

GOVERNMENT OF INDIA



**CENTRAL PUBLIC WORKS DEPARTMENT  
OFFICE OF CE- RANCHI**

|                                |   |                                                                                                                                 |
|--------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------|
| NIT No.                        | : | 12/NIT/CE-Ranchi/CPWD/2026-2027                                                                                                 |
| NAME OF WORK                   | : | Construction of Office Building for NABARD at<br>HEC Area Murma, Pundag Ranchi, Jharkhand                                       |
| ESTIMATED COST                 | : | Civil - Rs. 32,84,66,818/-<br>Elect - Rs. 10,33,19,823/-<br><u>Hort. - Rs. 14,72,030/-</u><br><b>Total - Rs. 43,32,58,671/-</b> |
| EARNEST MONEY                  | : | Rs. 53,32,587/-                                                                                                                 |
| TIME ALLOWED                   | : | 18 (Eighteen) Month                                                                                                             |
| LAST DATE OF BID<br>SUBMISSION | : | 24/09/2026                                                                                                                      |

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**This NIT for Rs. 43,32,58,671/- (Forty Three Crore Thirty Two Lakh Fifty Eight Thousand Six Hundred Seventy One Only) is approved.**

**AE(C)**

**AE(E)**

**EE (C)**

**Approved by**

**CE-RANCHI**

**INFORMATION AND INSTRUCTIONS FOR BIDDERS FOR e-TENDERING****Forming part of bid document**

The EE&SM (C)-I, Simbo, Ranchi on behalf of President of India invites online percentage rate bids from approved and eligible contractors of CPWD enlisted in appropriate class in (B&R) category for the following work(s):

| Sl. No. | NIT No.                         | Name of Work & location                                                                 | Estimated cost put to bid Rs.                                                                                                    | Earnest Money          | Stipulated Period of Completion of work | Last date & time of online submission of bid, copy of receipt of deposition of original EMD and other Documents as specified in the bid documents | Date & Time of opening of bid |
|---------|---------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1       | 12/NIT/CE-Ranchi/CPWD/2026-2027 | Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. | Estimated cost :<br><b>Rs. 43,32,58,671/-</b><br>Civil: Rs. 32,84,66,818/-<br>Elect: Rs. 10,33,19,823/-<br>Hort : Rs.14,72,030/- | <b>RS. 53,32,587/-</b> | 18 (Eighteen) months                    | Up to 24/09/2026 15: 00 Hrs.                                                                                                                      | 24/09/2026 15: 30 Hrs.        |

- The intending bidder must read the terms and conditions of CPWD-6 carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.
- Information and Instructions for bidders posted on website shall form part of bid document.
- The bid document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen and downloaded from website <https://etender.cpwd.gov.in> or [cpwd.gov.in](https://cpwd.gov.in) free of cost.
- But the bid can only be submitted after deposition of original EMD either in the office of Executive Engineer inviting bid or Division office of any Executive Engineer, CPWD within the period of bid submission and uploading the mandatory scanned documents such as insurance surety bonds, Account Payee Demand Draft or Bankers cheque or Fixed Deposit Receipts or/and Bank Guarantee i/c eBG (for balance amount as prescribed) from any of the commercial bank towards EMD in favor of Executive Engineer as mentioned in NIT, receipt for deposition of original EMD to Division office of any Executive Engineer (including NIT issuing EE/AE), CPWD and other documents as specified.
- Those contractors who are not registered or have not updated their profile on the website mentioned above, are required to get registered/update their profile before hand. The necessary training materials including the videos with step to step process are available on download section of <https://etender.cpwd.gov.in>.
- The intending bidder must have valid Class-III digital signature certificate with encryption key (combo type) to perform any operations / transactions on the e-tendering portal / website and the bidder should download and install the eMSigner on their system as per instructions available on download section of <https://etender.cpwd.gov.in>.

7. On opening date, the contractor can login and see the bid opening process. After opening of bids he will receive the competitor bid sheets.
8. Contractor can upload documents in the form of JPG format and PDF format.
9. Contractor must ensure to quote rate in the prescribed column(s) meant for quoting rate in figures appears in yellow colour and the moment rate is entered, it turns sky blue.  
In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as "0". Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (ZERO).  
However, If a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section / sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.
10. **Pre-bid conference** shall be held in the Office of Chief Engineer-Ranchi, CPWD, Airport Road, Hinoo, Ranchi at 16.00 hrs. on 18/09/2026 to clear the doubt of intending bidders, if any. Any query/clarification is welcome on Email: [eesmc1-simbo@cpwd.gov.in](mailto:eesmc1-simbo@cpwd.gov.in), [eesmc1simbo@gmail.com](mailto:eesmc1simbo@gmail.com) **16.00 hrs. on 17/09/2026.**

**List of mandatory documents to be scanned and uploaded within the period of bid submission:**

- I. Insurance Surety Bond, Demand Draft/ Account Payee Banker's Cheque / FDR/ Bank Guarantee i/c e BG of any commercial Bank against EMD.
- II. Enlistment Order of the Contractor.
- III. GST Registration Certificate if already obtained by the bidder.  
If the bidder has not obtained GST registration as applicable for **Jharkhand state**, then he shall scan and upload following under taking along with bid documents.  
"If work is awarded to me, I/we shall obtain GST registration certificate, as applicable, within one month from the date of receipt of award letter or before release of any payment by CPWD, whichever is earlier, failing which I/we shall be responsible for any delay in payments which will be due towards me/us on account of the work executed and/or for any action taken by CPWD or GST department in this regard"
- IV. Copy of receipt for deposition of original EMD to Division office of any Executive Engineer (including NIT issuing EE/AE) of CPWD.
- V. Undertaking on structural stability and soundness as per prescribed format Form 'F' (As per page 14 of NIT).
- VI. The certificate issued through LMS (Learning Management System) in ERP under Train the Trainers Program arranged by ERP Unit.
- VII. CPWD Form 7 duly signed (As per page 25 & 26 of NIT)
- VIII. Copy of elect. Licence or an undertaking stating that "I/We will either obtain valid electrical licence at the time of execution of electrical work"
- IX. **If the bidder is a firm in partnership, the bid shall be signed by all the partners of the firm above their full type written names and current address, or, alternatively, by a partner holding power of attorney for the firm. In the latter case, a certified copy of the power of attorney should accompany the bid. In both cases a certified copy of the partnership deed and current address of all the partners of the firm should accompany the bid.**
- X. **If the bidder is a limited company or a corporation, the bid shall be signed by a duly authorized person holding power of attorney for signing the bid accompanied by a copy of the power of attorney. The bidder should also furnish a copy of the Memorandum of Articles of Association duly attested by a Public Notary.**
- XI. **PAN CARD**

GOVERNMENT OF INDIA  
CENTRAL PUBLIC WORKS DEPARTMENT  
NOTICE INVITING BID

**PART - A**

Percentage rate bids are invited by EE&SM(C)-I, SIMBO, CPWD, RANCHI (Telephone No. 0651-2253003 & Fax No. 0651-2250421, E-mail ID – [eesmc1-simbo@cpwd.gov.in](mailto:eesmc1-simbo@cpwd.gov.in), [eesmc1simbo@gmail.com](mailto:eesmc1simbo@gmail.com) on behalf of President of India from approved and eligible contractors of CPWD enlisted in appropriate class in (B&R) category for the work of “**Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand**)”

1. The enlistment of the contractors should be valid on the last date of submission of bids. In case the last date of submission of bid is extended, the enlistment of contractor should be valid on the original date of submission of bids.
  - 1.1 The work is estimated to cost **Rs. 43,32,58,671/-**-This estimate, however, is given merely as a rough guide.
    - 1.1.1 The authority competent to approve NIT for the combined cost and belonging to the major discipline will consolidate NITs for calling the bids. He will also nominate Division which will deal with all matters relating to the invitation of bids. For composite bid, besides indicating the combined estimated cost put to bid, should clearly indicate the estimated cost of each component separately. The eligibility of bidders will correspond to the combined estimated cost of different components put to bid.
2. Agreement shall be drawn with the successful bidders on prescribed Form No. CPWD 7/8 (or other Standard Form as mentioned) which is available as a Govt. of India Publication and also available on website [www.cpwd.gov.in](http://www.cpwd.gov.in). Bidders shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.
3. The time allowed for carrying out the work will be **18 (Eighteen) months** from the date of start as defined in schedule 'F' or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the bid documents.
4. The site for the work is available.

OR

~~The site for the work shall be made available in parts as specified below:-~~

~~(ii) The architectural and structural drawing for the work is available~~

OR

The architectural drawing are available and may be asked from EE & SM(C)-I, SIMBO and structural drawings shall be made available in phased manner, as per requirement of the same as per approved programme of completion submitted by the contractor after award of work.

5. The bid document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents except Standard General Conditions of

Contract Form can be seen on website [https:// etender.cpwd.gov.in](https://etender.cpwd.gov.in) or [www.cpwd.gov.in](http://www.cpwd.gov.in) free of cost.

6. After submission of the bid, the contractor can re-submit revised bid any number of times or withdraw it before last date and time of submission of bid as notified. No post-tender modification is allowed by the tenderers except through negotiations, if required. In case, any tenderer does so, the tender will be rejected and the tenderer will be debarred for future tendering in CPWD for two years by the concerned enlisting authority (in case of CPWD enlisted contractor) and by the concerned CE/SE (in case of non-enlisted contractor).
7. While submitting the revised bid, contractor can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of bid as notified.
8. ~~When bids are invited in three stage system and if it is desired to submit revised financial bid then it shall be mandatory to submit revised financial bid. If not submitted then the bid submitted earlier shall become invalid.~~
9. Earnest Money in the form of **Insurance Surety Bonds, Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee i/c eBG (for balance amount as prescribed) from any of the Commercial Banks (drawn in favour of Executive Engineer, Ranchi Central Division, CPWD, Ranchi)** shall be scanned and uploaded on the e-Tendering website within the period of bid submission. The original EMD should be deposited either in the office of Executive Engineer inviting bids or division office of any Executive Engineer, CPWD within the period of bid submission. The EMD receiving Executive Engineer (including NIT issuing EE/AE) shall issue a receipt of deposition of earnest money deposit to the bidder in a prescribed format (enclosed) uploaded by tender inviting EE in the NIT

A part of earnest money is acceptable in the form of Bank Guarantee i/c eBG also. In such case, minimum 50% of earnest money or Rs. 20 lac, whichever is less, shall have to be deposited in shape prescribed above, and balance may be deposited in shape of Bank Guarantee i/c eBG of any Commercial bank having validity for a period of 90 days for single bid works and ~~180 days for two bid system~~ or more from the last date of receipt of bids which is to be scanned and uploaded by the intending bidders.

The earnest money given by all the tenderers except the lowest tenderer shall be refunded immediately after the expiry of stipulated bid validity period or immediately after acceptance of the successful bidder, whichever is earlier. ~~However, in case of two/three bid system, earnest money deposit of bidders unsuccessful during technical bid evaluation etc. should be returned within 30 days of declaration of result of technical bid evaluation.~~

Copy of Enlistment Order and certificate of work experience and other documents as specified in the notice inviting e- tender shall be scanned and uploaded on the e-Tendering website within the period of bid submission. **However, certified copy of all the scanned and uploaded documents as specified in e- tender notice shall have to be submitted by the lowest bidder within a week physically in the office of tender opening authority.** Online bid documents submitted by intending bidders shall be opened only of those bidders, whose original EMD deposited with any division of CPWD and other documents scanned and uploaded are found in order.

**The bid submitted shall be opened at 03:30 PM on 24/09/2026**

10. The bid submitted shall become invalid and e-Tender processing fee shall not be refunded if:
- I. The bidder is found ineligible.
  - II. The bidder does not upload scanned copies of all the documents stipulated in the bid document.
  - III. If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest bidder in the office of bid opening authority.
  - IV. If a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section / sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.
11. The contractor whose bid is accepted will be required to furnish performance guarantee (PG) and additional performance guarantee (APG) of specified percentage of the tendered amount as mentioned in **schedule E and within the period specified in Schedule F**. This guarantee shall be in the form of Insurance Surety Bonds, Account Payee Demand Draft, Fixed Deposit Receipt or Bank Guarantee i/c eBG from any of the Commercial Banks in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee and additional performance guarantee within the period as indicated in Schedule 'F', including the extended period if any, the Earnest Money deposited by the contractor shall be forfeited automatically without any notice to the contractor. The earnest money deposited along with bid shall be returned after receiving the aforesaid performance guarantee and additional performance guarantee. The contractor whose bid is accepted will also be required to furnish either copy of applicable **licenses/ registrations** or proof of applying for obtaining labour licenses, registration with **EPFO, ESIC and BOCW Welfare Board** including Provident Fund Code No. If applicable and also ensure the compliance of aforesaid provisions by the sub-contractors, if any engaged by the contractor for the said work within the period specified in Schedule F.
12. **The description of the work is as follows:**

**The said work comprises of for : “Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand”.**

**The work shall also comprise of various services such as including Internal Water Supply, Sanitary Installation, Drainage, Development of site, Road work, Providing Internal EI i/c Street Light, Substation & LT Distribution, EPABX & LAN, CCTV, DG Set, UPS, Fire Fighting System, Fire Alarm, EV Charger, Lifts, VRV/VRF AC System, Solar Photo Voltaic System, STP, Water Cooler & Purifier, Refrigeration, Boom Barrier and Audio Visual System etc.**

Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids 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 obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A bidders shall be deemed to have full knowledge of the site whether he

inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The bidders shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, **water, electricity access, facilities for workers** and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidder 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 of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

13. The competent authority on behalf of the President of India does not bind itself to accept the lowest or any other bid and reserves to itself the authority to reject any or all the bids received without the assignment of any reason. All bids in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the bidders shall be summarily rejected.
14. Canvassing whether directly or indirectly, in connection with bidders is strictly prohibited and the bids submitted by the contractors who resort to canvassing will be liable for rejection.
15. The competent authority on behalf of President of India reserves to himself the right of accepting the whole or any part of the bid and the bidders shall be bound to perform the same at the rate quoted.
16. The contractor shall not be permitted to bid for works in the CPWD Circle (Division in case of contractors of Horticulture/Nursery category) responsible for award and execution of contracts, in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazetted officer in the Central Public Works Department or in the Ministry of Housing and Urban Affairs. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department
17. No Engineer of Gazetted Rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the prior permission of the Government of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the bid or engagement in the contractor's service.
18. The bids for the work shall remain open for acceptance for a period of **30 (Thirty) days** from the date of opening of bids in case of single bid system.

Further

- (i) If any tenderer withdraws his tender or makes any modification in the terms & conditions of the tender which is not acceptable to the department within 7 days after last date of submission of bids, then the Government shall without prejudice to

any other right or remedy, be at liberty to forfeit 50% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.

