT bushing	3 nos. of 12 kV HT bushing for 11 kV and 4 nos. of LT bushing (1.1 kV) shall be provided. Each bushing (HV & LV) should be provided with 3 nos. of brass nuts and 2 plain brass washer.
8	Pulling lugs	4 nos
9	Aluminium die cast silica gel 1 No. breather 500 gms. Capacity	1 no.
10	Top cover lifting lugs	2 nos.
11	Bimetallic connectors to be fitted on the stud	HV: 3 nos. LV: 4 nos.
12	Radiators	1 no. for 25KVA/2 nos. for 63& 100KVA
13	Oil level gauge indicating three position of oil marked as below:-Minimum(-)5^0C, 30^0C Maximum 98^0C	1 no
14	Conservator	1 no.
15	Cable Terminal Box	1 for HV Side 1 for LV side

13.15 Transformer Oil:

The transformer shall be supplied complete with first filling of oil and the same shall comply with IS: 335-1983 with latest version thereof with ageing characteristics specified. These characteristics are shown in **Schedule-II(C)**. Type tests certificate of oil being used shall be produced at the time of inspection.

13.16 <u>Tests & Test Certificates</u>

The following routine tests and type tests are required to be carried out on the transformers.

13.16.1 Routine Tests:

Before dispatch, each of completely assembled transformer shall be subjected at the manufacturers works to the following routine tests in accordance with the details specified in IS: 2026:

(a) Measurement of winding resistances.
(b) Ratio, polarity and phase relationships.
(c) Impedance voltage.

(d) No load losses and no load current.
(e) Load losses.
(f) Insulation resistance.
(g) Separate source voltages withstand.
(h) Induced over voltage withstand.
(i) Vacuum test.

13.16.2 Type Test:

In addition to the routine tests as above the following type tests shall be carried out on the transformers in accordance with IS: 2026/1977 as amended from time to time:

(a) Lightening impulse tests.
(b) Temperature rise test.
(c) Short circuit test.

The suppliers may carefully note following specific requirements of short circuit, impulse voltage and temperature rise tests:

The Company intents to procure transformers designed and successfully tested for short circuit and impulse test. It may also be noted that the Company reserves the right to conduct any of the above type tests in accordance with the IS, afresh on each ordered rating at Company's cost, even if the transformers of the same rating and similar design are already tested. This test shall be carried out on a transformer to be selected by the Company either at their works - when they are offered in a lot for supplies or random sample unit from the supplies already made to Company's Area Stores. After conducting short circuit test, healthiness of active parts shall be checked by un-tanking the transformer. The findings and conclusion of these tests shall be binding on the supplier.

In case the transformer does not pass in either of the tests and if the active part details are not found to be in line with the design tested and approved, the following punitive measures shall be taken:

(i) 5% payment of the bill for the supplies already made will be recovered by the Company.
(ii) For transformers already supplied, the guarantee period shall stand twice the normal guarantee period. The period of performance Security Deposit shall be suitably extended to cover the extended guarantee period.
(iii) Further, supply of balance quantity of transformers will not be accepted by the Company, till another transformer from the manufactured batch is satisfactorily tested (OR transformers are modified according to the tested design) for both tests at your cost and consequent to this, if there is any delay in executing the order, the same shall be to your account. Company reserves the right to take action as per terms and conditions of the order.
(iv) The test charges shall be borne by the firm. Please note that if the terms and conditions detailed above regarding short circuit withstand test & impulse voltage test on transformers and procedure for these tests are not accepted by you in full, action will be taken as deemed fit as per the terms of the order.

13.16.3 Acceptance test:

The following tests shall be witnessed by the Purchaser through his representative at the firm's works:

(i) All the routine tests as mentioned above shall be performed on minimum 10% quantity of offered lot.
(ii) Heat run test (Temperature rise test): Heat run test shall have to be conducted at suppliers cost on one transformer of each rating in any offered lot during the course of supplies***. In case of transformers with tap changer, test shall be conducted on the lowest tap feeding corresponding losses at 75^{0}C***.

To facilitate conduction of heat run test on any unit in any lot at any point of time during the supplies, the manufacturers will provide a thermometer pocket, which gets immersed in oil on the side of the transformer in all the transformers. This pocket shall also be used for connecting thermal sensing device to monitor the variations in temperature and whenever required to operate the protective devices. The Sensor pocket shall be of 12 mm diameter with blanking screwed cap, removable at site. The depth of the projecting stem of this pocket inside the transformer will be below oil level. It shall not infringe with electrical clearances nor obstruct the un-tanking of the active part.

(iii) Verification of active parts on one unit of each rating of ordered quantity along-with weighing of unit.
(iv) **Unbalanced current test**: The value of zero sequence current in the star winding shall not be more than 2% of the full load current.
(v) Transformer shall be subjected to test for over fluxing of core, wherever required by the Company's inspecting officer.

Further, the purchaser's Inspector reserves the right to get the Spill Current Measurement Test and also the Pressure Test performed on any tank during their inspection.

(a) **Air pressure test:** The tank shall be fixed with a dummy cover with all fittings including bushings in position and be subjected to 0.8 Kg per cm sq. above atmosphere pressure for 30 minutes and the vacuum corresponding to (-) 0.7Kg per cm. Sq. for 30 minutes, permanent deflection for flat plate, after pressure has been released shall not exceed the values given below:

Length of plate	Deflection
Upto 750 mm	5mm
751 to 1250 mm	6 mm
1251 to 1750 mm	8mm

(b) **Test for Spill Current in neutral:** The test will comprise of measuring current between shorted secondary phases and neutral on applying impedance voltage at primary winding. The value should not exceed 2% of full load current.

13.17. Testing facilities

The bidder should have adequate testing facility for all routine and acceptance tests and also arrangement for measurement of losses, resistance, etc. details of which will be enumerated in the order.

13.18. Inspection

(A) To ensure about the quality of transformers, the inspection shall be carried out by the Company's representative or by third party at following two stages:

(i) **Stage Inspection** will be done when the raw material is received, and the assembly is in progress in the shop floor. After the main raw-materials i.e. core and coil materials and tanks are arranged and transformers are taken for production on shop floor and a few assembly have been completed, the firm shall intimate the O/o the CE(Engg),NRDA in this regard, so that an inspecting officer for carrying out such inspection could be deputed, as far as possible within fifteen days from the date of intimation. **During the stage inspection, a few assembled cores shall be dismantled to ensure that the CRGO laminations of M4 Grade used are of good quality**.

(ii) **Final Inspection** will be carried out at finished stage i.e. transformers are fully assembled and are ready for dispatch. As and when the transformers are ready for dispatch, an offer intimating about the readiness of transformers, for final inspection for carrying out tests as per relevant IS and as in **Clause 16** above, shall be sent by the firm along with Routine Test Certificates. The Company shall normally arrange t13.he inspection at the earliest after receipt of offer for pre-delivery inspection.