- (ii) If any tenderer withdraws his tender or makes any modification in the terms & conditions of the tender which is not acceptable to the department after expiry of 7 days after last date of submission of bids, then the Government shall without prejudice to any other right or remedy, be at liberty to forfeit 100% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.
- (iii) In case of forfeiture of earnest money as prescribed in para (i) and (ii) above, the bidders shall not be allowed to participate in the rebidding process of the same work.

19. This notice inviting Bid shall form a part of the contract document. The successful bidder/contractor, on acceptance of his bid by the Accepting Authority shall within 15 days from the stipulated date of start of the work, sign the contract consisting of:-

- (a) The Notice Inviting Bid, all the documents including additional conditions, specifications and drawings, if any, forming part of the bid as uploaded at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto.
- (b) Standard C.P.W.D. Form 7 or other Standard C.P.W.D. Form as applicable.

20. For Composite Bids

209.1.1 The Executive Engineer in charge of the major component will call bids for the composite work. The cost of bid document and Earnest Money will be fixed with respect to the combined estimated cost put to tender for the composite bid.

20.1.2 The bid document will include following three components:

Part A:- CPWD-6, CPWD-7 including schedule A to F for the major component of the work, Standard GCC Construction work – 2023 as amended/ modified & corrected up to **previous day of the last date of submission of bid.**

Part B:- General / specific conditions, specifications and schedule of quantities applicable to major component of the work

Part C:- Schedule A to F for minor component of the work (competent authority under clause 2 and clause 5 shall be same authority as mentioned in schedule A to F for major components), General/specific conditions, specifications and schedule of quantities applicable to minor component(s) of the work.

20.1.3 The bidders must associate himself, with agencies as per NIT conditions.

20.1.4 The eligible bidders shall quote rates for all items of major component as well as for all items of minor components of work.

20.1.5 After acceptance of the bid by competent authority, the EE in charge of major component of the work shall issue letter of award on behalf of the President of India. After the work is awarded, the main contractor will have to enter into one agreement with EE in-charge of major component and has also to sign two or more

copies of agreement depending upon number of EE's/DDH in-charge of minor components. One such signed set of agreement shall be handed over to EE/DDH in-charge of minor component(s).

EE of major component will operate Part A and Part B of the agreement. EE/DDH in-charge of minor component(s) shall operate Part- C alongwith Part A of the agreement.

20.1.6 Entire work under the scope of composite bid including major and all minor components shall be executed under one agreement.

20.1.7 Security Deposit will be worked out separately for each component corresponding to the estimated cost of the respective component of works.

20.1.8 The main contractor has to associate agencies for specialized component(s) conforming to eligibility criteria as defined in the bid document and has to submit detail of such agency(s) to Engineer-in-Charge of relevant component(s) within prescribed time. Name of the agency(s) to be associated shall be approved by Engineer-in-Charge of relevant component(s).

20.1.9 In case the main contractor intends to change any of the above agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-Charge of relevant specialized component(s).

The new agency/agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

20.1.10 The main contractor has to enter into MoU with agency(s) associated by him. Copy of such MoU shall be submitted to EE/ DDH in charge of each relevant component as well as to EE-in-charge of major component. In case of change of associate contractor, the main agency(s) has to enter into MoU/agreement with the new contractor associated by him.

20.1.11 Running payment for the major component shall be made by EE of major discipline to the main contractor. Running payment for minor components shall be made by the Engineer- in-Charge of the discipline of minor component directly to the main contractor. The CMB/EMB shall be maintained independently by Engineer-in-Charge of major and minor components

20.1.12A. The composite work shall be treated as complete when all the components of the work are complete. The completion certificate of the composite work shall be recorded by CE- Ranchi.

20.1.12B. Final bill of whole work shall be finalized and paid by the EE of major component. Engineer(s) in charge of minor component(s) will prepare and pass the final bill for their component of work and pass on the same to the EE of major component for including in the final bill for composite contract.

21. ~~Integrity Pact: The contractor shall download the Integrity Pact, which is a part of tender documents, affix his signature in the presence of a witness, and upload the same while submitting online bids for all works of estimated cost put to tender equal or more than the threshold value given in Schedule F. In the event of his failure to sign and upload the Integrity Pact along with other bid documents, his bid shall be rejected.~~
22. The intending bidders are required to update their profile in CPWD e- tender portal and to upload their bids well in advance of last date of submission of tender. Any issue related to updating profile/uploading tender can be resolved through the concerned Executive Engineer/Assistant Engineer (Telephone No. 0651-2253003 & Fax No. 0651-2250421, E-mail ID – [eesmc1-simbo@cpwd.gov.in](mailto:eesmc1-simbo@cpwd.gov.in), [eesmc1simbo@gmail.com](mailto:eesmc1simbo@gmail.com)) or ERP helpline no. 18001803286 or e-mail Id [cpwd.support@techmahindra.com](mailto:cpwd.support@techmahindra.com). The e-tendering bidders are also advised not to wait to raise any issues till the last date of submission of bid in their own interest.

**RECEIPT OF DEPOSITION OF ORIGINAL EMD**  
(Receipt No...../date.....)

**Name of work:- Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.**

1. NIT No :- **12/NIT/CE-Ranchi/CPWD/2026-2027**
2. Estimated Cost:- **Rs. 43,32,58,671/-**
3. Amount of Earnest Money Deposit :- **Rs. 53,32,587/-**
4. Last date of submission of bid:-24/09/2026 upto 15.00 hours.

(\* to be filled by EE&SM(C)-I, SIMBO, CPWD, RANCHI)

1. Name of contractor:- .....#
2. Form of EMD :- .....#
3. Amount of Earnest money deposit .....#
4. Date of submission of EMD .....#

(# to be filled by EMD receiving EE)

**EMD Drawn in favour of Executive Engineer, Ranchi Central Division, CPWD, Ranchi.**

Signature, Name and Designation  
of EMD receiving officer  
along with Office stamp  
(EE/AE(P)/AE/AAO)

**Undertaking on structural stability and soundness of already completed buildings and infrastructure projects.**

Name of work: **Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.**

NIT No :- 12/NIT/CE-Ranchi/CPWD/2026-2027

I/we undertake and confirm that any building / infrastructure constructed by our firm /partnership firm/ company has not suffered any failure, making it unfit for intended use, either due to structural design and defects or due to use of sub-standard materials or execution of sub-standard work, poor workmanship or any other reason during the last 25 (twenty five) years.

I/we, further, undertake that if such information comes to the notice of CPWD, then Engineer-in- Charge shall be free to terminate the bid/agreement and to forfeit the entire amount of earnest money deposit, performance guarantee and security deposits.

I/we, also undertake that in addition to above, the Engineer-in-Charge shall be free to debar us forever from tendering in CPWD. The decision of Engineer-in-Charge or any higher authority shall be final and binding.

Signature of notary with seal

Signature of bidder or an  
authorized person of the  
firm with stamp

**Note : Affidavit to be furnished on a 'Non-judicial' stamp paper of Rs. 200/- (scanned copy of the notarized affidavit to be uploaded at the time of submission of bid)**

(Guarantee offered by Bank to CPWD inconnection with the execution of contracts)  
**Form of Bank Guarantee i/c eBG for Earnest Money Deposit/Performance  
Guarantee (PG)/Additional Performance Guarantee (APG)/Security Deposit/  
Mobilization Advance**

1. Whereas the Executive Engineer.....(name of division)....., CPWD on behalf of the president of India (hereinafter called "The Government") has invited bids under .....(NIT number).....dated .....for..... (name of work).....The Government has further agreed to accept irrevocable Bank Guarantee i/c eBG for Rs.....(Rupees.....only) valid upto.....(date)\*.....as Earnest Money Deposit from .....(name and address of contractor).....(hereinafter called "the contractor") for compliance of his obligations in accordance with the terms and conditions of the said NIT.

OR\*\*

Whereas the Executive Engineer.....(name of division)....., CPWD on behalf of the president of India (hereinafter called "The Government") has entered into an agreement bearing number.....with.....(name and address of contractor).....(hereinafter called "the contractor") for execution of work.....(name of work).....The Government has further agreed to accept an irrevocable Bank Guarantee i/c eBG for Rs.....(Rupees.....only) valid upto.....(date).....as Performance Guarantee/ Security Deposit/ Mobilization Advance from the said contractor for compliance of his obligations in accordance with the terms and conditions of the agreement.

2. We, .....(indicate the name of bank).....(hereinafter referred to as "the Bank") hereby undertake to pay to the Government an amount not exceeding Rs. .... (Rupees..... Only) on demand by the Government within 10 days of the demand.
3. We, .....(indicate the name of the Bank)....., do hereby undertake to pay the amounts due and payable under this guarantee without any demure, merely on a demand from the Government stating that the amount claimed as required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. .... (Rupees .....only).
4. We, ..... (indicate the name of the Bank)....., further undertake to pay the government any money so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceeding pending before any court or Tribunal, our liability under this Bank Guarantee i/c eBG being absolute and unequivocal. The payment so made by us under this Bank Guarantee i/c eBG shall be a valid discharge of our liability for payment there under and the contractor shall have no claim against us for making such payment.
5. We, ..... (indicate the name of the Bank)....., further agree that the Government shall have the fullest liberty without our consent and without affecting in any

manner our obligation hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of the Government or any indulgence by the Government to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. We, ..... (indicate the name of the Bank)....., further agree that the Government at its option shall be entitled to enforce this guarantee against the bank as a principal debtor at the first instance without proceeding against the contractor and notwithstanding any security or other guarantee the government may have in relation to the contractor's liabilities.
7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
8. We, ..... (indicate the name of the Bank)....., undertake not to revoke this guarantee except with the consent of the Government in writing.
9. This Bank Guarantee i/c eBG shall be valid up to .....\* .....unless extended on demand by the Government. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs. .... (Rupees .....only) and unless a claim in writing is lodged with us within the date of expiry or the extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Date.....

Witness :

1. Signature.....

Name and address

Authorized signatory

Name

Designation

Staff code no.

Bank seal

1. Signature .....

Name and address

\* Date to be worked out based on the basis of validity period of 90 days where only financial bids are invited and 180 days for two / three bid system from the date of submission of tender.

\*\* In paragraph 1, strike out the portion not applicable. Bank Guarantee i/c eBG will be made either for earnest money or for performance guarantee/security deposit/ mobilization advance, as the case may be.

## **Eligibility criteria for Specialized Works**

### **1- Engagement of Associates for Specialized works:**

For specialized items of works, Contractor has to engage specialized agencies/firms who have work experience and submit work experience certificate issued by competent authority for satisfactory completion of similar works as per following criteria during last seven years and shall be got approved from the Engineer-in-Charge of the respective discipline. The decision of Engineer-in-charge shall be final and binding on the contractor.

a) Three similar works each costing not less than 40% of tendered cost of each specialized work / item concerned.

Or

b) Two similar works each costing not less than 60% of tendered cost of each specialized work / item concerned.

Or

c) One similar works each costing not less than 80% of tendered cost of each specialized work / item concerned.

~~Note: In case of furniture work, the following conditions of turnover can also be considered for eligibility of association of specialized agency.~~

The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to previous day of last day of month previous to date of award of the work.

Annual Financial Turn Over in the domain of specialized similar works, equal to the tendered cost of such particular specialized work, during any of the immediate last three consecutive Financial years ending on 31st March 2026 as certified by the Chartered accountant.

The main contractor may have to choose more than one specialized agency for a specific specialized work, depending on requirement of target progress and to be in conformity with the above specified eligibility criteria. In case main contractor himself has satisfactorily completed similar work of required magnitude as mentioned above, he may also be allowed to carry out specialized work. The contractor shall submit all required relevant documentary evidences to the satisfaction of Engineer in charge for ascertaining credentials of specialized agencies as may be demanded by Engineer in charge like certified copy of work order/contract with SOQ, income tax TDS certificates/Form-26AS in support of amount paid, satisfactory completion certificate etc. including inspection of such works and any other document as asked upon by the Engineer-in-Charge.

### **Specialized Items of Work (Civil & Horticulture)**

Various specialized items of works under this agreement in respect of civil construction are asbelow:

1. Water proofing treatment
2. Anti termite chemical treatment
3. Fire door
4. BIM modeling ( including MEP)
5. Verticle Green Wall
6. Cut flowers

1.1 The Contractor shall submit documents in support of experience of proposed specialised agency, issued by competent authority for approval of the Engineer-in- Charge of the respective discipline. The contractor shall submit all required relevant documentary evidences to the satisfaction of Engineer in charge for ascertaining credentials of specialized agencies as may be demanded by Engineer in charge like certified copy of work order/contract, income tax TDS certificates/Form-26AS in support of amount paid, satisfactory completion certificate etc. including inspection of such works.

1.2. In case Engineer-in-charge is satisfied that the Specialized Agencies with above credentials are not available, then multiple agencies may be approved or the above criteria may be relaxed with the approval of NIT approving authority. The decision of Engineer-in-charge shall be final and binding on the contractor.

1.3. The main contractor may have to choose more than one specialized agency, limited to maximum 3, for a specific specialized work, depending on requirement of target progress and to be in conformity with the above specified eligibility criteria for quantum of work proposed.

1.4. In case main contractor himself has satisfactorily completed similar work of required magnitude as mentioned above, he may also be allowed to carry out specialized work. However, in such cases, contractor has to certify that such similar work was not executed by him through any other specialised agency.

1.5. In case the main contractor intends to change any of the above agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in- Charge of relevant specialized component(s). The new agency/agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

1.6. The main contractor has to enter into MoU with agency(s) associated by him. Copy of such MoU shall be submitted to EE/ DDH in charge of each relevant component as well as to EE-in-charge of major component. In case of change of associate contractor, the main agency(s) has to enter into MoU/agreement with the new contractor associated by him.

**2. Additional Security Deposit: Additional security @10% of value of work done of each specialized work shall also be withheld from the contractor bill. The amount shall only be released after satisfactory performance of the minimum 5 Years after completion of main work is recorded. This additional security can also be deposited in the form of bank**

**guarantee issued by the scheduled bank. Such bank guarantee bond shall be valid for the period of 5 years from date of completion of whole construction work, recorded by the Engineer-in- charge. The Performa for the BG shall be as given in the tender document. The 50% of such additional security amount can be released after of half of the total guarantee period on satisfactory performance of the item after the completion of main work is recored.**

3. Guarantee bond: The contractor shall submit Guarantee bond for various items of work as stipulated in the contract document. Performa for Guarantee bond shall be as given in the tender document.

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS**

**AFTER COMPLETION IN RESPECT OF WATER-PROOFING WORKS & Anti termite**

**treatment**

**(All Water Proofing Items/Anti termite treatment)**

The agreement made this..... day of ..... (Two Thousand .....only) between .....S/o..... (hereinafter called the GUARANTOR of the one part) and the PRESIDENT OF INDIA (hereinafter called the Government of the other part).

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated .....and made between the GUARANTOR OF THE ONE PART AND the Government of the other part where by the contractor inter alia under took to render the building and structures in the said contract recited completely water and leak-proof/**Anti termite**.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said work will remain water and leak proof/**Anti termite**, for five years from the date of completion of the work.