(C) In case of any defect/defective workmanship observed at any stage by the Inspecting Officer, the same shall be pointed out to the firm in writing for taking remedial measures. Further processing should only be done after clearance from the Inspecting Officer/ this office.

(D) All tests and inspection shall be carried out at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and purchaser at the time of purchase. The manufacture shall offer the Inspector representing the Purchaser all reasonable facilities, without charges, to satisfy him that the material is being supplied in accordance with this specification. This will include Stage Inspection during manufacturing stage as well as Active Part Inspection during Acceptance Tests.

(E) Random sample checking and testing of the transformer selected at random from the supplies made to the Area Stores shall be done for verification of technical details, design and losses as per approved G.T.P. drawings and technical specification of the order. In case of variations, the lot shall be rejected.

(F) The purchaser has all the rights to conduct the test including type tests, at his own cost by an independent agency whenever there is dispute regarding the quality of supply or interpretation of test results. **In the event of failure of transformers in such tests, the expenses incurred in testing shall be to the supplier's account as already mentioned above in case of random testing**.

(G) **Test reports on the analysis of raw materials:** The supplier shall furnish details of source(s) of raw-materials, test certificates and report on the analysis of electrolytic copper//Aluminium used for the winding and the steel used for core, insulation material and also other bought out items form Sub-suppliers.

13.19. Inspection & Testing of Transformer Oil

To ascertain the quality of the transformer oil, the original manufacturer's tests report should be submitted at the time of inspection. Also arrangements should be made for testing of transformer oil,

after taking out the sample from the manufactured transformers and tested in the presence of purchaser's representative.

13.20. Loading of Transformers

Transformer loading should be complied with IS:6600.

13.21 Drawing:-

13.21.1 A set of following drawings with all dimensions shall be submitted by the Bidder along with the offer:

i. General Dimensional drawing.
ii. Core Assembly drawing.
iii. Internal Construction Drawing.
iv. Rating & Diagram Plate Drawing.
v. HV/LV Bushings indicating measurement of creepage distances.

13.21.2 The drawings shall be of A-4 size only. The bidder should also supply along with his offer the pamphlets/literatures etc. for fittings/ accessories.

13.22 Finishings:

The exterior of the transformer and other ferrous fittings shall be thoroughly cleaned, scrubbed and given primary coat and two finishing coats of durable oil and weather resistant paint of enamel. ***The color of finishing coats shall be DARK GREEN confirming to IS: 5 of 1961 (colors for ready mixed paints) with conservator painted with white color. 3 stars(***) should be painted on white conservator with green paint clearly visible from ground to indicate that the transformer is a 3 star rating, besides the BEE labelling.***

13.23 Guaranteed Technical Particulars:

The bidder should fill up all the details in GTP parameter list, the statement such as "as per drawings enclosed", "as per NRDA/C.S.P.D.C.L.'s requirement" "as per IS" etc. shall be considered as details are not furnished and such offers shall liable for rejection.

14. Street Lighting Automation

14.1. Operational Features

i. Automatic Control and Remote Operation from Central Control Station to be provided with SCADA software.
ii. Remote operation through mobile phones at zonal level.
iii. Status indication of the operation at central location and to Maintenance Staff on their mobiles through SMS message.
iv. Remote indication of faulty feeders at central station and power failure message through SMS to zonal staff (alarm message).
v. Forced operation ON/OFF from central station and by mobiles through SMS for maintenance purpose.
vi. Event and alarm logging facility - can be customized for analysis of the fault duration and type of faults, etc.
vii. Security of operation by passwords.
viii. It should be possible to modify/change the authorized mobile phone no. of the zonal staff from Central SCADA by SMS
ix. The system shall communicate with the Energy Meter installed in the panel on RS 485 network with Modbus protocol and collect important parameters i.e., 3 phases Voltages and Currents, KWH, Power Factor.
x. It should be possible to set a base current (each phase) from remote (by SMS). Any deviation beyond predefined percentage should be reported as an exception to the Zonal Staff Mobile phone and Central SCADA by SMS with absolute value of the deviated parameter. The Voltage and Power Factor limits shall be fixed as per the standards and should generate a message in case of an event.

xi. Continuous Load current measurement - for analysis of aging factor of the lamps and healthiness of the individual circuits.

xii. The system shall have an in-built Real Time Clock (RTC)

xiii. The system should generate an event message, in case it loses communication with the Energy Meter (for whatsoever reason) and generate an SMS to the Mobile Maintenance Crew and Central SCADA

xiv. The communication of the SCADA shall be on a DSL/Leased line from the service provider's SMS database.

xv. There will be a dedicated URL which should be accessible from Internet on a browser, which shall list all the messages exchanged through the 3 digit short code

xvi. Report generation – daily consumption report and Exception report for power failures. xvii. Supervision, control & logging to be archived district and zone wise.

xviii. System can be de-fragmented in future for district level operation and control in addition to central control station.

14.2 GSM based Street Light Automation System:

A) System Specification:

i) The Streetlight Control System with GSM Interface should have a Central control station SCADA with two way communication using SMS messages.

ii) Street light Automation system should have dimmer option maximum upto 50%.

iii) Switching of 100 & 200 Amp continuous load consisting of LED/Fluorescent Tube Lights, HPSV Lamps and Halogen Lamps

iv) The system should have a provision for remote and local operation with a three way selector switch.

	Description	Qty.
	100/200 Amps GSM Switch Module Specification :	
	Logic Controller	1
	Communication Module	1
	RTC (Real Time Clock) Module	1
	Communication Cable (RS232 / RS485 for Energy Meter)	2
	GSM Modem	1
	Suitable MCCB with Trip contact	1
	Contactor 100A/200A	1
	MCB, 2A, 220V AC, 2P	1
	By-pass Switch of suitable rating	1
	Enclosure (14 G, CRCA, (1050x600x250 mm)	1
	Aux Relay	1
	Isolation Transformer 415/200V, 200 VA	1
	CTs (Cast Resin, Class 0.5, 100/5) - 3 nos.	1
	Acrylic Sheet Shroud for bus bars	1

B) **Hardware Configuration**

i) 4 pole MCCB suitable for Positive Isolation with a Trip Contact

ii) 3 Pole Contactor with Aux Contact and 220 V AC Coil

iii) Controller with
CPU with DI-09, DO-07 RTC, 24 V DC Power Supply
1 x RS 485 Port (Modbus) for communication with Energy Meter
1 x RS 232 Port for communication with GSM Modem

iv) GSM Modem
v) Energy Meter

vi) Aux relay for interposing the command to contactor from Controller

vii) Class 0.5 or 1.0 Cast resin CTs for connecting the Energy meter
viii) Isolation Transformer (415 V AC / 200 V AC) for control supply
ix) 2P MCB for control supply
x) The earth conductor GI of size 25 X 3 mm

(C) Panel Enclosure

i) The panel shall be wall mounting cubicle type with four supports to accommodate 8 mm Bolts
ii) Sheet steel thickness for complete enclosure to be 2 mm
iii) Cable entry will be from bottom with a gland plate made of 3 mm sheet steel
iv) 25 x 10 mm Aluminum bus bars for each phase and neutral
v) Bus bars shall be mounted on 130 mm long insulators
vi) Control wiring shall be 1.5 sq. mm PVC insulated copper cable
vii) CT wiring shall be 4 sq. mm PVC insulated copper cable
viii) All control cables shall be ferruled at both ends as per drawing

ix) Engraved Legend plates shall be provided for equipment designation
x) 'Danger' plate shall be provided on the LT compartment
xi) Panel shall be painted in Siemens Grey Paint, shade no. RAL7032
xii) A transparent Acrylic Sheet Shroud shall be provided in the LT compartment housing MCCB & Contactor.
xiii) Two earthings to be provided to the GSM switch. The earth conductor of size 25 X 3 mm will be tapped from the nearest earth mat available.

(D) MCB

i) Should be ISI mark as per IS 8828:96 and IEC 898 with short circuit breaking capacity as 10 kA.
ii) Should be classified as per application. B Curve in this case iii) Should be suitable for Isolation
iv) Should have positive contact indication
v) Let through energy should be of class 3
vi) Should have Low energy watt loss
vii) Should offer Protection degree of IP 20
viii) Should have grooved tunnel terminal
ix) Should have captive screws
x) Should have an endurance of 20, 000 Number of operations when energized
xi) Resistance to electrical shocks (or dielectric withstand) should be 2.5 KV
xii) Should have line load reversibility

(E) MCCB

a) General

i) The circuit breakers shall comply with IEC60947.2 & IS 13947 part 2.

ii) The breaking capacity performance certificates shall be available for category A to the above mentioned standards. The test shall be carried out under the breaking performance during the ultimate breaking capacity (Icu), Ics rating =100% Icu. Certificate for all the sequences (Sequence 1 mandatory) should be available.
iii) All circuit breakers shall have a rated operational voltage of 600V AC (50/60Hz).

iv) The rated insulation voltage shall be 600V and 660V at 50/60 Hz. for low breaking capacity and high breaking capacity MCCBs respectively.

v) There should be different levels of breaking capacities starting from 10kA upto 50kAfor flexibility in selection.

vi) The breaker shall be maintenance free and fully tropicalized. vii) It all have 4 poles (switched neutral).

viii) Production site organization shall be certified to comply with ISO 9001 standard.

b) Construction

i) Operating mechanism shall be of the quick make quick break type, with the speed of operation independent of the operator, and mechanically trip free from the operating handle so as to prevent the contacts from being held closed against short-circuit and overload conditions. The operating mechanism shall be constructed to operate all poles in a multi-pole breaker simultaneously during opening, closing and tripped conditions.

ii) It shall not require any external power supply to operate the tripping mechanism.

iii) The breakers shall be operated by a toggle which shall clearly indicate the three fundamental positions ON, OFF and TRIPPED.

iv) If required, the breaker will be equipped with rotary handles.

v) The breaking and extinction of the electrical arc shall be achieved by means of non- welding contacts and an arc chute surrounding these contacts.

c) Characteristics

i) The protection unit shall have Short circuit setting fixed at 10In +/- 20% as specified in IEC 947 and IS 13947 part2.

d) Operation

i) The electrical and mechanical endurance of the moulded-case circuit breakers should be as defined by IEC 947-2 standard.

ii) The moulded-case circuit breakers shall be equipped with a "push to trip" button in front to test operation and the opening of the poles.

e) Options

i) Alarm contacts should be available for remote indication of circuit breaker trip condition.

f) Installation

i) The circuit breaker should provide the flexibility of terminating line and load from any direction. Manufacturers should test the circuit breaker for this condition and requisite test certificate should be available.

Phase barrier should be provided as a standard feature.

F) Contactor

i) Should be conforming to IEC 60947-4-1, IS 13947 ii) No. of Poles – 3

iii) Insulation Voltage – 690 V

iv) Impulse withstand voltage (Uimp) – 8 KV

v) Insulation – Class 'F'

vi) Shock resistance 10/15 gn

vii) Should pick-up @ 85 – 110% of control voltage viii) Should drop @ 30-60% of control voltage
ix) Operating time – 15 to 35 ms

x) Suitable for switching HPSV Lamps (Very high in-rush considering the Capacitance in

HPSV)

xi) The contactor should be designed and tested for at least 5, 000, 000 mechanical operations

& 1, 000,000 electrical operations

xii) Should be possible to inspect the contact wear and easy contact replacement xiii) Should have Mechanical ON/OFF indicator
xiv) Should have provision for side mounted aux. Contacts

G) GSM Modem

i) 900/1800 Dual Band, GSM

ii) GPRS Class B, Class 2 (28.8 Kbps down load, 14.4 Kbps up load)

iii) Fully Type approved – R&TTE

iv) CE Approved

v) AT Command set (GSM 07.05 and 07.07)

vi) Suitable for Data, SMS, Voice & Fax vii) SIM Tool Kit Class 2
viii) DTMF Function

ix) Data circuit asynchronous, transparent, non transparent up to 14.4 Kbps x) SMS – Text & PDU, Point to Point (MT/MO), Cell Broadcast
xi) One user programmable I/O port for connecting external devices xii) Input Voltage 5 – 30 V DC
xiii) Current consumption: max. 450 mA (avg.), max. 2.5 A Peak, up to 35 mA in idle mode xiv) SIM Holder
xv) SMA Antenna (50 Ohm)

xvi) Temperature - Operation : -15 to +50 deg. C, Storage : -20 to 65 deg. C

H) Controller

i) AC Power voltage range from 85 to 264 VAC.

ii) DC Input voltage (positive or negative logic) operating at 24VDC with a range from

20.4VDC to 28.8VDC

iii) Relay outputs capable of handling over 2 A of power.