NOW THE GUARANTOR hereby guarantee that work executed by him will render the structures completely leak proof/**Anti termite** and the minimum life of such water proofing treatment/ **Anti termite** shall be five years to be reckoned from the date of completion of the work.

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final and binding on Guarantor.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building water proof/ **Anti termite** to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the water proofing/ **Anti termite** and fails to control all kinds of leakage and seepage or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and / or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents ..... have been executed by the obligator and .....by for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :

1.....

2 .....

SIGNED FOR AND BEHALF OF THE PRESIDENT OF INDIA BY in the presence of:

1.....

2.....

**Note : For Water proofing & Anti termite minimum 10% (ten percent) of the cost of these items would be retained as Guarantee Bond to watch the performance of the work done shall be withheld for five years from the date of completion of the work.**

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS**  
**AFTER COMPLETION IN RESPECT OF uPVC WINDOWS**

The agreement made this..... day of ..... (Two Thousand .....only) between .....S/o..... (hereinafter called the GUARANTOR of the one part) and the PRESIDENT OF INDIA (hereinafter called the Government of the other part).

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... And made between the GUARANTOR OF THE ONE PART AND the Government of the other part where by the contractor inter alia under took to render the building and structures in the said contract **structurally stable to fulfill its intended purpose, free from workmanship defects, discoloration, installation and use of only specified, certified material.**

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said work will remain **structurally stable to fulfill its intended purpose, free from workmanship defects, discoloration, installation and finishing for ten years from the Actual date of completion of the work.**

NOW THE GUARANTOR hereby guarantee that work executed by him will remain **structurally stable to fulfill its intended purpose, and guarantee for quality workmanship, material, discoloration, installation and finishing for ten years to be reckoned from the Actual date of completion of the work.**

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final and binding on Guarantor.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building water proof to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the water proofing and fails to control all kinds of leakage and seepage or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and / or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator and .....by for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :

1.....

2 .....

SIGNED FOR AND BEHALF OF THE PRESIDENT OF INDIA BY in the presence of:

1.....

2.....

**Note :For uPVC Windows minimum 10% (ten percent) of the cost of these items would be retained as Guarantee Bond to watch the performance of the work done shall be withheld for ten years from the actual date of completion of the work.**

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS  
AFTER COMPLETION IN RESPECT OF AAC BLOCK WORK INCLUDING GYPSUM PLASTER**

The agreement made this..... day of ..... (Two Thousand .....only) between .....S/o..... (hereinafter called the GUARANTOR of the one part) and the PRESIDENT OF INDIA (hereinafter called the Government of the other part).

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... And made between the GUARANTOR OF THE ONE PART AND the Government of the other part where by the contractor inter alia under took to render the building and structures in the said contract **structurally stable to fulfill its intended purpose, free from workmanship defects, Cracks or any other type of defect in AAC block work including Gypsum plaster.**

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said work will remain **structurally stable to fulfill its intended purpose, free from workmanship defects, Cracks or any other type of defect in AAC block work including Gypsum plaster for five years from the Actual date of completion of the work.**

NOW THE GUARANTOR hereby guarantee that work executed by him will remain **structurally stable to fulfill its intended purpose, free from workmanship defects, Cracks or any other type of defect in AAC block work including Gypsum plaster for five years from the Actual date of completion of the work.**

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final and binding on Guarantor.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building crack free to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the defects and fails to control all kinds of cracks etc. or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and / or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator and .....by for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :

1.....

2 .....

SIGNED FOR AND BEHALF OF THE PRESIDENT OF INDIA BY in the presence of:

1.....

2.....

**Note: For AAC block work including Gypsum plaster work minimum 5% (five percent) of the cost of these items would be retained as Guarantee Bond to watch the performance of the work done shall be withheld for five years from the actual date of completion of the work. If the work is found satisfactory for a period of three (3) years, the Engineer-in-charge may release 50% of such withheld amount.**

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS**  
**AFTER COMPLETION IN RESPECT OF SPECIFIED ITEMS OF WORK OF SEWAGE**  
**TREATMENT PLANT**

The agreement made this..... day of ..... (Two Thousand .....only) between .....M/s..... (hereinafter called the GUARANTOR of the one part) and the PRESIDENT OF INDIA (hereinafter called the Government of the other part).

WHEREAS THIS agreement is supplementary to a contract no.....dated..... (Hereinafter called the Contract) and made between the GUARANTOR OF THE ONE PART AND the Government of the other part where by the contractor inter alia undertook to render the work in the said contract structurally stable, workmanship, finishing and use of sound materials.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said work will remain structurally stable and guaranteed against faulty workmanship, finishing and materials for 15 years to be reckoned from the date after the expiry of defect liability period prescribed in the contract

NOW THE GUARANTOR hereby guarantees that work executed by him will remain structurally stable and defect free for minimum period of 15 (Fifteen) years to be reckoned from the date after the expiry of defect liability period prescribed in the contract.

During this period of guarantee, the guarantor shall make good all defects to the satisfaction of the Engineer-in-charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all the defects, commits breach thereunder, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator and .....by for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :

1.....

2 .....

SIGNED FOR AND BEHALF OF THE PRESIDENT OF INDIA BY in the presence of:

1.....

2.....

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS**  
**AFTER COMPLETION IN RESPECT OF FIRE DOORS**

The agreement made this..... day of ..... (Two Thousand .....only) between .....S/o..... (hereinafter called the GUARANTOR of the one part) and the PRESIDENT OF INDIA (hereinafter called the Government of the other part).

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... And made between the GUARANTOR OF THE ONE PART AND the Government of the other part where by the contractor inter alia under took to render the building and structures in the said contract **structurally stable to fulfill its intended purpose, free from workmanship defects, discoloration, installation and use of only specified, certified material.**

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said work will remain **structurally stable to fulfill its intended purpose, free from workmanship defects, discoloration, installation and finishing for ten years from the Actual date of completion of the work.**

NOW THE GUARANTOR hereby guarantee that work executed by him will remain **structurally stable to fulfill its intended purpose, and guarantee for quality workmanship, material, discoloration, installation and finishing for ten years to be reckoned from the Actual date of completion of the work.**

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final and binding on Guarantor.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building water proof to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the water proofing and fails to control all kinds of leakage and seepage or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and / or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator and .....by for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :

1.....

2 .....

SIGNED FOR AND BEHALF OF THE PRESIDENT OF INDIA BY in the presence of:

1.....

2.....

**Note :For Fire doors minimum 10% (ten percent) of the cost of these items would be retained as Guarantee Bond to watch the performance of the work done shall be withheld for five years from the actual date of completion of the work.**

**PERCENTAGE RATE TENDER & CONTRACT FOR WORKS**

Tender for the **Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.**  
work of:-

- (i) To be uploaded by 16:00 hours on 10/09/2026 to the EE & SM(C)-I, SIMBO, CPWD, RANCHI upload at <http://etender.cpwd.gov.in> or [www.cpwd.gov.in](http://www.cpwd.gov.in).
- (ii) To be opened in presence of tenderers who may be present at 15:30 hrs. on 24/09/2026 in the office of the EE & SM(C)-I, SIMBO, CPWD, RANCHI.

**TENDER**

I/We have read and examined the notice inviting tender, schedule, A, B, C, D, E & F Specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, Special conditions, Schedule of Rate & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the President of India within the time specified in Schedule 'F' viz., schedule of quantities and in accordance in all respect with the specifications, designs, drawing and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respect of accordance with, such conditions so far as applicable.

I/We agree to keep the tender open for **30 (Thirty) days from the due date of its opening in case of single bid system** and not to make any modification in its terms and conditions.

I/We have deposited EMD for the prescribed amount in the office of concerned Executive Engineer as per the bid document.

A copy of earnest money deposit receipt of prescribed amount deposited in the form of Insurance Surety Bond, Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee i/c eBG(as prescribed) issued by a commercial Bank, is scanned and uploaded. If I/We, fail to furnish the prescribed performance guarantee and additional performance guarantee within prescribed period, I/We agree that the said President of India or his successors, in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I/We fail to commence work as specified, I/We agree that President of India or the successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said performance guarantee absolutely. The said Performance Guarantee shall be a guarantee to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form.

Further, I/We agree that in case of forfeiture of Earnest Money or Performance Guarantee and performance guarantee as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work.

I/We undertake and confirm that eligible similar work(s) has/have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the notice of Department, then I/We shall be debarred for tendering in CPWD in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee and performance guarantee.

I/We hereby declare that I/We shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived therefrom to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated \_\_\_\_\_ Signature of Contractor \_\_\_\_\_

Witness: \_\_\_\_\_ Postal Address \_\_\_\_\_

Address: \_\_\_\_\_

Occupation: \_\_\_\_\_

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the President of India for a sum of Rs. .... \* .....Rupees..... \* .....  
.....)

The letters referred to below shall form part of this contract agreement:-

- (a) \*
- (b) \*
- (c) \*

For & on behalf of the President of India.

Signatures..... \* .....

Dated: ..... \* .....  
( --\*-- Blanks to be filled by EE & SM(C)-I, SIMBO)

Designation..... \* .....

## **PROFORMA OF SCHEDULES FOR CIVIL WORK**

### **SCHEDULE 'A'**

|                                         |                                                           |
|-----------------------------------------|-----------------------------------------------------------|
| Schedule of quantities (as per PWD-3) : | Civil - Page No. 274 to 321<br>Hort – Page No. 407 to 410 |
|-----------------------------------------|-----------------------------------------------------------|

### **SCHEDULE 'D'**

Extra schedule for specific requirements/document for the work, if any : **As attached in tender documents.**

### **SCHEDULE 'E'**

|                                              |                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reference to General Conditions of contract. | Applicable GCC is GCC Construction Works - 2023, as modified and corrected up to previous day of the last date of submission of the tender.                                                                                                                                                                                                                                                      |
| Name of work                                 | <b>Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.</b>                                                                                                                                                                                                                                                                                                   |
| Estimated cost of work                       | <b>Rs. 43,32,58,671/-</b><br>(Civil : Rs. 32,84,66,818/-, Elect : Rs. 10,33,19,823/-) & Hort : Rs. 14,72,030/-)                                                                                                                                                                                                                                                                                  |
| (i) Earnest money                            | <b>Rs. 53,32,587/-</b>                                                                                                                                                                                                                                                                                                                                                                           |
| (ii) Performance Guarantee (PG)              | (a) 5% of Estimated cost put to tender (ECPT) or 5% of tendered amount whichever is higher.<br><br>(b) Additional Performance Guarantee (APG)<br>The amount of additional Performance Guarantee (APG) shall be equivalent to the difference between the 80% amount of ECPT and quoted amount.<br><b>Note :Please refer OM No. DG/CON/Construction 2023/20 dated 27.02.2026 for more details.</b> |
| (iii) Security Deposit                       | 2.5 % of tendered value                                                                                                                                                                                                                                                                                                                                                                          |

### **SCHEDULE 'F'**

|                                                                                                                                                 |                                                                                 |                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GENERAL RULES &amp; DIRECTIONS:</b>                                                                                                          |                                                                                 |                                                                                                                                                                        |
| Officer inviting tender:                                                                                                                        |                                                                                 | EE & SM(C)-I, SIMBO, CPWD, HINOO RANCHI                                                                                                                                |
| 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 (Refer Clause-12)                                                                                                                                            |
| <b>Definitions:</b>                                                                                                                             |                                                                                 |                                                                                                                                                                        |
| 2(v)                                                                                                                                            | Engineer-in-Charge :                                                            | EE&SM(C)-I, SIMBO, CPWD, HINOO RANCHI or his successor thereof                                                                                                         |
| 2(viii)                                                                                                                                         | Accepting Authority:                                                            | CE-Ranchi, CPWD, Ranchi                                                                                                                                                |
| 2(x)                                                                                                                                            | Percentage on cost of materials and labour to cover all overheads and profits : | 15%                                                                                                                                                                    |
| 2(xi)                                                                                                                                           | Standard Schedule of Rates                                                      | <b>Civil</b> : DSR - 2023 with up-to-date correction slips up to last date of submission of bids and Market Rates.                                                     |
| 2(xii)                                                                                                                                          | Department                                                                      | Central Public Works Department                                                                                                                                        |
| 9(ii)                                                                                                                                           | Standard CPWD contract Form GCC 2023, CPWD Form 7 as modified & corrected up to | Standard CPWD contract form <b>GCC Construction Works- 2023</b> , CPWD Form 7 as modified & corrected up to previous day of the last date of submission of the tender. |

Clause 1

|      |                                                                                                                                                                                                                                                            |        |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| (i)  | Time allowed for submission of Performance Guarantee, Programme Chart (Time and Progress) and applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board or Proof of applying thereof from the date of issue of letter of acceptance: | 7 days |
| (ii) | Maximum allowable extension with late fee @ 0.1% per day of Performance Guarantee amount beyond the period provided in (i) above:                                                                                                                          | 3 days |

Clause 2

|                                                    |                                    |
|----------------------------------------------------|------------------------------------|
| Authority for fixing compensation under clause 2 : | CE-Ranchi or his successor thereof |
|----------------------------------------------------|------------------------------------|

Clause 5

Authority to decide:

|       |                                                                                 |   |                                                                            |
|-------|---------------------------------------------------------------------------------|---|----------------------------------------------------------------------------|
| (i)   | Authority to convey the decision of shifting of milestone and Extension of time | : | EXECUTIVE ENGINEER& SM (C)-I, SIMBO, CPWD, RANCHI or his successor thereof |
| (ii)  | Authority to decide Rescheduling of mile stones and extension of time           | : | CE-Ranchi or his successor thereof                                         |
| (iii) | Shifting of date of start in case of delay in handing over of site.             | : | CE-Ranchi or his successor thereof                                         |

|                                                                                           |                      |
|-------------------------------------------------------------------------------------------|----------------------|
| Time allowed for execution of work                                                        | 18 (Eighteen) months |
| Number of days from the date of issue of letter of acceptance for reckoning date of start | 10 days              |