iv) TUV certified product line confirming to the following EMC standards
i. EN 61131-2, Amendment 1 (CI 7,8,10,11,12)
ii. EN 50081-2 ; 1993
iii. EN 50082-2 ; 1995

v) confirming to UL standard of Class 1, division 2, Group A, B, C & D

vi) Internal EEPROM for program backup vii) 1 x RS 485 Modbus Master Port
viii) 1 x RS 232 Port for Modem ix) Insulation resistance.
x) Between power and ground terminals: 10 M minimum (500 VDC)

xi) Between I/O and ground terminals: 10 M minimum (500 VDC)

xii) Noise resistance. AC power terminals: 1.5 kV, 50 ns to 1 µs. I/O terminals (coupling clamp): 1.5 kV, 50 ns to 1 µs
xiii) Provision for Plug in EEPROM for programming and memory extension

xiv) Programmable input filter. Input filter time can be changed during configuration. No filtering or filtering at 3 ms or 12 ms. I/O points are configured in groups
xv) Storage Temperature of -25 deg. C to + 70 degree C and operating temperature from 0 deg. C to + 55 degree C
xvi) processor with a processing cycle time of 1 ms per 1000 instructions xvii) IEC1131 compliant supporting ladder, Grafset, instruction list
xviii) Powerful instruction set including arithmetic, logic, numeric, drum control, automation functional blocks, trigonometric & Boolean
xix) Scanning: Normal (cyclical) or periodic (constant) (2 to 150 ms)

xx) Execution time: 0.14 µs to 0.9 µs for a list instruction

xxi) Inbuilt analogue adjustment points accessible from the front panel updated from each scan xxii) Relative humidity handling from 30-95% without condensation
xxiii) Should be able to generate AT Commands for Modem

xxiv) Capable of embedding Real-time data into an SMS with Time Stamp xxv) Programmable in Ladder and Grafset
xxvi) Should be able to record the time of the last power loss

I) SCADA Software

i) Shall be a reputed make with special functions required for the project

ii) Should have unlimited tags (as the expected no. of tags are expected to touch 1 lac nos. or more
iii) Should support standard databases such as SQL, Oracle, and Access etc. iv) Should be OPC compliant
v) Should have all the possibilities of protocols for future up gradation viz., IEC 60870-5-

101/104, DNP3.0 etc

vi) Should have feature of creating Web Clients for future viewing vii) Should have Crystal Reports integrated for report generation

14.3 **DATA Transmission System** :

The following options are to be considered:

i) **By SMS** - Meter reading at predefined time periodically and same logged by the SCADA

software.

ii) **By direct polling by Central Station** – the Central SCADA will call up each unit periodically and fetch details of metering from each location and update its records with date and time. In this case all controllers will have DATA enabled SIM from GSM service provider.

iii) **By continuous Connection with the field control units** – this option enables the central station to be always in touch with all field controllers and can keep on logging at very frequent intervals. In this case all controllers will have GSM modems with GPRS/EDGE communication capability provided by the GSM service provider.

14.4 **Location of GSM switches**:

The Location of GSM switches have been categorized into the following three categories:

a) Category I: Location of GSM switch within the sub station building

i) This category is assumed / estimated to have a population of 60% of the installations
ii) The GSM switch would be installed on wall by using Anchor Fasteners.

b) Category II: Location of GSM switch in the outdoor kiosks

i) This category is assumed / estimated to have a population of 30-35% of the installations
ii) The GSM switch would be installed within the existing out door kiosk on the existing PCC poles.
iii) It is envisaged that at some locations it may not be possible to install the GSM switch within the existing fenced outdoor kiosk, in which case the GSM would be installed near to the kiosk or a separate MS Angle frame fabricated from 50 X 50 X 6 mm angle and grouted in ground and the entire area would be suitably fenced.

c) Category III: Location of GSM switch in congested areas and Flood light Masts i) This category is assumed / estimated to have a population of 10-15% of the
installations

ii) The flood light masts may be connected to the street light circuit. iii) The GSM switch would be installed in the indoor substations

d) High Mast : Falling in proximity of any of the above 3 categories

i) The flood-light masts may be connected to the GSM Switches on existing circuits falling in any of the above categories
ii) Necessary modification need to be carried out to by-pass the existing high- mast control panel

14.5 **Supply and cabling**:

1. The LV supply to the GSM switch will have Incoming cable size of 4 Core 50 sqmm(for 100 amp switch) and 4core 95 sqmm cable (for 200 amp switch) XLPE cable and subsequent section of the street light mains shall be done through 4 Core 25 sqmm XLPE cable.

2. The connections from Junction/fuse box to the Luminaries shall be done with 2.5

Sqmm multistrand copper conductors.

14.6 Provisions of IER : 1956

Bidder shall comply with provisions of Indian Electricity Rules 1956 as amended/updated.

14.7 Standards

Relevant IS shall be followed in all cases. For any aspect for which IS is not available

International Standards such as IEC/BS shall be followed.

15. 11 KV RING MAIN UNIT

Scope of work : Design, Engineering, Manufacturing, assembly, inspection and testing before despatch, packing & forwarding and delivery at site/stores of outdoor type compact 11KV Oil Ring Main Units with Load break Isolators for 11 KV Incoming & Out going cables and HT HRC fuse unit for Distribution Transformer with future provisions for motorization and necessary take off terminal units for future SCADA automations, other accessories and auxiliaries equipments and mandatory spares, described herein and required for their satisfactory operation in various locations of the Naya Raipur, in combinations of 2 LBS + 1 HT HRC fuse BOTH SIDE EXTENSIBLE and all these units are shielded in a outdoor metal body with a dielectric media of Oil with provision of additional load break switches and HT HRC fuses extensible at both side:-

Provision of all the RMU with necessary take off terminal units for future SCADA automations.

15.1 The objective of the RMUs is for extremely small construction width, Compact, maintenance free, independent of climate, easy installation, operational reliability, Safe and easy to operate, minimum construction cost, minimum site work and minimum space requirement.

15.2 The RMUs shall conform in all respects to high standards of Engineering design, workmanship and latest revisions of relevant standards at the time of offer and purchaser shall have the right to reject any material which in his judgment is not in full accordance therewith.

15.3 The insulating medium for load break isolators, HT HRC fuse unit, Earth switch, 11 KV Buses and other associated equipments should be oil confirming to relevant IS/IEC.

15.4 The complete RMU must be fully Type Tested including for Internal Arc Fault withstand for 20KA / 0.1 Seconds. as per latest Standard IEC 62271-100/200.

15.2 STANDARDS :

Unless otherwise specified elsewhere in this Specification, the RMU, Switchboard (Switchgear), Load break isolators, Instrument Transformers and other associated accessories shall conform to the latest revisions and amendments thereof of the following standards.

IEC 60 298/ IEC 62271-200/IS 12729:1988	General requirement for Metal Enclosed Switchgear

IEC62271-102/ IS 9921	Alternating current Dis-connector's (Load break isolators) and Earthing switch
IEC 62271-100/ IEC 62271-200	Specification for alternating current circuit breakers.
IEC 60044-1/IEC 60185/IS 2705:1992	Current Transformer
IEC 62271-103	High voltage switches
IEC 60273/IS :2099	Dimension of Indoor & Outdoor post insulators with voltage > 1000 Volts
IEC 60529/IS 13947(Part-1)	Degree of protection provided by enclosures for low voltage switchgear and control gear
IEC 60255	Electrical Relays
IEC 60265	Specification for high-voltage switches

The following parts of RMU shall be type tested for Degree of protection:-

IP 54 - tank with high voltage components. IP 2X - front covers of the mechanism.

IP 3X - cable connection covers. IP 54 - outdoor enclosure/kiosk.

Equipment meeting with the requirements of any other authoritative standards, which ensures equal or better quality than the standard mentioned above shall also be acceptable. If the equipments, offered by the Bidder conform to other standards, salient points of difference between the standards adopted and the specific standards shall be clearly brought out in relevant schedule. In case of any difference between provisions of these standards and provisions of this specification, the provisions contained in this specification shall prevail. One Hard copy of such standards with authentic English Translations shall be furnished along with the offer.

15.3. SERVICE CONDITIONS:

All out door Equipment / material to be supplied against this specification shall be suitable for satisfactory continuous operation under tropical conditions as specified below:-

(i)	Peak Outdoor temperature	: 50 ^{0} C Minimum (50 ^{0} C+40 ^{0} C)
(ii)	Maximum oil temperature	: (50 ^{0} C+35 ^{0} C) : 85^{0}C under max. temperature & max load condition attainable.
(iii)	Maximum relative humidity point).	: 95% (sometime approaches saturation
(iv)	Minimum relative humidity	: 10%
(v)	Average No. of thunderstorm days per annum.	: 40 days
(vi)	Average number of rainy days	: 90 days

(vii) Number of months of tropical monsoon conditions. : 3 months

(viii) Average annual rainfall : 125 cm.

(ix) Wing pressure : 100 Kg/m^2

(x) Altitudes not exceeding : 1000 meters.

15.4 TECHNICAL PARAMETERS OF RMU: I. 11KV

Bus Bar

Type of material	: Copper
Current Carrying Capacity	: 400 Amps. Short time
rating current for 3 secs.	: 13.1 kA
Insulation of bus bar	: Oil
Bus bar connections	: Anti-oxide grease

II. Parameters for Switch Gear of DT and load break isolators

Type	: Metal enclosed
No of Phases	: 3
No. of poles	: 3
Rated voltage	:12 KV
Operating voltage	:11 KV(+10% to –20%) Rated lightning
impulse withstand voltage	:75 KV
Rated power frequency withstand voltage	:28 KV
Insulating medium	: Oil
Rated short time current	:13.1 KA.
Rated short time	:3s
Rated peak withstand current	:35 KA.
Rated current (Bus):	: 630 A
Rated current Load Break Isolator:	: 630 A
Rated current (HRC fuse)	: 400 A
Rated frequency	: 50 Hz
Number of mechanical/Remote operations for earthing & Ring switches	: 1000 Nos.

III. PRINCIPAL FEATURES:

S. No	DESCRIPTION	DT breaker
1	Circuit label	Yes
2	Mimic diagram	Yes
3	Supply voltage indication	Yes
4	Current Transformer	N/A
6	Anti–Reflexing Mechanism	Yes
7	Interlock to defeat the operation of the line side earthing when the line side isolator is ON.	Yes

8	Interlock to defeat the operation of the earthing when the breaker is in service position and is ON.	Yes
9	Local /Remote Switch	Not Applicale
10	ON/OFF indication	Yes
11	Spring Charge indication / Spring assisted mechanism.	Yes
12	Fault Tripping indication	Yes
13	Bus bar end caps	Yes
14	Whether the Oil level indicator and filling arrangement.	Yes
15	Whether the spring assisted mechanism with operating handle for ON/OFF.	Yes
16	Whether the earth positions with arrangement for padlocking in each position and independent manual operation with mechanically operated indicator are provided	Yes
17	RMUs are provided with necessary take off terminals for future SCADA automation.	Yes

IV.1 Load break switch(Isolators) :

Type : load breaking and fault making.

Rated current : 400 A

Fault making capacity (KA peak min.) : 31.5 KA

IV.2 Earthing switch for 11 KV Line side Isolation and DT :

Rated short time current :13.1 KA.
Rated short time :3s
Rated peak withstand current :35 KA
Interlocking facility : 1) Between 11 KV Line side isolator 'ON"& Earthing.
2) Between 11 KV DT side HT HRC on close condition & Earthing.

15.5. GENERAL CONSTRUCTION FEATURE FOR RING MAIN UNIT:

The compact RMU shall be designed to operate at the rated voltage of 12 KV. It shall include, within the same metal enclosure, earthing switches for each Load Break Switch and HT HRC fuse earthing each of the devices. Suitable fool-proof interlocks shall be provided to these earthing switches to prevent its inadvertent or accidental closing when the circuit is live and the concerned Load Break Switch/Circuit Breaker is in closed position. The degree of protection required against environment shall be not less than IPX4 of IS 12063. The Compact RMU shall have atleast an IP54 Protection Index as per IS 12063 against dust and splashing of water. The active parts of the switchgear shall be maintenance free and the Compact RMU shall be of low-maintenance type.

15.5.1 The Ring Main Unit shall be installed at 11 KV junction points to have continuous supply by isolating faulty sections. The RMU shall be both side extensible and consists of the combinations of load break

switches and HT HRC fuse for a nominal voltage of 12 KV using oil as insulating and arc quenching medium.

15.5.2 The RMU and combination shall be outdoor metal enclosed type. The RMU metal parts shall be of high thickness high tensile steel which must be grit/short blasted, thermally sprayed with Zinc alloy, phosphate and subsequently painted with polyurethane based powder paint, the overall paint layer thickness shall be not less than 80 microns.

15.5.3 **Relevant IE rules for clearances, safety and operation inside the enclosure shall be applicable**. The enclosure shall be free from pollution, humidity, dust, vermin etc. IP-54 and type tested for accelerated aging & weather proof at EREDA/CPRI/any other testing house meeting PQR.

15.5.4 All high voltage live parts except for the cable connections shall be insulated with Oil. The Oil enclosures shall be made of robotically/laser / TIG/ MIG welded stainless steel/ hermetically sealed metalized cast resin tank without use of sealant, gaskets, 'O' rings, etc. and shall be type tested for IP-67 Degree of protection.

15.5.5 The cubicle shall be touch proof metallic encapsulation with a electro galvanized sheet steel of high thickness and provided with a pressure relief arrangement away from operator.

15.5.6 RMU should be suitable for motorization in future for remote operation through SCADA.

15.5.7 Any accidental over pressure inside the sealed chamber shall be limited by the opening of a pressure-limiting device in the rear/top part of the enclosure. Oil will be release to the rear of the switchboard away from the operator to ensure safety of the operating personnel and all the manual operations will be carried out on the front of the switchboard.