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

| Sl. No. | Description of Milestone (Physical)<br>(Civil & Electrical)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Time allowed in days<br>(from date of start) | Amount to be withheld in case of non achievement of milestone (Civil and/or electrical Tender Amount) |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1       | <b>Civil :</b> <ul style="list-style-type: none"> <li>a) Appointment of BIM Modeling (including MEP) consultant along with completing the BIM Model required as per terms and conditions of tender document.</li> <li>b) Setting up of site office, site testing lab, approval of design mix, steel yard, cement store.</li> <li>c) Submission of documents for specialized agencies for all civil works as mentioned in tender documents.</li> </ul> <b>Electrical :</b> <ul style="list-style-type: none"> <li>a) Submission of conduit and cable layout drawings of IEI, Service connection etc. for approval.</li> </ul> | 40 days                                      | 1%                                                                                                    |
| 2       | <b>Civil :</b> <ul style="list-style-type: none"> <li>a) Submission of all plumbing drawings.</li> <li>b) Excavation and Completion of foundation work upto Plinth level including Raft and re filling of excavated earth.</li> </ul> <b>Electrical :</b> <ul style="list-style-type: none"> <li>a) Laying of conduit as per approved drawing where civil work is in progress.</li> </ul>                                                                                                                                                                                                                                    | 120 days                                     | 1%                                                                                                    |

| Sl. No. | Description of Milestone (Physical)<br>(Civil & Electrical)                                                                                                                                                                                                                                                                                                                                                                                                                                        | Time allowed in days<br>(from date of start) | Amount to be withheld in case of non achievement of milestone (Civil and/or electrical Tender Amount) |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------|
|         | <b>b)</b> Submission of Fire fighting drawings, Fire Alarm drawings, CCTV, Networking, Solar PV, Street Light/ Compound light, VRV/VRF AC drawing and Substation & LT distribution drawing in complete shape.                                                                                                                                                                                                                                                                                      |                                              |                                                                                                       |
| 3       | <b>Civil :</b><br>a) Completing all Structural works upto 3 <sup>rd</sup> floor slab level.<br>b) Completing of masonry work upto 1 <sup>st</sup> floor slab level.<br><b>Electrical :</b><br>a) Delivery of materials for fans, fittings, Street / Compound & Garden Light, Substation & LT Distribution, DG Set, Lifts, Fire Alarm & PA System, Fire Fighting System, UPS, CCTV & Networking, Solar Photovoltaic Power Plant and VRV/VRF AC System and cable etc i/c all motors & panels of STP. | 06 Months                                    | 1.00%                                                                                                 |
| 4       | <b>Civil :</b><br>a) Completing all structural work of the office building as well as Substation STP Etc all completed<br>b) Completing of masonry work upto 4 <sup>th</sup> floor slab level.<br>c) Internal Finishing work like plastering, painting, flooring, Fixing of Doors and windows, false ceiling work up to 2nd floor level<br><b>Electrical :</b><br>a) Installation, Testing & Commissioning of complete work in all respect of all components.                                      | 12 Months                                    | 1.00%                                                                                                 |
| 5       | Completing all works (Civil & Electrical) i/c all development work, Installation, Testing & Commissioning of all Electrical works and Handing over i/c STP.                                                                                                                                                                                                                                                                                                                                        | 18 Months                                    | 1.00%                                                                                                 |

**Note: Operation of Mile Stone shall be made by Executive Engineer of major component in consultation with EE(E) as per details given in above table. However milestone shall be withheld by EE (C) of major component for composite tender amount.**

#### **Schedule of handing over of site**

| Part   | Portion of site                              | description                            | Time period for handing over reckoned from date of issue of letter of intent. |
|--------|----------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------|
| Part A | Portion without any hindrance                | Full site is available with the Client | 10 days                                                                       |
| Part B | Portions with encumbrances                   | NIL                                    | -                                                                             |
| Part C | Portions dependent on work of other agencies | NIL                                    | -                                                                             |

#### **Clause 6**

|                                                                                                           |                       |
|-----------------------------------------------------------------------------------------------------------|-----------------------|
| Computerized Measure Book (CMB) / Electronic Measurement Book (EMB)<br>(i) Mode of Measurement: CMB / EMB | Yes, eMB through ERP. |
|-----------------------------------------------------------------------------------------------------------|-----------------------|

#### **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. 200 Lakh (Civil) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|

#### Clause 7A

|                                         |                                                                                                                                                                                                                                    |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Whether Clause 7A shall be applicable - | Yes,<br>No Running Account bill shall be paid for the work till the applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board whatever applicable are submitted by the contractor to the Engineer-in-Charge. |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### Clause 8

|                                                                                                |                                    |
|------------------------------------------------------------------------------------------------|------------------------------------|
| I. Details of consultancy work/building/infrastructure project to be completed early for use : | Full scope as per NIT conditions   |
| II. Competent authorities to inspect and issue part / final completion plans                   | CE-Ranchi or his successor thereof |

#### Clause 8A

|                                                                                             |                                                                                     |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Authority to decide compensation on account if contractor fails to submit completion plans. | Engineer-in-charge.<br>(0.1% of tendered amount or Rs. 1.00 Lakh whichever is more) |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|

#### Clause 10A

|                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------|
| List of testing equipment to be provided by the Contractor at site lab – <b>As per list attached as Appendix-I</b> |
|--------------------------------------------------------------------------------------------------------------------|

#### Clause 10B(ii)

|                                                                    |                                                                                                                                                                                                                    |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Whether Clause 10 B (ii) shall be applicable(Mobilization Advance) | Applicable<br>The mobilization advance shall be given as mentioned below:<br>(i) 1st instalment = 4% of contract value<br>(ii) 2nd instalment = 3% of contract value<br>(ii) 3rd instalment = 3% of contract value |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### Clause 10C

|                                                           |                |
|-----------------------------------------------------------|----------------|
| Component of labour expressed as percent of value of work | Not Applicable |
|-----------------------------------------------------------|----------------|

|             |            |
|-------------|------------|
| Clause 10CC | Applicable |
|-------------|------------|

#### For Construction period

| Sl. No. | Relevant Component of Material/ Labour for price escalation                                  | Percentage of total value of work |
|---------|----------------------------------------------------------------------------------------------|-----------------------------------|
| 1.      | Cement Component                                                                             | 14.5%                             |
| 2.      | Labour Component                                                                             | 20%                               |
| 3.      | Civil Component of other Construction Materials                                              | 30.5%                             |
| 4.      | (E&M) Electrical & Mechanical component of Construction materials                            | 15%                               |
| 5.      | Reinforcement steel bars/TMT bars / structural steels (including strands & cables) component | 20%                               |
|         | Total                                                                                        | 100%                              |

#### Clause 11

|                                                     |                                                                                                     |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Specifications to be followed for execution of work | CPWD Specifications 2019 volume -I & II with correction slips up to last date of submission of bid. |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------|

|          |      |                                                                                                                                                        |                           |
|----------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 12.2 (c) |      | Deviation Limit beyond which clauses 12.2 (c) shall apply for building work                                                                            | 100%<br>(Hundred percent) |
| 12.4     | (i)  | Deviation Limit beyond which clauses 12.2 (c) shall apply for foundation work (except items mentioned in earth work sub-head in DSR and related items) | 100%<br>(Hundred percent) |
|          | (ii) | Deviation Limit for items mentioned in earth work sub-head of DSR and related items.                                                                   | 100%<br>(Hundred percent) |

#### Clause 16

|                                                |                                                                                                                                     |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Competent Authority for deciding reduced rates | 1. CE-Ranchi or his successor thereof - (upto 5% of total tendered amount)<br>2. ADG - Patna - (Beyond 5% of total tendered amount) |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|

#### Clause 18

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

**As per list attached as Appendix-II**

|             |   |                                                                    |
|-------------|---|--------------------------------------------------------------------|
| Clause 19 C | - | EE&SM(C)-I, SIMBO, CPWD, RANCHI to decide penalty for each default |
| Clause 19 D | - | EE&SM(C)-I, SIMBO, CPWD, RANCHI to decide penalty for each default |
| Clause 19 G | - | EE&SM(C)-I, SIMBO, CPWD, RANCHI to decide penalty for each default |
| Clause 19 K | - | Rs. 500 per tradesman per days                                     |

#### Clause 25

##### Settlement of Dispute by Conciliation and Arbitration

|         |                                 |                                      |
|---------|---------------------------------|--------------------------------------|
| SI. No. |                                 |                                      |
| (i)     | Conciliator                     | ADG – Patna or his successor thereof |
| (ii)    | Arbitrator Appointing Authority | CE-Ranchi or his successor thereof   |
| (iii)   | Place of Arbitration            | Ranchi                               |

#### Clause 32

##### Requirement of Technical Representative(s) and recovery Rate

| SI No | Minimum Qualification of Technical Representative | Discipline | Designation (Principal 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) |                                                    |
|-------|---------------------------------------------------|------------|--------------------------------------------------|----------------------------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|       |                                                   |            |                                                  |                                                                |        | Figure                                                                                                            | Words                                              |
| 1.    | Graduate Engineer                                 | Civil      | Project Manager                                  | 20 years (and having experience of one similar nature of work) | 1      | Rs. 60,000/- (per month per person)                                                                               | Rupees Sixty Thousand only. (per month per person) |
| 2.    | Graduate Engineer                                 | Civil      | Deputy Project Manager                           | 12 years (and having experience of one similar nature of       | 1      | Rs. 40,000/- (per month per person)                                                                               | Rupees Forty Thousand only. (per month per person) |

| SI No | Minimum Qualification of Technical Representative | Discipline | Designation (Principal/ 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) |                                                          |
|-------|---------------------------------------------------|------------|---------------------------------------------------|---------------------------------|--------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
|       |                                                   |            |                                                   |                                 |        | Figure                                                                                                            | Words                                                    |
|       |                                                   |            |                                                   | work)                           |        |                                                                                                                   |                                                          |
| 3.    | Graduate Engineer or Diploma Engineer             | Civil      | Project /Site Engineer                            | 5 Year or 10 Years respectively | 1      | Rs. 25,000/- (per month per person)                                                                               | Rupees Twenty Five Thousand only. (per month per person) |
| 4.    | Graduate Engineer or Diploma Engineer             | Civil      | Project Planning/ quality/ billing Engineer       | 2 Year or 5 Years respectively  | 1      | Rs. 15,000/- (per month per person)                                                                               | Rupees Fifteen Thousand only. (per month per person)     |

Engineer(s) deployed as per stipulation in the contract looks after only the work under this contract and no other work and is available fully during execution of work. Even if contractor (or partner in case of firm/Company) is himself/ herself an engineer, it is necessary on part of contractor to employ engineer(s) and/or overseer for the supervision of work as per stipulation. The above given strength shall be required to be deployed as and when necessity arises at site or so directed by Engineer-in-charge.

**# Diploma holder with minimum 10 years relevant experience with a reputed construction co. can be treated at par with Graduate Engineers for the purpose of such deployment subject to the condition that such diploma holders should not exceed 50% of requirement of degree engineers.**

#### Clause 38

|      |     |                                                                                                                                           |                                       |
|------|-----|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| (i)  | (a) | Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates 2023 printed by CPWD. |                                       |
| (ii) |     | Variations permissible on theoretical quantities:                                                                                         |                                       |
|      | (a) | Cement, For works with estimated cost put to tender more than Rs. 25 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                                   |

**List of minimum testing equipment to be provided by the contractor at site lab will be as below and as per direction of Engineer-in-Charge.**

|     |                                                                                                                                                                           |                          |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1   | STANDARD SIEVES (INDIAN STANDARD)                                                                                                                                         |                          |
| a)  | Set of sieves 450 mm internal dia (GI sheet frames) of sizes (100 mm, 80mm, 63mm, 50mm, 40 mm, 25 mm, 20 mm, 12.5 mm, 10.0 mm, 6.3 mm, 1.75 mm complete with lid and pan) | 1 sets                   |
| b)  | Set of fine sieves 200 mm internal dia (brass frame)consisting of (2.36 mm, 1.18mm, 600mic, 425microns, 300mic, 212microns, 150mic, 90microns, 75 mic with lid andpan)    | 1 sets                   |
| c)  | Motorized sieve shaker for the above sieves                                                                                                                               | 1 no.                    |
| 2   | Compression Testing Machine with Electricity operated of required capacity                                                                                                | 1 no.                    |
| 3   | Slump test apparatus complete                                                                                                                                             | 1 no.                    |
| 4   | Concrete cube moulds 15x15x15cm (ISI Marked)                                                                                                                              | 24 nos.                  |
| 5   | Pruning Rods 2 kg weight length 40 cm and ramming face 25 mm <sup>2</sup>                                                                                                 | 1 no.                    |
| 6   | Mortar Cube Moulds 7.07x7.07x7.07 cm                                                                                                                                      | As per site requirement  |
| 7   | Mortar Cube vibrator                                                                                                                                                      | As per site requirement  |
| 8   | Vicate needle apparatus                                                                                                                                                   | 1 no.                    |
| 9   | Blaine's Apparatus                                                                                                                                                        | As per site requirement  |
| 10  | Weighing platform capacity 100 kg (Digital)                                                                                                                               | 1 no.                    |
| 11  | Weighing scale capacity 10 kg, 5 kg (Digital, least count 1 gram)                                                                                                         | 1 no.                    |
| 12  | Hot air oven (temp range 500C to 3000C, sensitivity 1 degree)                                                                                                             | 1 no.                    |
| 13  | Enamel Trays                                                                                                                                                              | 1 no.                    |
| 14  | 300 x 250 x 40 mm                                                                                                                                                         | 1 no.                    |
| a)  | Circular plates of 250 mm dia                                                                                                                                             | 1 no.                    |
| b)  | Hammer 1lb and 2 lb                                                                                                                                                       | 1 no.                    |
| 15  | Wooden Hammer                                                                                                                                                             | 1 no.                    |
| 16  | Measuring steel tape 3,5,15 and 30metre                                                                                                                                   | 1 no. each               |
| 17  | Depth gauge 20cm                                                                                                                                                          | 1 no.                    |
| 18  | Steel Foot Plate                                                                                                                                                          | 1 no.                    |
| 19  | Vernier Caliper (Digital)                                                                                                                                                 | 1 no.                    |
| 20  | Screw gauge                                                                                                                                                               | 1 no.                    |
| 21  | Digital PH meter least count 0.01                                                                                                                                         | 1 no.                    |
| 22  | Digital Micrometer least count. 0.01mm                                                                                                                                    | 1 no.                    |
| 23  | Digital paint thickness meter for steel 500 microns                                                                                                                       | As per site requirement  |
| 24  | Distance Measuring Laser Apparatus                                                                                                                                        | As per site requirement  |
| 25  | Measuring cylinder TPX or Poly propylene capacity 100 ml, 250 ml, 500 ml,1000 ml                                                                                          | As per Actualrequirement |
| 26  | Pyrex, corning or Borosil beakers with cover capacity 500 ml, 200 ml, 50 ml                                                                                               | As per Actualrequirement |
| 27  | Thermometers 1-150 degree centigrade                                                                                                                                      | As per Actualrequirement |
| 28  | Moisture Meter                                                                                                                                                            | As per Actualrequirement |
| 29  | Dial Gauge, 25mm travel - 0.01 mm/division                                                                                                                                | As per Actualrequirement |
| 30  | LT Megger, HT Megger and Earth Tester                                                                                                                                     | As per Actualrequirement |
| 31  | Ultrasonic Pulse Velocity Test equipment as & when required                                                                                                               | 1 Set                    |
| 32. | Rebound Hammer                                                                                                                                                            | 1 No                     |
| 33. | Any other equipment for site tests as outlined in BIS codes and as directed bythe Engineer-in-Charge.                                                                     | As per Actualrequirement |

**i) Note :- All dial guage reading equipment shall be calibrated with NABL accredited lab or weight & measure department, Ranchi/Dhanbad, Jharkhand.**