15.5.8 The enclosure for switchgear and metallic RMU housing shall have a design such that in the event of an internal arc fault, the operator shall be safe. This should be in accordance with IEC 298 & Standard IEC 62271-100/200 and relevant TYPE TEST certificates shall be submitted.

15.5.9 The Entire units of RMU shall be in a single compact metal clad weather proof enclosure, outdoor type suitable for all weather conditions. The switchgear and bus bar shall all be filled with oil IEC/IS Standards relative pressure ensure the insulation and breaking functions. The enclosure must be sealed for life and shall meet the "sealed pressure system" criterion in accordance with the IEC 298 & 62271-100/200 standard.

15.5.10 Suitable temperature rise test on the RMU with enclosure shall be carried out as per relevant IEC/IS.

15.5.11 Each switchboard shall be identified by an appropriately sized label, which clearly indicates the functional units and their electrical characteristics.

15.5.12 The switchgear and switchboard shall be designed so that the position of the different devices is visible to the operator on the front of the switchboard and operations are visible as well.

15.5.13 The entire system shall be totally encapsulated. There shall be no access to exposed conductors. In accordance with the standards in effect, the switchboards shall be designed so as to prevent access to all live parts during operation without the use of tools.

15.5.14 The entire 11 KV RMU shall be insulated by Oil suitable for operating voltage up to 12 KV respectively.

15.5.15 Deleted

15.5.16 The Compact RMU shall be suitable for mounting on its connecting cable trench. A suitably sized nameplate clearly indicating its functional units and their electrical characteristics shall identify each unit. The positions of the different devices shall be clearly visible to the operator on the front of the compact RMU and the operations shall be clearly visible. The compact RMUs shall be such that access to live parts shall not be possible without the use of tools.

15.5.17 The design shall incorporate such features to prevent any accidental opening of the earth switch when it is in closed position. Similarly accidental closing of Load Break Switch shall be prevented when the same is in open position from the release of any latch or spring in tension due to vibrations caused externally or internally and shall prevent accidents.

FORMATION OF COMPACT RMU:

15.5.18 The compact RMU shall be of single busbar outdoor, tropicalized in accordance with the relevant clauses mentioned in these specifications. An earth fault passage indicator using a core balance Current Transformer shall be provided for the Incomers to assist in identifying the faulty cable section in order to isolate the same.

15.5.19 The Incomers panel shall comprise of, but not limited to the following:
The earth fault passage indicators (The indicator flag of the relay shall be visible till such time the relay is reset manually). These shall not require any external Power Supply and must be suitable for unattended places.

15.5.20 The transformer loop circuit control panels shall consist of but not limited to the following:

A HT HRC fuse suitable for 63 KVA transformers, with a rated making capacity under fault conditions with short circuit levels of 13.1 KA.

15.6 Oil

The transformer shall be supplied complete with first filling of oil and the same shall comply with IS: 335-1983 with latest version thereof with ageing characteristics specified. These characteristics are as per IS. Type tests certificate of oil being used shall be produced at the time of inspection.

1. The units shall be supplied with the complete insulating medium. The recommended insulating medium for switch chambers is oil. However, equipment with any other approved insulating medium offered and supported with full technical particulars could be considered.
2. Relevant gauge indicators and Sample testing facilities should be provided if the medium is oil.
3. Design and application of the insulating medium in the unit shall be in strict compliance to the relevant standard specification specified.

15.7 RMU OUTDOOR METAL CLAD:-

The RMU enclosure must be a metallic; it follows an industrialized process of manufacturing**.** The RMU shall be of single bus bar Oil insulated outdoor, tropicalised and metal enclosed type. The RMU metal parts shall be made of high thickness high tensile steel which must be grit/short blasted, thermally sprayed with Zinc alloy, phosphate and subsequently painted with polyurethane based powder paint, the overall paint layer thickness shall be not less than 80 microns.

TAKE OFF TERMINAL UNITS FOR FUTURE AUTOMATION :

The RMU should be provided with necessary take off terminal units for future SCADA automations. Both the load break switches and the tee off circuit breaker shall be suitable for

motorization in future.

15.8. ISOLATORS (LOAD BREAK TYPE) :

The load break isolators for Incoming and Outgoing supply must be provided and the load break isolators are fully insulated by Oil. The load break isolators shall consist of 400 Amp fault making/load breaking spring assisted ring switches, each with integral fault making earth switches. The switch shall be naturally interlocked to prevent the main and earth switch being switched 'ON' at the same time. The selection of the main and earth switch is made by a lever on the fascia, which is allowed to move only if the main or earth switch is in the off position. The load break isolators should have the facility for future remote operation. Each load break switch shall be of the triple pole, simultaneously operated, non automatic type with quick break contacts and with integral earthing arrangement.
The earthing switch shall also be designed for rated fault making of 50KA for operator's safety reasons.

15.9. SCADA CONNECTIVITY:

Provision shall be made in all the RMUs with necessary take off terminal units for future automations / SCADA connectivity.

15.10 HT HRC Fuse :

(i) Fuse links shall be provided on a removable carriage and the opening of the fuse chamber access cover shall dis-connect the carriage in order to provide double disconnection.
(ii) Latching arrangements of fuse carriage, after partly lifting for full access of fuses, shall be provided.
(iii) The fuses shall be in accordance to Schedule of Technical Requirements.

15.11. BUSHINGS :

The units are fitted with the standardized bushings that comply with IEC standards.
All the bushings are the same height from the base and are protected by a cable cover. All the bushings shall be Partial Discharge free & preferably Laser welded with the SS container in case of stain less steel tank type RMU.

15.12 CABLE BOXES :

All the cable boxes shall be air insulated suitable for dry type cable terminations. The cable boxes at each of the two ring switches shall be suitable for accepting HV cables of sizes 3c x 240 / 3c x 185 sq.mm and fuse unit cable be suitable up to 3c x 50 sq.mm to 3C x 185 sq mm.

Necessary Right angle Boot should be supplied to the cable terminations. The type of the Right angle Boot should be cold applied insulating Boot.

A non Ferro- magnetic cable clamp arrangement for 3 core XLPE cables must be provided for all cables terminated on the RMU. Glands in the base plate of the RMU shall be provided for proper Cable termination.