**ii) Necessary recovery shall be done on account of not installing the requisite number of Testing Equipments as stipulated above as per prevailing market rate after issuing notice from the Engineer-in-charge.**

**List of machinery, tools & plants to be deployed by the contractor at site**

| Sl.No. | Equipment                                                                                                                                                                                            | Numbers (Tentative)            |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1.     | Automatic Concrete Batch Mix Plant fully Computerized (Capacity Min- 30 cum/hrs)/ <del>Mini batching plant/ Truck mounted weight batcher/ Ajax fieri batch mix plant</del> or RMC of approved vender | 1                              |
| 2.     | Concrete Pumps and with sufficient length of pipe                                                                                                                                                    | 1                              |
| 3.     | Fixed / Mobile Tower crane                                                                                                                                                                           | 1                              |
| 4.     | Excavator cum loaders (JCB 3D model or equivalent).                                                                                                                                                  | 2                              |
| 5.     | Poklene for rock cutting                                                                                                                                                                             | As per actual site requirement |
| 6.     | Compressor machine minimum 200 cfm capacity.                                                                                                                                                         | As per actual site requirement |
| 7.     | DG set of minimum capacity 40 KVA                                                                                                                                                                    | 1                              |
| 8.     | Needle Vibrators                                                                                                                                                                                     | 3                              |
| 9.     | Plate Vibrators                                                                                                                                                                                      | 2                              |
| 10.    | Dumpers (As & when required)                                                                                                                                                                         | 2                              |
| 11.    | Reinforcement bending machines                                                                                                                                                                       | 3                              |
| 12.    | Reinforcement / Steel cutting machines                                                                                                                                                               | 3                              |
| 13.    | Power driven earth rammers (Soil compactors) (if required)                                                                                                                                           | As per actual site requirement |
| 14.    | Real Time Kinematic (RTK) / Total station with distance meter (As & when required)                                                                                                                   | 1                              |
| 15.    | Theodolite with tripod                                                                                                                                                                               | As per actual site requirement |
| 16.    | Tractor with trolley (as per requirement)                                                                                                                                                            | 2                              |
| 17.    | Water tankers (minimum capacity 5000 litre)                                                                                                                                                          | 2                              |
| 18.    | Welding machines 400 Ampere                                                                                                                                                                          | 2                              |
| 19.    | Screener for Coarse Sand and Fine Sand                                                                                                                                                               | 2                              |
| 20.    | Centrifugal Mono Block Water Pump suitable for minimum 60 m head                                                                                                                                     | 2 or more                      |
| 21.    | Transit Mixer (As & when required)                                                                                                                                                                   | 2                              |
| 22.    | Concrete Mixer                                                                                                                                                                                       | 2                              |
| 23.    | Screed leveler                                                                                                                                                                                       | 1                              |
| 24.    | Good quality Camera for taking photographs and video recording of major activities for record purpose and for quality assurance.                                                                     | 1                              |
| 25.    | Steel shuttering materials with necessary props                                                                                                                                                      | 3500 sqm                       |
| 26.    | Double steel scaffolding and staging materials                                                                                                                                                       | 3500 sqm                       |
| 27.    | Vibratory roller (As & when required)                                                                                                                                                                | 1                              |
| 28.    | Drilling machine                                                                                                                                                                                     | 2                              |
| 29.    | Floor grinding/ polishing machines                                                                                                                                                                   | 2                              |
| 30.    | Granite cutting machine                                                                                                                                                                              | 2                              |
| 31.    | Ceramic tile cutting machine                                                                                                                                                                         | 2                              |
| 32.    | Granite polishing machine                                                                                                                                                                            | 2                              |
| 33.    | Granite hand polishing machine                                                                                                                                                                       | 2                              |
| 34.    | Concrete core cutting machine with required dia drill bits.                                                                                                                                          | 2                              |
| 35.    | Rock breaker/ excavator                                                                                                                                                                              | As per site requirement        |
| 36.    | Any other machinery required for completion of the work as per decision of Engineer-in-Charge.                                                                                                       | As per Actual requirement      |

**Note:**

- (i) The above list is only indicative and not exhaustive. Any other machinery/ equipment desired for required progress shall be arranged by the agency as per direction of Engineer-in-Charge.
- (ii) All dial guage reading equipment shall be calibrated with NABL accredited lab or weight & measure department, Ranchi/Dhanbad, Jharkhand.
- (iii) The machinery, tools & plants shall have to be mobilized as per requirement of work & as per

approved completion program which can be demobilized after completion particular activity for which such machinery, T&P was required.

- (iv) Other machineries, T&P not mentioned in above list shall be arranged by Contractor as and when required to complete the particular activity as per approved completion program & direction of engineer-in-charge.
- (v) Necessary recovery shall be done on account of not installing the requisite number of machineries as stipulated over as per prevailing market rate after issuing notice from the Engineer-in-charge.

# **PART – B**

## **(Civil Works)**

### **ADDITIONAL CONDITIONS**

1. Unless otherwise specified, CPWD Specifications 2019 volume I&II with up-to-date corrections slips shall be followed in general. Any additional item of work, if taken up subsequently, shall also conform to the relevant CPWD specifications mentioned above. In case, there is any difference or discrepancy between the description of items as given in the schedule of quantities, particular specifications for individual items of work (including special conditions) and I.S. Codes etc., the following order of preference shall be observed:
  - i) Description of items as given in Schedule of quantities
  - ii) Additional conditions
  - iii) Additional specifications
  - iv) General Conditions of Contract for CPWD Construction works 2023 with up-to-date correction slip and CPWD Specifications
  - v) I.S. Codes
  - vi) Decision of Engineer-in-Charge

### **2 INSPECTION OF SITE**

The Contractors are advised to inspect and examine the site and its surroundings and satisfy themselves with the nature of site, the means of access to the site, the constraints of space for stacking material / machinery, labour etc. constraints put by local regulations, if any, weather conditions at site, general ground / subsoil conditions etc. or any other circumstances which may affect or influence their tenders.

- 3 The Contractor shall, if required by him, before submission of the tender, inspect the drawings in the Office of the Engineer-in-Charge. The Department shall not bear any responsibility for the lack of knowledge and also the consequences, thereof to the Contractor. The information and data shown in the drawings and mentioned in the tender documents have been furnished, in good faith, for general information and guidance only. The Engineer-in-Charge, in no case, shall be held responsible for the accuracy thereof and / or interpretations or conclusions drawn there from by the Contractor and all consequences shall be borne by the Contractor. No claim, whatsoever, shall be entertained from the Contractor, if the data or information furnished in tender document is different or in-correct otherwise or actual working drawings are at variance with the drawings available for inspection or attached to the tender documents. It is presumed that the Contractor shall satisfy himself for all possible contingencies, incidental charges, wastages, bottlenecks etc. likely during execution of work and acts of coordination, which may be required between different agencies. Nothing extra shall be payable on this account.

- 4 Unless otherwise specified in the schedule of quantities, the rates of all items of work shall be considered as inclusive of executing all work, wherever required, in or under water and / or liquid mud, including bailing out water encountered from any source such as rain, floods, tides ingress of water through pressure relieving sleeves left during PCC at base, sub- soil water table being high and / or any other source whatever. During entire execution of work, the contractor shall carry out dewatering (at his own cost), as and when required or specified herein. Nothing extra shall be payable on this account.

- 5 The nomenclature of the item given in the schedule of quantities gives in general the work content but is not exhaustive i.e. does not mention all the incidental works required to be carried out for complete execution of the item of work. The work shall be carried out , all in accordance with true intent and meaning of the CPWD Specifications and the drawings taken together, regardless of whether the same may or may not be particularly shown on the drawings and / or described in the Specifications, provided that the same can be reasonably inferred there from. There may be several incidental works, which are not mentioned in the nomenclature of each item but will be necessary to complete the item in all respect. All these incidental works / costs which are not mentioned in item nomenclature but are necessary to complete the item shall be deemed to have been included in the rates quoted by the contractor for various items in the schedule of quantities. No adjustment of rates shall be made for any variation in quantum of incidental works due to variation / change in actual working drawings. Also, no adjustment of rates shall be made due to any change in incidental works or any other deviation in such element of work (which is incidental to the items of work and are necessary to complete such items in all respects) on account of the directions of Engineer-in-Charge. Nothing extra shall be payable on this account.
- 6 Unless otherwise provided in the Schedule of Quantities, the rates quoted by the Contractor shall be inclusive of carrying out the works at and / or upto all heights, lifts, leads and depths. The contractor shall make all arrangements for the same. Nothing extra shall be payable on this account.
- 7 Accommodation for labour huts, site office, stores, installation of batching plant etc. will be given at site as per availability only. In case, space is not available at the site of work, Contractor shall make his own arrangements to provide such accommodation as per the rules of the local bodies. He shall make his own arrangements for stores, field office etc. Before tendering, he shall visit the site and assess the manner in which he is able to arrange the above facilities. The Engineer-in-Charge shall in no way be responsible for any delay on this account and no claim, whatsoever, on this account shall be entertained. Nothing extra shall be payable on this account.
- 8 **SUBMISSIONS IMMEDIATELY AFTER AWARD OF WORK**  
The Contractor shall submit the following details immediately after award of work.
- List of Equipment's proposed to be deployed for this work.
  - Site organization chart with Bio-data of Project Manager and Key Personnel proposed to be deployed at site.
  - A certified copy of Power of Attorney in the name of person who has signed the tender document.
  - The details of shuttering and scaffolding material proposed to be used to complete the entire R.C.C structural work commensurate with overall stipulated period for completion of work.
  - The contractor shall prepare and submit a tentative integrated Bar Chart (for Civil and E & M services) clearly indicating the various activities, in a manner to complete the entire work covered under this tender within the stipulated period.
- 9 The Contractor shall keep himself fully informed of all acts and laws of the Central & State Governments, all orders, decrees of statutory bodies, tribunals having any

jurisdiction or authority, which in any manner may affect those engaged or employed and anything related to carrying out the work. The contractor shall adhere to all the rules & regulations and byelaws laid down by local Bodies and any other statutory bodies, during the execution of work. The Contractor shall also adhere to all traffic restrictions notified by the local authorities. All statutory taxes, levies, charges (including water and sewerage charges, charges for temporary service connections and / or any other charges) payable to such authorities for carrying out the work, shall be borne by the Contractor. The Contractor shall arrange to give all notices as required by any statutory / regulatory authority and shall pay to such authority all the fees that is required to be paid for the execution of work. He shall protect and indemnify the Department and its officials & employees against any claim and /or liability arising out of violations of any such laws, ordinances, orders, decrees, by himself or by his employees or his authorized representatives. Nothing extra shall be payable on these accounts. The fee payable to statutory authorities for obtaining the various permanent service connections and Occupancy Certificate for the building shall be borne by the Department.

- 10 Royalty at the prevalent rates shall be paid by the Contractor or the RMC supplier as per the terms of supply between them on all materials such as boulders, metals, sand and bajri etc. collected by him for the execution of the work, directly to the revenue authority of the state government concerned. Nothing extra shall be payable on this account.
- 11 No foreign exchange shall be made available by the Department for importing (purchase) of equipments, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor, on account of variation in the foreign exchange rate.
- 12 The Contractor shall assume all liability, financial or otherwise in connection with this contract and shall protect and indemnify the Department from any and all damages and claims that may arise on any account. The Contractor shall indemnify the Department against all claims in respect of patent rights, royalties, design, trademarks of name or other protected rights, damages to adjacent buildings, roads or members of public, in course of execution of work or any other reasons whatsoever, and shall himself defend all actions arising from such claims and shall indemnify the Department in all respect from such actions, costs and expenses. Nothing extra shall be payable on this account.

### 13 SIGN BOARDS

The Contractor shall provide and erect a display board of size and shape as required and paint over it, in a legible and workman like manner, the details about the salient features of the project, as required by the Engineer-in-Charge. The Contractor shall fabricate and put up a sign board in an approved location and to an approved design indicating name of the project, client / owner, architects, structural consultants, Department etc. besides providing space for names of other Contractors, Sub-Contractors and specialized agencies. Nothing extra shall be payable on this account.

**14 INTEGRATED SERVICE DRAWINGS**

The contractor shall prepare following drawings for various civil and electrical services showing details of lay out plan including sectional elevations and submit the same for the approval of Engineer-in-Charge.

- a) Plumbing drawings GI/SS and CI line
- b) Layout of conduits, switchboard, Distribution boxes etc.

Subsequently Integrated drawings shall be prepared and submitted by the Contractor as per local Byelaws and as per the site conditions to facilitate convenient installation as well as maintenance. Nothing extra shall be payable on this account.

**15 PROTECTIVE / SAFETY MEASURES**

Necessary protective and safety equipment's shall be provided to the Site Engineer, workers & Supervisory staff by the Contractor at his own cost and to be used at site.

The Contractor shall do proper sequencing of the various activities by suitably staggering the activities within various pockets in the plot so as to achieve early completion. The agency may deploy adequate equipment's, machinery and labour as required for the completion of the entire work within the stipulated period specified. Also, ancillary facilities shall be provided commensurate with requirement to complete the entire work within the stipulated period. Nothing extra shall be payable on this account. Adequate number/sets of equipment's in working condition, along with adequate stand-by arrangements, shall be deployed during entire construction period. It shall be ensured by the Contractor that all the equipment's, Tools & Plants, machineries etc. provided by him are maintained in proper working conditions at all times during the progress of the work and till the completion of the work. Further, all the constructional tools, plants, equipment's and machineries provided by the Contractor, on site of work or his work shop for this work, shall be exclusively intended for use in the construction of this work and they shall not be shifted / removed from site without the permission of the Engineer-in-Charge.

**16 DISPLAY PERMISSIONS**

The Contractor shall display all permissions, licenses, registration certificates, bar charts, other statements etc. under various labour laws and other regulations applicable to the works at his site office.

**17 REMOVAL OF 'MULBA' ETC. FROM SITE**

The Contractor shall not stack building material / mulba / muck on any other land outside site barricading. The muck, rubbish etc. shall be removed periodically as directed by the Engineer-in-Charge, from the site of work to the approved dumping grounds as per the local byelaws and the Contractor shall obtain regulations of the concerned authorities and all necessary permissions in this regard from the local bodies. Nothing extra shall be payable on this account. The contractor shall be liable to pay any charges/penalties as may be levied by local bodies. The Engineer –in-Charge shall be at liberty to recover, such sums due but not paid to the concerned authorities on the

above counts, from any sums due to the Contractor including amount of the Security Deposit and performance guarantee in respect of this contract agreement.

**18 TOOLS AND PLANTS**

The Department shall supply no tools and plants including any special T&P etc. and the Contractor shall have to make his own arrangements at his own cost. No claim of hindrance (or any other claim) shall be entertained on this account.

**19 COORDINATION WITH OTHER AGENCIES**

The Contractor shall conduct his work so as not to interfere with or hinder the progress of the work being performed by other Contractors or by the Engineer-in-Charge. As far as possible, he shall arrange his work and place, so as not to interfere with the operations of other Contractors or shall arrange his work with that of the others, in an acceptable and coordinated manner and shall perform it in proper sequence.

**20 FACILITIES BY THE CONTRACTOR TO THE OTHER CONTRACTORS / AGENCIES**

The Contractor shall cooperate with and provide the facilities to the sub-Contractors and other agencies working at site for smooth execution of the work. The Contractor shall

- a) Allow use of scaffolding, toilets, sheds etc.
- b) Properly co-ordinate their work with the work of other contractors.
- c) Provide control lines and benchmarks to his Sub-Contractors and the other Contractors.
- d) Provide electricity and water at mutually agreed rates.
- e) Provide hoist and crane facilities for lifting material.
- f) Co-ordinate with other Contractors for leaving inserts, making chases, alignment of services etc. at site.
- g) Adjust work schedule and site activities in consultation with the Engineer-in-Charge and other Contractors to suit the overall schedule completion.
- h) Resolve the disputes with other Contractor amicably and the Engineer-in-Charge shall not be made intermediary or arbitrator. The contractor shall indemnify the Department against any claim(s) arising out of such disputes.

- 21** The site of work shall be always kept clean due to constraints of space and to avoid any nuisance to the users of buildings in the adjacent plots. The Contractor shall take all care to prevent any water- logging at site. The wastewater, slush etc. shall not be allowed to be collected at site. It may be directly pumped into the creek with prior approval of the concerned authorities. For discharge into public drainage system, necessary permission shall be obtained from relevant authorities after paying the necessary charges, if any, directly to the authorities. The work shall be carried out in such a way that the area is kept clean and tidy. All the fees/charges in this regard shall be borne by the Contractor. Nothing extra shall be payable on this account.

**22 PREVENTION OF NUISANCE AND POLLUTION**

The Contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupants of the adjacent properties and to the

public in general. The Contractor shall take all care, as not to damage any other adjacent property or other services running adjacent to the plot. If any damage is done, the same shall be made good by the Contractor at his own cost and to the entire satisfaction of the Engineer-in-Charge. The Contractor shall use such methodology and equipment's for execution of the work, so as to cause minimum environmental pollution of any kind during construction, to have minimum construction time and minimum inconvenience to road users and to the occupants of the buildings on the adjacent plot and public in general, etc. He shall make good at his own cost and to the entire satisfaction of the Engineer in Charge any damage to roads, paths, cross drainage works or public or private property whatsoever caused, due to the execution of the work or by traffic brought thereon, by the Contractor. Further, the Contractor shall take all precautions to prevent any pollution of streams and waterways. All waste or superfluous materials shall be carted away by the Contractor, entirely to the satisfaction of the Engineer-in-Charge. Utmost care shall be taken to keep the noise level to the barest minimum so that no disturbance as far as possible is caused to the occupants / users of adjoining buildings. **No claim what so ever on account of site constraints mentioned above or any other site constraints not specifically stated here, shall be entertained from the Contractor. Therefore, the Contractors are advised to visit site and get first hand information of site constraints. Accordingly, they should quote their tenders. Nothing extra shall be payable on this account.**

**23 SCAFFOLDING**

Wherever required for the execution of work, all the scaffolding shall be provided and suitably fixed, by the Contractor. It shall be provided strictly with steel double scaffolding system, suitably braced for stability, with all the accessories, gangways, etc. with adjustable suitable working platforms to access the areas with ease for working and inspection. It shall be designed to take all incidental loads. It should cater to the safety features for workmen. Nothing extra shall be payable on this account. It shall be ensured that no damage is caused to any structure due to the scaffolding.

- 24** The Contractor shall maintain all the work in good condition till the completion of entire work. The Contractor shall be responsible for and shall make good, all damages and repairs, rendered necessary due to fire, rain, traffic, floods or any other causes. The Engineer-in-Charge shall not be responsible for any claims for injuries to person/workmen or for structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the Contractor or of any other of his representatives, in his employment during the execution of the work. The compensation, if any, shall be paid directly to the Department / authority / persons concerned, by the Contractor at his own cost.

- 25** For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, not with-standing the fact that the Contractor may have to pay extra amounts for any reason to the labourers and other staff engaged directly or indirectly on the work

according to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them.

- 26** In case of flooding of site on account of rain or any other cause and any consequent damage, whatsoever, no claim financially or otherwise shall be entertained not withstanding any other provisions elsewhere in the contract agreement. Also, the Contractor shall make good, at his own cost, the damages caused, if any.
- 27** The Contractor shall render all help and assistance in documenting the total sequences of this project by way of photography, slides, audio / video recording etc. Nothing extra shall be payable to Contractor on this account. However, cost of photographs, slides, audio / videography etc. shall be borne by the Department. The original films shall be the property of the Department. No copy shall be prepared without the prior approval of the Engineer- in - Charge.
- 28** The Contractor shall make all necessary arrangements for protecting from rains, the work already executed and for carrying out the further work, during monsoon including providing and fixing temporary shelters, protections etc. Nothing extra shall be payable on this account. Also, no claims for hindrance shall be entertained on this account.
- 29** **INCIDENTAL CHARGES**  
For all items of work, the entire incidental charges of any kind including cartage, storage, wastage and safe custody of material etc. shall be borne by the Contractor and no claim of any kind, whatsoever, shall be entertained on this account.
- 30** **STORAGE OF MATERIAL AT SITE**  
No inflammable materials including P.O.L shall be allowed to be stored in huge quantity at site. Only limited quantity of P.O.L may be allowed to be stored at site subject to the compliance of all rules / instructions issued by the relevant authorities and as per the direction of Engineer -in- Charge in this regard. Also all precautions and safety measures shall be taken by the Contractor for safe handling of the P.O.L products stored at site. All consequences on account of unsafe handling of P.O.L shall be borne by the Contractor.
- 31** **NO WAIVING OF LEGAL RIGHTS AND POWERS**  
The Engineer-in-Charge shall not be precluded or stopped from taking any measurements, and framing of estimates or detaining any certificates made either before or after the completion and acceptance of the work and payment, from showing the true amount and character of the works performed and materials furnished by the Contractor and from showing that any such measurements, estimates or certificates untrue or incorrectly made and that Engineer-in-Charge shall not be precluded or stopped from recovering from the Contractor such damages as it may be sustained by reasons of his failure to comply with the terms and conditions of the contract.
- 32** **FINAL TESTING OF THE INSTALLATION**  
The Contractor shall demonstrate trouble free functioning of all the Civil and E & M installations and services. The Engineer-in-Charge or his authorized representatives shall carry out final inspection of the various Civil and E & M services and installations. Any defect(s) noticed during demonstration shall be rectified by the Contractor at his own cost to the entire satisfaction of the Engineer-in-Charge. Nothing extra shall be payable on this account.

- 33 Unless otherwise provided in the Schedule of quantities, the rates of tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the building and nothing extra shall be payable to him on this account. Payment for centering, shuttering, however, if required to be done for heights greater than 3.5 m shall be admissible at rates arrived at in accordance with clause 12 of the agreement if not already specified.
- 34 The contractor shall make his own arrangements for water and for obtaining electric connections if required and make necessary payments directly to the department concerned.
- 35 Other agencies doing work related with this project will also simultaneously executed the works and the contractor shall afford necessary facilities for the same. The contractor shall leave such necessary holes, openings etc. for laying, burying in the work pipes, cables, conduits, clamps, boxes and hooks for fan clamps, etc. as may be required for other agencies conduits for Electrical wiring/cables will be laid in a way that they leave enough space for concreting and do not adversely affect the structural members. Nothing extra over the agreement rates shall be paid for the same.
- 36 Some restrictions may be imposed by the security staff etc. on the working and for movement of labour, materials etc. The contractor shall be bound to follow all such restrictions/instructions and nothing extra shall be payable on this account.
- 37 (a) The building for components will be carried out in the manner complying in all respect with the requirements of relevant by laws of the local body under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-Charge and nothing extra will be paid on this account.  
(b) The contractor shall comply with proper and legal orders and directions of the Local or Public authority or Municipality and abide by their rules and regulations and pay all fees and charges, which he may be liable.
- 38 The contractor shall give a performance test of the entire installation(s) as per standing specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for the test.
- 39 Any cement slurry added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items and nothing extra shall be payable (or) extra cement considered in consumption on this account.
- 40 Testing of materials:  
Samples of various materials required for testing shall be provided free of charge by the Contractor including its transportation to testing laboratories. **The cost of tests for all materials shall be borne by the Contractor. The test shall be carried out by the contractor from the approved laboratory as mentioned in NIT page no. 55 para 5.8.**  
**Testing of materials shall primarily be got conducted from Govt. labs & however, in case of exigencies of some works, testing may be permitted from the approved Private Labs (NABL Accredited only) / Any govt. engineering Institution on written request by the Contractor.**

**However, permission for testing materials from Private Labs (NABL Accredited only) depends solely at the discretion of the NIT approving authority.**

**All the laboratory testing reports have to be submitted by the contractor with every running account bill.**

41. The Structural and Architectural drawings shall be all times be properly co-related before executing any work. However, in case of any discrepancy in the item given in the schedule of quantities, appendent with the tender and Architectural drawings relating to the relevant item, the former shall prevail unless and otherwise given in writing by the Engineer-in-Charge.
42. For the purpose fo recording measurements and preparing running account bills, the abbreviated nomenclatures indicated in the publications “Abbreviated nomenclature of item of DSR-2023” with up to date correction slips shall be accepted. The abbreviated nomenclature shall be taken to cover all the materials and operations as per the complete nomenclature of the relevant items in the agreement and other relevant specifications. In the case of items for which abbreviated nomenclature is not available in the above cited publication and also in case of extra and substituted items of works for which abbreviated nomenclature is not provided in the agreement, the full nomenclature of the items shall be reproduced in the measurement books and bill forms for running account bill. The full nomenclature of the items shall be adopted in preparing abstract of final bill form in the measuremet book and also in the bill form for final bill.
43. Public Procurement (Preference to Make in India) order 2017 issued by competent authority of Government of India shall be implemented during selection of materials and execution of work accordingly.
45. Agency shall ensure availability of mining materials and procure the same in advance. No claim shall be entertained on account of non availability of mining materials ( sand,stone chips etc.) monsoon.
46. Ageny shall quotate their rate considering 18% GST on work contract.
47. Contractor shall not divert any advance payments or part thereof for any other purpose other than needed for completion of this contracted work. All advance payments received as per terms of the contract (i.e. mobilization, secured against materials brought at site, secured against plant & machinery and/or for work done during interim stages, etc.) are required to be re-invested in the contracted work to ensure advance availability of resources in terms of materials, labour, plant & machinery needed for required pace of progress for timely completion of work.

48. **SITE OFFICE ESTABLISHMENT:**

For site related works by the Engineer-in-charge and his project team, Contractor shall provide (Prefabricated/built up) site office of minimum 60 sqm area ( Approx 30 sqm for conference room and 10 Sqm each for 3 nos Chambers), with all required furniture (2 Nos Executive table (wooden), 3 Nos Executive Chair, boardroom/conference table , 16 nos office chairs, 2 Nos steel big almirah, 2 Nos small Almirah, 1 Nos Digital display arrangement (with projection system & sound system for conference room) ) ,all civil & electrical fittings & fixtures i/c AC in all rooms. The site office shall have 3 department engineers room,1 conference room, toilet (Separate for Gents + Ladies), sample room, store room, record room etc. The electricity and day to day maintenance i/c cleaning, sweeping to be ensured and minimum **One multitasking staff** to be provided with additional security guards for security of office and material store as required etc. all shall be within the scope of the Contractor. Nothing extra shall be paid for the same In order to ensure smooth, timely and proper management of work by department's project team under the Engineer-in-charge, the contractor shall provide following arrangements at project site, for the entire

duration of the contract agreement i/c extension, if any. **Nothing extra shall be paid to the contractor for providing these arrangements at site and contractors should quote the rates considering this factor.**

1. For site office establishment, the contractor within 30 days of this start of the work shall provide 2 (Two) Nos. ios based computers / laptops / ios based latest generation tablets with building works software installed (e.g. Autocad , E-tab , MS office etc.) along with 1 (one) multifunction printers & scanners and **minimum 1 (one) no. computer operator** for the execution of computer tasks related to this work on direction of Engineer-in-charge and nothing extra shall be paid to the contractor on account of this. This shall be treated in scope of this work & if contractor fails to provide such facility for smooth & speedy execution of this work then Engineer-im-Charge shall be at liberty to make arrangements himself for the same and deduct the respective cost from the running/final bill of contractor.
2. The contractor shall provide high speed broadband (upto 1 GBPS speed) internet facility with unlimited data(both wifi and LAN CAT6A connections at every room in office) and AMC/ maintenance thereof for entire project period. Nothing extra shall be paid for the same.
3. The Contractor shall provide necessary Air Conditioners, lighting and fixtures i/c fans, RO purified drinking water etc. till the payment of final bill. AMC charges, Electricity bill, water supply bills, RO/ drinking water bills, telephone charges, internet charges etc. shall be borne by the contractor.
4. The contractor shall be responsible for security and watch and ward of the office, records, furniture and fixtures.
5. The contractor shall maintain the site office and its surroundings in a neat and clean condition for the entire duration of the construction. The toilet effluent shall be discharged into sewer line or soak pits without causing unsanitary conditions in the surroundings. After completion of the work, site office shall be dismantled by the contractor and all the dismantled materials furniture fixtures shall be taken away at his cost. The price of this shall be deemed to have been covered in the tendered amount. The quoted rate by the EPC contractor is inclusive of these facilities.
6. The contractor shall provide clean and safe drinking water for the workers employed at site, his technical staffs and site staff of Department free of charge. .
7. The Sample collection room, sample store, Testing Laboratory complete in all respect within two months of award of work as per direction of Engineer in Charge and nothing extra shall be payable on this account.

**49. Third Party Quality Assurance (TPQA):**

**49.1 In order to achieve a high standard** of quality, it may be required to go for Third Party Quality Assurance. For this purpose, a separate agency may be appointed by the CPWD who will carry out independent testing of materials and checking and ensuring overall quality procedures. **The contractor shall be required to fully cooperate with agency and facilitate them in taking samples, transportation and examination of various activities including documentation at no extra time and cost.** In case of any adverse findings by the agency, the contractor shall do the needful rectifications at no extra time and cost. The Engineer-in- charge shall be at liberty for getting quality assurance work done through agencies like IITs/ NITs/ Govt. Engineering College or Institute of repute. The successful tenderer shall include the provisions of Quality Assurance while framing the proposed methodology for tests. The expenditure towards engaging TPQA team shall be borne by CPWD.

**49.2**All the arrangements required for sampling, transporting, and getting them tested including testing charges shall be borne by the Contractor for which nothing extra shall be payable. The Contractor shall extend full cooperation to Third Party Quality Assurance Agencies engaged by the department for the Project during their field visits for arranging the necessary quality assurance tests for materials and the construction works.