15.13. FAULT PASSAGE INDICATORS (FPI):

This shall be integral part of the RMU and shall be provided to assist in identifying the faulty cable section in order to isolate the same. The Fault Passage Indicators (FPI) shall have automatic rest facility and shall be suitable for trouble free operation. The indicator flag of the relay shall be visible till such time the relay is reset. LED indicating bulb should be provided for better visibility particularly in day time The relay should not require any external power supply

15.14. CABLE TESTING FACILITY :

It shall be possible to test the cable without opening the cable boxes or 'where there is no provision for testing the cable without opening the door or cover', opening of door or cover should not be possible unless the earthing switch is closed as per IEC 298 clause 5.102.4. The cable testing should be possible without dismounting the cable plugs but the after opening the cable covers.

15.15. VOLTAGE INDICATOR LAMPS AND PHASE COMPARATORS :

The RMU shall be equipped with a voltage indication to indicate whether or not there is voltage on the cable. There should be a facility to check the synchronization of phases with the use of external device. It shall be possible for the each of the function of the RMU to be equipped with a permanent voltage indication as per IEC 601958 to indicate whether or not there is voltage on the cables. The indicating lamp shall be LED type for better visibility during day light.

15.16. EXPANDABILITY :

Each combination of RMU shall have the provision for future extension on both sides by load break isolators / HT HRC fuse, with a suitable trunking chamber and accessories and necessary Bus Bar. Extensible isolator(s) and fuse unit(s) shall be individually housed in a separate Oil epoxy enclosures. Even in case of extensible HRC, the HRC fuse should be capable of necessary short circuit operations as per IEC, and the HT HRC fuse should have a rated current carrying capacity of 200 A.

15.17. BUS COUPLER/ BUS BAR SECTIONALISER WITH LOAD BREAK SWITCH

The load break switch of the Bus bar Sectionaliser shall be rated for 12 KV, 400 A, 13.1 KA for 3 secs. The LBS should be housed in a oil Insulated stainless steel enclosure conforming to IP-54 Degrees of protection and shall be with motorized mechanism. The sectionaliser shall be provided with all the necessary electrical and mechanical interlocks required for proper functioning with the Incomers.

15.18. PADLOCKING FACILITIES

Provision shall be made for padlocking the load break switch /HRC fuse and the earthing switches in either open or closed position with lock & master key. The circuit breakers and earthing switches can be locked in the open or closed position by 1 to 3 padlocks 6 to 8 mm in diameter.

15.19. WIRING & TERMINALS:

The wiring should be of high standard and should be able to withstand the tropical weather conditions. The wiring cable must be standard single-core non-sheathed, Core marking (ferrules), stripped with non-notching tools and fitted with end sleeves, marked in accordance with the circuit diagram with printed adhesive marking strips. All wiring shall be provided with single core multi-strand copper conductor wires with P.V.C insulation and shall be flame retardant low smoke type. The wiring shall be carried out using multi-strand copper conductor super flexible PVC insulated wires of

650/1100V Grade for AC Power, DC Control and CT circuits. Suitable colored wires shall be used for phase identification and interlocking type ferrules shall be provided at both ends of the wires for wire identification. Terminal should be suitably protected to eliminate sulphating. Connections and terminal should be able to withstand vibrations.

The terminal blocks should be stud type for controls and disconnecting link type terminals for CT leads with suitable spring washer and lock nuts.

Flexible wires should be used for wiring of devices on moving parts such as swinging Panels (Switch Gear) or panel doors. Panel wiring shall be securely supported, neatly arranged readily accessible and connected to equipment terminals, terminal blocks and wiring gutters. The cables should be uniformly bunched and tied by means of PVC belts and carried in a PVC carrying trough.

The position of PVC carrying trough and wires should not give any hindrance for fixing or removing relay casing, switches etc., Wire termination shall be made with solder less crimping type of tinned copper lugs. Core identification plastic ferrules marked to correspond with panel wiring diagram shall be fitted with both ends of each wire. Ferrules shall fit tightly on the wire when disconnected. The wire number shown on the wiring shall be in accordance with the IS.375.

All wires directly connected to trip circuits of breaker or devices shall be distinguished by addition of a red color unlettered ferrule.

Inter-connections to adjacent Panels (Switch Gear) shall be brought out to a separate set of Terminal blocks located near the slots or holes to be provided at the top portion of the panel. Arrangements shall be made for easy connections to adjacent Panels (Switch Gear) at site and wires for this purpose shall be provided and bunched inside the panel. The bus wire shall run at the top of the panel. Terminal block with isolating links should be provided for bus wire. At least 10% of total terminals shall be provided as spare for further connections. Wiring shall be done for all the contacts available in the relay and other equipment and brought out to the terminal blocks for spare contacts. Colour code for wiring is preferable in the following colours.

Voltage supply	: Red, Yellow, Blue for phase and Black for Neutral
CT circuits	: Similar to the above
DC circuits	: Grey for both positive and negative
250V AC circuits	: Black for both phase and neutral
Earthing	: Green

The wiring shall be in accordance to the wiring diagram for proper functioning of the connected equipment. Terminal blocks shall not be less than 650V grade and shall be piece-molded type with insulation barriers.

The terminal shall hold the wires in the tight position by bolts and nuts with lock washers. The terminal blocks shall be arranged in vertical formation at an inclined angle with sufficient space between terminal blocks for easy wiring.

The terminals are to be marked with the terminal number in accordance with the circuit diagram and terminal diagram. The terminals should not have any function designation and are of the tension spring and plug-in type.

15.20. EARTHING :

EARTHING OF ISOLATORS AND DISTRIBUTION TRANSFORMER HT HRC Fuse (EARTH SWITCH) :

Necessary arrangements shall be made at Load break isolators / Distribution Transformer Fuse for selecting Earth position. Mechanical interlocking systems shall prevent the RMU function from being operated from the 'ON' to 'Earth On' position without going through the 'OFF' position.

The RMU outdoor metal clad, Switch Gear, Load break isolators, Distribution Transformer ,LT pillar

box, & steel structure etc., shall be equipped with an earth bus securely fixed along the base of the RMU.

15.21. ACCESSORIES & SPARES:

The following spares and accessories shall be supplied along with the main equipments at free of cost:-

1. Charging lever for operating load break isolators & Fuse unit of each RMU
2. Kit for identifying oil leakage – 1 numbers
3. Deleted
4. Necessary oil filling plant with adopter and tools etc for filling oil at Site --1 Nos
5. 6. Any other spares & Tools, which are all essentially required at the time of emergency and routine maintenance.

The following accessories shall be supplied with each compact RMU at free of cost:

1. Pad locks for all doors with one set (3 Nos.) Master keys
2. Earth bus formed out of 30X5 mm tinned Copper flat.
3. Wire guard protective mesh on the front doors and back for prevention of pasting of papers etc.
4. Base channel with foundation bolts
5. Live part shrouds, danger plates, caution boards, name plates, rating plates etc. as per requirements
6. All other components, even though not specifically mentioned, but required for the safe operation of the unit.