**49.3** The Agency shall allow access to Third Party Quality Assurance Agency (TPQA) engaged by Engineer-in charge to have a control on quality and methodology of execution. If required the Samples of materials including Cement Concrete Cubes shall be taken jointly by Agency and TPQA / Engineer-in-charge or his authorised representative. All arrangements for sampling and transporting them to

required lab shall be done by agency. The cost of all the mandatory testing (required as per CPWD specifications/(Refer PART-B Quality Assurance) /contract specifications/ BIS/ IRC /MORTH requirements, manuals and relevant IS codes, or specified elsewhere in tender document ) shall be borne by agency only.

**50. Accessible India Measures (Universal Accessibility):**

1. Planning, Designing and construction shall confirm to (i) the GRIHA/IGBC norms / IGBC (Compiled conditions are placed at “Conditions specific to Green Building practice” in the tender document). (ii) Barrier free built environment & accessible for Divyangjan norms. (shall comply with the provisions of “hand book on barrier free and accessibility”, “CPWD manual on Accessible Built environment 2019” – copy for free down load is available on [www.cpwd.gov.in](http://www.cpwd.gov.in) hence copy of the same is not included in the tender document but it forms part of tender) (iii) Hand book on Safety, health and environment – 2019 - copy for free down load is available on [www.cpwd.gov.in](http://www.cpwd.gov.in) hence copy of the same is not included in the tender document but it forms part of tender).
2. The agency shall construct the buildings considering the built environment accessibility and implement it in the buildings. All measures shall be taken to eliminate obstacles and barriers indoors and outdoors and workplaces. An accessible building is where persons with disabilities have no barrier in entering it and using all the facilities therein. This covers the built environment – services, steps and ramps, corridors, entry gates, emergency exits, lifts, parking, toilets in GF – as well as indoor and outdoor facilities including lighting, signage, alarm systems and public toilets.
3. The CPWD publication of “Handbook on Barrier free and accessibility”, “CPWD manual on accessible built environment 2019” (copy of free download is available on [www.cpwd.gov.in](http://www.cpwd.gov.in)) and MOUD guidelines published in 2016 “Harmonised Guidelines and Space Standards on Barrier Free Built Environment for persons with Disability and Elderly Persons” and requirements as per International Standard/ISO 21542 – 2011 could be referred to for compliance.
4. Contractors should follow norms of Barrier free built environment as per CPWD “Manual on Accessible Built Environment 2019” for persons with disability and elderly persons.

**51. GHAR RATING**

I. The Building is to be Constructed for GREEN PLUS rating under GHAR rating system of CPWD. In order to secure these ratings, a high degree of responsibility and cooperation is necessary from the contractors. All materials and systems used in the project are intended to maximize energy efficiency for operation of Project throughout service life (substantial completion to ultimate disposition – reuse, recycling, or demolition) with an emphasis on top quality. Materials and systems are to maximize environmentally-benign construction techniques, including construction waste recycle, reusable delivery packaging, and reusability of selected materials. All vendors / contractors must adhere to best practices related to Green Buildings.

II. Agency has to formulate the plan & obtain adequate points as per GREEN PLUS rating under GHAR rating system of CPWD attributed to site related activities. Shortfall in achieving GREEN PLUS rating under GHAR rating system of CPWD in other parameters shall also brought to the notice of Engineer-in-Charge for remedial actions. All GHAR related inputs related to work including half yearly environmental compliances/as per the GHAR requirement shall be provided by the Contractor.

**52. Approval of Samples, Materials, Patterns and Colours:-**

The Contractor shall, at his own cost and without any extra payment, arrange and submit **multiple samples of materials, patterns, colours, finishes, fittings, fixtures, and other items** as required by the Engineer-in-Charge/Competent Authority for inspection and approval before bulk procurement, manufacture, installation or execution of the respective items of work. The Contractor shall provide such number and variety of samples as may be considered necessary by the Engineer-in-Charge/Competent Authority and shall make all necessary modifications or resubmit alternative samples until the required sample is approved. **No separate payment shall be made for the cost of preparation, procurement, transportation, submission or display of such samples**, and all such costs shall be deemed to be included in his quoted rates. The contractor should quote his rate considering this factor.

Only the sample finally approved by the Engineer-in-Charge/Competent Authority shall be used for execution of the work. **All rejected samples shall remain the sole property of the Contractor**, who shall remove or dispose of the same at his own cost as directed by the Engineer-in-Charge. Such rejected samples **shall not be measured, accounted for, or paid for under any circumstances**, irrespective of their quantity, cost or value.

**53. Royalty:-**

- a) Payment of Royalty at the prevailing rates, if any, on the earth, boulders, metal, shingle, sand and bajri etc. or any other material collected by agency for the work shall be made direct to revenue authorities. The proof for deposition of royalty amount have to be submitted in the office of Engineer-in-charge. If the agency fails to submit such proof before every running account bill, then amount as per prevailing rate will be deducted from running account bill and will be deposited in the concerned office by the Engineer-in-charge.

54. Unless otherwise specified in the schedule of quantities or CPWD specifications, the rates for respective items shall be all inclusive and apply to the following: -

- a) All lifts & all heights, floors including terrace, ,leads, depthsand carriage.
- b) All labour, material, tools and plants and other inputs involved in the execution of the item.
- c) Any of the conditions and specifications mentioned in the tender documents.
- d) Pumping / bailing out surface water / rain water / sub soil water, if necessary for any reason.
- e) Providing sunk flooring in bath-rooms, kitchen, etc.
- f) Any legal or financial implications resulting out of disposal of earth, if any.
- g) All types of royalty included in the schedule rate.
- h) Performance test of the entire installation(s) before the work is finally accepted.
- i) Any cement slurry added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items.
- j) All incidental charges for cartage, storage and safe custody of materials brought to site.

**55. Defect liability period:-** The defect liability period shall be 12 months after the record of completion of main work by the competent authority. Also, the security deposit shall only be released after the mentioned defect liability period is over.

During this period, the defects noticed in the work shall be rectified by the contractor at his own cost. In case he fails to do so after intimation to him in writing by the Engineer-in charge, the same shall be carried out by the Department at his risk and cost. However, maintenance of other building activities such as cleaning, sweeping of pocket & desilting of sewer lines, Drain shall be done only once, at the time prior to handing over the building. Defects of serious nature causing inconvenience such as leakage, reverse floor slopes affecting the drainage (ponding of water), warping and opening of joints in doors and window shutters etc. shall be undertaken by the contractor immediately on receipt of the complaint but not exceeding one week time, failing which the defects will be got removed at his risk and cost. All other defects notified to the contractor during the DLP shall be rectified to the entire satisfaction of Engineer-in-Charge or item replaced as soon as possible but not later than one month in any case. Failure to do so in a reasonable period, the Engineer-in-Charge shall get it done at the contractor's cost after final notice of 07 days. The decision of Engineer-in-Charge regarding a defect being of serious nature or otherwise shall be final and binding.

**56. Following Recovery shall be made in case of non compliance of provision of the contract/tender documents:-**

- i) In case of delay in submission of monthly progress report, recovery per week will be made @ Rs.5000/- from the respective running account bills.
- ii) In case of delay in submission of revised programme charts, recovery per day for delay in submission of revised programme will be made @ Rs.20,000/- from the respective running account bills.
- iii) In case of delay in submission of BIM Model or any related documents beyond the specified time mentioned in the milestone chart recovery shall be made @ Rs.30000/- per months ( Maximum upto 6 Lakhs) from the RA bills.
- iv) Recovery of ₹50,000/- per month ( Maximum upto 9 Lakhs) **shall be made for each month of delay beyond the stipulated timeline, if the site office is not constructed within the period specified in the milestone table**
- v) In case the contractor fails to supply “as built drawing” aforesaid within 30 days of the date of completion, then the recovery @ Rs.25,000/- each for such set of drawings shall be made from the contractor’s final bill.
- vi) In the event of non-provision or absence of 01 No. Multitasking Staff at the site office, as stipulated above, a recovery of ₹20,000/- (Rupees Twenty Thousand only) per month shall be made from the Contractor’s running account bill for each month of such non-compliance.
- vii) In the event of non-provision or absence of 01 No. computer operator at the site office, as stipulated above, a recovery of ₹30,000/- (Rupees Thirty Thousand only) per month shall be made from the Contractor’s running account bill for each month of such non-compliance.
- viii) In the event of non-provision of 02 (Two) Nos. iOS laptops/tablets and 01 (One) No. printer, as stipulated above, within the specified period of 30 days from the date of commencement of the work, an amount of ₹2,00,000/- (Rupees Two Lakhs only) shall be withheld from the Contractor’s running account bills. The withheld amount shall be released upon satisfactory provision of the above-mentioned equipment at the site.
- ix) In the event of non-submission of the required laboratory test reports along with the running account bills, the necessary amount, as determined by the Engineer-in-Charge, shall be withheld from the respective bills. The withheld amount shall be released upon submission of the required laboratory test reports to the satisfaction of the Engineer-in-Charge.
- x) In the event of non-obtaining of the Green plus GHAR Rating certificate, recovery of Rs. 2,50,000.00 (Rs. Two Lakh Fifty Thousand) only shall be made from the final bill.

57) This office building is overall a B+G+5 building. However in this scope of work, construction upto (B+G+4) only has to be done, having provision for future expansion of small portion at 4<sup>th</sup> floor and one additional floor (5<sup>th</sup> floor).

### **SPECIAL CONDITIONS**

1. The contractor shall not store/dump construction material or debris on metalled road.
2. The contractor shall get prior approval from Engineer-in-charge for the area where the construction material or debris can be stored beyond the metalled road. This area shall not cause any obstruction to the free flow of traffic/inconvenience to the pedestrian. It should be ensured by the contractor that no accidents occur on account of such permissible storage.
3. The contractor shall take appropriate protection measure like raising wind breakers of appropriate height on all sides of the plot/area using CGI sheets or plastic and/or other similar material to ensure that no construction material dust fly outside the plot area.
4. The contractor shall ensure that all the truck or vehicle of any kind which are used for construction purpose/or are carrying construction material like cement, sand and other allied material are fully covered. The contractor shall take every necessary precaution that each vehicle is properly cleaned and dust free to ensure to exit for their destination and also it is to be ensured that no dust, sand or any other particles are released in air to pollute.
5. The Contractor shall provide mask to every worker on the construction site and hand gloves specially who are involved in loading, unloading and carriage of construction material and construction debris to prevent inhalation of dust particles and injury respectively.
6. The contractor shall provide all medical help, investigation and treatment to the workers involved in the construction of building.
7. The contractor shall ensure that C&D waste is transported to the C&D waste site only and due record shall be maintained by the contractor.
8. The contractor shall compulsorily use of wet jet in grinding and stone cutting.
9. The contractor shall comply all the preventive and protective environmental steps as stated in the MoEF guidelines, 2010.
10. The contractor shall carry out on-Road-inspection for black smoke generating machinery. The contractor shall use cleaner fuel.
11. The contractor shall ensure that all DG sets comply emission norms notified by MoEF.
12. The Contractor shall use vehicles having up to date pollution control certificate.
13. The Contractor shall ensure that the construction material is covered by tarpaulin. The contractor shall take all other precaution to ensure that no dust particles are permitted to pollute air quality as a result of such storage.
14. Unless otherwise specified in the schedule of quantities, the rates for respective items shall be all inclusive and apply to the following: -
  - a) All lifts & all heights, floors including terrace, leads and depths.
  - b) All labour, material, tools and plants and other inputs involved in the execution of the item.
  - c) Any of the conditions and specifications mentioned in the tender documents.
  - d) Pumping / bailing out surface water / rain water / sub soil water, if necessary for any reason.
  - e) Providing sunk flooring in bath-rooms, kitchen, etc.
  - f) Any legal or financial implications resulting out of disposal of earth, if any.

- g) Payment of Royalty at the prevailing rates, if any, on the earth, boulders, metal, shingle, sand and bajri etc. or any other material collected by him for the work shall be made direct to revenue authorities. The proof for deposition of royalty amount has to be submitted in the office of Engineer-in-Charge. If the agency fails to submit such proof before every running account bill, then amount as per prevailing rate will be deducted from running account bill and will be deposited in the concerned office by the Engineer-in-charge.
  - h) Performance test of the entire installation(s) before the work is finally accepted.
  - i) Any cement slurry added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items.
  - j) All incidental charges for cartage, storage and safe custody of materials brought to site.
15. The agency has to fill the gap with silicon sealant in between the plaster surface and aluminium / MS steel /uPVC windows / Door frame without any extra cost.
  16. Agency has to make suitable approach for carrying the material / labour etc. required for construction without any additional cost.
  17. The work is to be executed in NABARD, Ranchi, Jharkhand; the necessary safety measures may be adopted for movement of vehicles and storage of materials.
  18. **The intense and prolonged rains are common feature in area. No extension of time shall be allowed on this ground. However, in case of unprecedented rain, the hindrance may be recorded on the prior approval of NIT approving authority.**
  19. There is scarcity of sand in the area. Also, the sand supply is hampered due to mining ban by NGT or other reasons of rain etc. The contractor should plan the procurement efficiently to continue the work without interruptions. In addition, sufficient quantity of stone chips / bricks may also be procured. No extension of time shall be entertained on this ground. **However, in case of prolonged continuous ban, the hindrance may be recorded on the prior approval of NIT approving authority.**
  20. The space for installation of batch mix plant shall be provided based on the availability of space in the campus. Deptt. is not bound to provide the same as per agency choice.
  21. The quoted rates are inclusive of core cutting and nothing extra shall be claimed on this account.
  22. The quoted rates are inclusive of disposing the mullaba/rubbish to the approved municipal ground and nothing extra shall be claimed on this account.
  23. Surplus unusable excavated earth after considering required quantity for backfilling, excavated rock as per site conditions to be disposed off at the suitable location as decided by the Engineer-in-charge. No extra payment will be made for the same.

**NOTE:**

1. No extra payment will be made to the Contractor for the operation of the above activity as mentioned at Sl. No. 1 to 23. The contractor shall quote his rate considering these factors.

#### **Maintenance of all Register at site –**

1. All the Registers including MAS,Cement,Steel, Site Order Book, Mandatory test, Paint, Road Roller, Inspection etc. shall be maintained by Contractor under his safe custody which shall be issued to the contractor by Engineer-in-Charge. Authenticated copies of bills / Invoice of materials which has to be entered in the MAS register are to be submitted by the contractor to CPWD before making payments.
2. Cement Register shall be reviewed by EE at least once in a month.
3. It will be deemed that work so measured, checked and paid is of the required quality and standard, both in respect of ingredients as well as the intended functions it is supposed to perform. In other words, the work would not only meet the required specifications but also the workmanship as per sound engineering practices.
4. The CE shall also have to check and sign these reports at suitable intervals in token of his ensuring compliance of the 'Quality Assurance Plan' for the work.
5. Copies of bills / Invoice: Agency will provide authenticated copies of itemize bills of materials which has to be entered in the MAS Register viz steel, cement, bitumen, paint, water proofing or any other item suggested by the Engineer-in-Charge.