15.22. TESTING OF EQUIPMENT & ACCESSORIES:

15.22.1 INSPECTION & TESTIMG :

The inspection may be carried out by the NRDA at any stage of manufacture. The supplier shall grant free access to NRDA's representative at any reasonable time when the work is in progress..

The supplier shall keep the NRDA informed in advance, about the manufacturing programme so that arrangement can be made for inspection. The NRDA reserves the right to insist for witnessing the acceptance/routine testing of the bought out items..

No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested / unless the same is waived by the NRDA in writing.

15.22.2 ACCEPTANCE AND ROUTINE TESTS :

All acceptance and routine tests as stipulated in the latest relevant IS/IEC shall be carried out by the supplier at his works in the presence of NRDA's representative.The supplier shall give at least 15 days advance intimation to the NRDA to enable them to depute their representative for witnessing the tests. The cost towards these tests and other expenses shall be borne by the supplier.

15.22.4 TYPE TEST

The Tenderers should, along with the tender documents, submit copies of all Type test certificate of their make in full shape as confirming to relevant ISS/IEC of latest issue obtained from a laboratory/ testing house as detailed in Pre Qualifying Requirement (PQR) attached with.

The above type test certificates should accompany the drawings for the materials duly signed and certified by the institution who has issued the type test certificate. The following type test certificate shall be provided:

S. No.	Name of Type Test
01.	Short time current withstand test and peak current withstand test.
02.	Lightning Impulse voltage with-stand test
03.	Temperature rise test
04	Short Circuit current making and breaking tests CB Isolator
05.	Power frequency voltage withstand test (dry/wet)
06	Capacitive current switching test confirming to IEC
07.	Mechanical Endurance Test confirming to IEC /
08	Measurement of the resistance of the main circuit.
09	Checking of degree of protection
10	Switch, circuit breaker, earthing switch making Capacity Fuse Unit Earth Switch
11	Switch, circuit breaker, earthing switch breaking Capacity Fuse Unit
12	Internal Arc Withstand
13	Partial Discharge test on Complete RMU
14	Other type & routine tests insists by IEC for RMU

15.23 PERFORMANCE GUARANTEE

The performance Guarantee period shall be 2 (Two) years from the date of receipt of equipment along with its all accessories.

15.24 DOCUMENTATION

15.24.1 DRAWINGS

The tenderer shall submit along with his tender dimensional general arrangement drawings of the equipments, illustrative and descriptive literature in triplicate for various items in the RMUs which are all essentially required for future automation.

i) Schematic diagram of the RMU panel ii)

Instruction manuals

iii) Catalogues of spares recommended with drawing to indicate each items of spares

iv) List of spares and special tools recommended by the supplier. v) Copies of Type Test Certificates as per latest IS/IEC.

vi) Drawings of equipments, relays, control wiring circuit, etc. vii) Foundation drawings of RMU.

viii) Dimensional drawings of each material used for item Vii.

ix) Actual single line diagram of RMU/RMUs with or without Extra combination shall be made displayed on the front portion of the RMU so as to carry out the operations easily.

The following should be supplied to each consignee circle along with the initial supply of the equipments ordered.

5copies of printed and bound volumes of operation, maintenance and erection manuals in English along with the copies of approved drawings and type test reports etc.

3 sets of the manuals as above shall be supplied to the Exexutive Engineer (Elect), NRDA, Raipur. A soft copy of the all Technical and Drawing furnished in a CD.

All drawings shall conform to relevant International Standards Organization (ISO) Specification. All drawings shall be in ink and suitable for microfilming.

15.24.1.1 All drawings submitted by the Supplier including those submitted at the time of bid shall be in sufficient detail to indicate the type, size, arrangement, dimensions, material description, Bill of Materials, weight of each component, break-up for packing and shipment, required fixing arrangement, the required dimensions for installation and any other information specifically requested in the Specification.

15.24.1.2 Each drawing submitted by the Supplier shall be clearly marked with the name of the Purchaser, the unit designation, the Specification title, the Specification number and the name of the Project. All titles, noting, markings and in writings on the drawing shall be in English. All the dimensions should be to the scale and in metric units.

15.24.1.3 The drawings submitted by the Supplier shall be reviewed by the Purchaser as far as practicable within 15 days and shall be modified by the Supplier if any modifications and / or corrections are required by the Purchaser in compliance with the Specification. The Supplier shall incorporate such modifications and or corrections and submit the final drawings for approval. Any delays arising out of failure by the Supplier to rectify the drawings in good time shall not alter the completion date.

15.24.1.4 The drawings submitted for approval to the Purchaser shall be in quadruplicate. One print of such drawings shall be returned to the Supplier by the Purchaser marked "approved / approved with corrections". The Supplier shall thereupon furnish the Purchaser additional print as stipulated in Technical Specification along with one reproducible in original of the drawings after incorporating all corrections.

15.24.1.5 Further work by the Supplier shall be strictly in accordance with these drawings and no deviation shall be permitted without the written approval of the Purchaser, if so required.

15.24.1.6 All manufacturing and fabrication work in connection with the equipment / material prior to the approval of the drawings shall be at the Supplier's risk. The Supplier may make any changes in the

design, which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Purchaser. Approval of Supplier's drawing or work by the Purchaser shall not relieve the Supplier of any of his responsibilities and liabilities under the Contract.

15.24.1.7 All rights of the design / drawing shall be strictly reserved with the Purchaser only and any designs / drawings / data sheets submitted by the supplier from time to time shall become the property of the Purchaser. Under no circumstances, the Supplier shall be allowed to use / offer above designs / drawings / data sheets to any other authority without prior written permission of the Purchaser. Any deviation to above is not acceptable and may be a cause of rejection of the bid.

15.24.2 NAME PLATE:

Each RMU and its associated equipments shall be provided with a nameplate legible and indelibly marked with at least the following information.

(a) Name of manufacturer
(b) Type, design and serial number
(c) Rated voltage and current
(d) Rated frequency
(e) Rated symmetrical breaking capacity
(f) Rated making capacity
(g) Rated short time current and its duration
(h) Purchase Order number and date
(i) Month and Year of supply & Expiry of Guarantee period
(j) Rated lighting impulse withstand voltage
(k) D.C. component of current.
(l) Feeder name(Incoming and Out going),DTs Structure name,11000Volts Dangers etc.

NOTE: i) The word rated need not appear on the name plate. Recognized abbreviations may be used to express the above particulars.

ii)Whether the circuit breaker is fitted with closing/tripping devices necessitating an auxiliary supply shall be stated either on the circuit breaker name plate or any other acceptable position.

15.25. **TRAINING**:

The supplier shall give rigorous training to at least 2 NRDA Engineers & staff at the site for 3 days in attending trouble shooting and maintenance. The cost towards transport, food and other expenses shall be borne by the supplier.