### **ADDITIONAL SPECIFICATION**

1. The work shall be executed and measured as per metric dimensions given in the Schedule of quantities, drawings etc. (F.P.S. units wherever indicated are for guidance only).
2. The following modifications to the above specifications and some additional specifications shall however apply:
  - i) All stone aggregates shall be of hard stone variety to be obtained from approved quarries or from any other quarries where the material meeting to required quality and specification is available after approval from the Engineer-in-charge.
  - ii) Sand to be used for cement concrete work, mortar for masonry and plaster work shall be of standard quality. Sand shall be obtained from approved location or from any other place where the material meeting to required quality and specification is available after approval from the Engineer-in-charge.
  - iii) Brick of class designation 7.5 shall be obtained from any kiln where the material meeting to required quality and specification is available after approval from the Engineer-in-charge.
  - iv) Fly ash bricks of required designation and strength shall be used in the work. Bricks shall be obtained from approved manufacturer only. The material should meet to required specifications.

**(v) Check list for seeking approval of Source /Product/Agency**

**Name of Material/ Product/ Source- .....**

Name of Work :

Name of Contractor :

| Sl. No | Particulars                                                                                                         | Description / details | Sign. Of Contractor | Sign. Of JE/ AE/EE | Remarks |
|--------|---------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|--------------------|---------|
| 1      | Name and address of the manufacturer/ supplier                                                                      |                       |                     |                    |         |
| 2      | Whether the supplier/manufacturer included in the preferred make list ?                                             |                       |                     |                    |         |
| 3      | Whether the material satisfies the test requirements specified in the BOQ item?                                     |                       |                     |                    |         |
| 4      | Whether the supplier can supply the material in desired quantity/ lot size as per the site schedule?                |                       |                     |                    |         |
| 5      | Whether the manufacturer has given the method statement for its application? (attach a copy of the method statement |                       |                     |                    |         |

3. Wherever any reference to any Indian Standard Specification occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued thereto or revisions thereof, if any, up to the last date of submission of bid.
4. Unless otherwise specified in the schedule of quantities, the rates for all items of the work shall be considered as inclusive of pumping out or bailing out water if required for which no extra payment will be made. This will include water encountered from any source, such as rains, floods, and sub-soil water table being high due to any other cause whatsoever.

## 5. RCC Work & DESIGN MIX CEMENT CONCRETE

The contractor shall be required to submit two separate design mix of concrete with and without using plasticizers, separately. The decision of the engineer-in-charge to specify the design mix of concrete based on above shall be final.

- 5.1 Coarse aggregate: As per CPWD Specifications
- 5.2 Fine Aggregate: As per CPWD Specifications.
- 5.3 Water: It shall conform to requirements laid down in IS:456: 2000 and CPWD specifications.
- 5.4 Cement: Cement arranged by the contractor will be PPC (in bags) conforming to IS:1489-Part-I. If for any reasons, cement other than that specified in this para for example OPC of grade 43 or higher grade is brought to site by contractor, the issue, payments rate as well as the quantity to be used in the design mix concrete will remain unchanged.
- 5.5 Slump: Design slump should be clearly specified in the mix design.
- 5.6 Admixtures shall not be used without approval of Engineer-in-charge. Wherever required, admixtures of approved quality shall be mixed with concrete as specified. The admixtures shall conform to IS: 9103. The contractor shall not be paid anything extra for admixture required for achieving desired workability without any change in specified water cement ratio for RCC/CC work.
- 5.7 Grade of Concrete : The compressive strength of various grades of concrete shall to be given as below:

|     | Grade designation | Compressive strength on 15 cm cubes min. 7 days (N/mm <sup>2</sup> ) | Specified characteristic compressive strength at 28 days (N/mm <sup>2</sup> ) | Minimum cement quantity (Kg. per cum. Mtr.) | Maximum water cement ratio |
|-----|-------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------|----------------------------|
| I   | M 25              | As per design                                                        | 25                                                                            | As per CPWD specification/<br>BIS Code      | 0.50                       |
| II  | M 30              | As per design                                                        | 30                                                                            |                                             | 0.45                       |
| III | M 35              | As per design                                                        | 35                                                                            |                                             | 0.45                       |
| IV  | M 40              | As per design                                                        | 40                                                                            |                                             | 0.40                       |

### Note-

- (i) In the designation of a concrete mix letter M refers to the mix and number to the specified characteristic compressive strength of 15 cm x 15 cm x 15 cm – cube 28days compressive strength expressed in N/mm<sup>2</sup>
- (ii) The minimum/maximum cement content for design mix concrete shall be maintained as per the quantity mentioned above. In case where the quantity of cement required is higher than the minimum specified above to achieve desired strength based on an approved mix design extra shall become payable to the contractor.

- (iii) Design slump has to be constantly monitored and maintained during placing of concrete through slump tests carried out as per CPWD specification 2019 Vol. 1 for Mortar, Concrete and RCC works, and records maintained accordingly.

5.8 The concrete mix design/laboratory tests with and without admixture shall be got done by contractor at his own cost and will be carried out by the contractor through one of the following laboratory/Test houses:

- (i) NIT Jamshedpur
- (ii) IIT Dhanbad & Patna
- (iii) BIT, Sindri
- (iv) Any NABL Accredited LAB approved by ADG (Patna)
- (v) Govt. Engineering Institutions, in case of exigency, as directed by E-in-Charge.

Note :The various ingredients for mix design / laboratory tests shall be sent to the test houses through the Engineer-in-Charge and the samples of such aggregate & cement shall be preserved at site by the department.

5.9 The contractor shall submit the mix design report from any of above approved laboratory for approval of Engineer-in-Charge within 30 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the mix design is approved by the Engineer-in-charge. In case of white Portland cement and the likely use of admixtures in concrete with PPC/white Portland cement the contractor shall design and test the concrete mix by using trial mixes with white cement and/or admixtures also for which nothing extra shall be payable.

5.10 In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, a revised laboratory mix design report conducted at laboratory established at site shall be submitted by the contractor as per the direction of the Engineer-in-Charge.

Note: Extra Cement up to 10% of the minimum specified cement content in design mix shall be payable separately.

In case the cement content in design mix is more than 1.10 times of the specified minimum cement content, the contractor shall have discretion the either re-design the mix or bear the cost of extra cement.

**However, if admixture is not used in approved design mix, necessary recovery shall be affected as per agreement item.**

5.11 The contractor shall be free to use Ready Mix Concrete (RMC)/ Batch mix concrete. The contractor shall ensure that transit mixtures shall transport the concrete to site. All the precautions shall be taken during the transportation and handling of concrete to achieve the desired strength, durability, etc. as envisaged in the Mix Design. Contractor has to get the approval from Engineer-In-Charge regarding source of RMC by giving the details of such plants indicating name of owner / company, its location, technical establishment, past experience and text of Memorandum of Understanding (proposed to be entered between purchaser and supplier). The Engineer-in-Charge, after satisfying himself about quality / capability of the company shall give approval in writing (subject to drawing of MOU). The MOU shall be drawn with RMC plant owner / company and submitted to Engineer-in-Charge within a week of such approval. The contractor will not be allowed to purchase RMC without completion of above formalities for use in the project. Notwithstanding the approval granted by Engineer-in-Charge in aforesaid

manner, the contractor shall be fully responsible for quality of concrete including input control, production, transportation and placement etc. The Engineer-in-Charge will reserve the right to deploy his supervisor at plant site to inspect at any such stage and reject the material / concrete etc if he is not satisfied about quality of material / product.

## 6. Trial Batches

The designed mix proportion shall be checked for target mean compressive strength by means of trial batches.

The quantities of materials for each trial mix shall be sufficient for at least six specimens (cubes) and the concrete required for carrying out work ability tests.

The work ability of Trial Mix No. 1 shall be measured and mix shall be carefully observed for freedom from segregation, bleeding and its finishing characteristics. The water content, if required, shall be adjusted corresponding to the required changes in the work ability.

With the modified water content, the mix proportions shall be recalculated by keeping with water cement ratio unchanged. The mix proportions, as modified, shall form the Trial Mix No.2 and tested for the specified strength and work ability.

In addition, Trial Mix No. 3 and 4 shall be designed by keeping water contents same as that determined for trial mix 2 but varying the water cement ratio  $\pm 10$  percent of the specified value and tested for their design characteristics.

All cost of mix designing and testing connected therewith including charges payable to the laboratory shall be borne by the contractor including redesigning of the concrete mix wherever required and directed by Engineer-in-Charge.

## 7. APPROVAL OF DESIGN MIX:

The mix design for a specified grade of concrete shall be done for a target mean compressive strength  $T_{ck} = F_{ck} + 1.65 S$ . Where  $F_{ck}$  = Characteristic compressive strength of 28 days,  $S$  = Standard deviation which depends on degree of quality control. The degree of quality control for this work is "good" for which the standard deviation (s) obtained for different grades of concrete shall be as below:

| Grade of Concrete | For "Good" quality of control |
|-------------------|-------------------------------|
| M 25              | 4.00                          |
| M 30              | 5.00                          |
| M 35              | 5.00                          |
| M 40              | 5.00                          |

of the six specimen of each set three shall be tested at seven days and remaining three at 28 days. The preliminary tests at seven days are intended only to indicate the strength to be attained at 28 days.

- 7 (a) All cost of mix designing and testing connected therewith including charges payable to the laboratory shall be borne by the contractor.
- 7 (b) The batching plant shall conform to IS:4925. It shall have the facilities of presetting the quantity to be weighed with automatic cutoff when the same is achieved. Concreting at places may have to be resorted to through concrete pump for which nothing extra shall be paid.

7 (c) All other operations in concreting work like Mixing, Slump, Laying Placing of concrete, compaction curing etc. not mentioned in this particular specification for Design Mix of concrete shall be as per CPWD specification.

#### 7(d) WORK STRENGTH TEST

##### TEST SPECIMEN

Work strength test shall be conducted in accordance with IS: 456 on random sampling. Each test shall be conducted on six specimens, three of which shall be tested at 7 days and remaining three at 28 days.

#### 7 (e) TEST RESULTS OF SAMPLE

The test result of the sample shall be the average of the strength of three specimen. The individual variation shall not be more than 15 percent of the average. If more, the test results of the sample are invalid. 90% of the total test shall be done at the laboratory established at site by contractor and remaining 10% in the laboratory of CPWD or in any other laboratory as directed by the Engineer-in-Charge.

##### Lot size

The minimum frequency of sampling of concrete of each grade shall be according to the following:-

| Quantity of concrete in the work cubic metre per day | Number of samples.                                                       |
|------------------------------------------------------|--------------------------------------------------------------------------|
| 1-5                                                  | 1                                                                        |
| 6-15                                                 | 2                                                                        |
| 16-30                                                | 3                                                                        |
| 31-50                                                | 4                                                                        |
| 51 & above                                           | 4 + one additional sample for additional 50 cubic metre or part thereof. |

**Note: At least one sample shall be taken from each shift.**

#### 8. FREQUENCY OF TEST:

The minimum frequency of sampling of concrete of each grade shall be one sample for every 50 cum or part thereof. At least one sample shall be taken from each shift. 90% of the total tests shall be done at the laboratory established at site by the contractor and remaining 10% in any laboratory mentioned in Para 3.9 above.

#### 9. STANDARD OF ACCEPTANCE:

Acceptance criteria of design mix shall be in accordance with Para 5.8.3 of CPWD Specification 2019 Volume I.

10. For cast-in-situ (if required), the contractor has to arrange at site centering and shuttering as given in Proforma of Schedule before one month from stipulated date of start of work. Only M.S. centering / shuttering and scaffolding material unless & otherwise specified shall be used for all R.C.C. work to give an even finish of concrete surface. However, marine-ply shuttering as per site requirement may be used on specific request from contractor as approved by the Engineer-in-Charge. No extra payment shall be made on any of these grounds

11. In order to keep the floor finish as per architectural drawings and to provide required thickness of the flooring as per specifications, the level of top surface of R.C.C. shall be accordingly adjusted at the time of its centering, shuttering and casting for which nothing extra shall be paid to the Contractor.
12. As per general engineering practice, level of floors in toilet / bath, balconies, corridors shall be kept 12mm to 20mm lower than corridor/ adjacent rooms/ general floors and shuttering should be adjusted accordingly and slabs should be laid with slope towards the drainage point. Nothing extra is payable on this account.

### **13. FORM WORK**

- 13.1 The work shall be done in general as per CPWD Specifications.
- 13.2 Only M.S. centering / shuttering and scaffolding material unless & otherwise specified shall be used for all R.C.C. work to give an even finish of concrete surface. However, shutter-ply shuttering in exceptional cases as per site requirement may be used on specific request from contractor to be approved by the Engineer-in-Charge. Steel shuttering as approved by the Engineer-in-Charge shall be used by the contractor. Minimum size of shuttering plates shall be 600mm x 900mm except for the case when closing pieces required to complete the shuttering panels. Dented, broken, cracked, twisted or rusted shuttering plates shall not be allowed to be used on the work. The shuttering plates shall be cleaned properly with electrically driven sanders to remove any cement slurry or cement mortar or rust. Proper shuttering oil or de-bonding compound shall be applied on the surface of the shuttering plates in the requisite quantity before assembly of steel reinforcement.
- 13.3 For the execution of centering and shuttering, the contractor shall use propriety "Reebole" chemical mould release agent of FOSROC or equivalent as shuttering oil as approved by Engineer-in-charge and nothing extra shall be paid on this account.
- 13.4 Double steel scaffolding having two sets of vertical supports shall be provided for external wall finish, cladding etc. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding platform shall be fixed. Scaffolding shall have steel staircase for inspection of works at upper levels.
- 13.5 Nothing extra shall be paid for the centering and shuttering, circular in shape whenever the form work is having a mean radius exceeding 6m in plan.
- 13.6 In order to keep the floor finish as per architectural drawings and to provide required thickness of the flooring as per specifications, the level of top surface of R.C.C. shall be accordingly adjusted at the time of its centering, shuttering and casting for which nothing extra shall be paid to the Contractor.
- 13.7 As per general engineering practice, level of floors in toilet / bath, balconies, shall be kept 12 to 20mm lower than general floors as required. Shuttering should be adjusted accordingly. Nothing extra is payable on this account.
- 13.8 Concreting of upper floor shall not be done until concrete of lower floor has set at least for 14 days but form work and reinforcement can be taken up after the concrete has set at least for three days.

**14. STAINLESS STEEL CRAMPS**

The size & shape of the cramps shall be as per drawing and as per directions of Engineer-in-charge. The samples of steel cramps should be got approved in advance before starting the stone cladding work.

**15. FLOORING**

The rate of items of flooring is inclusive of Providing Sunken Flooring in Bathrooms, Kitchen, W.C., etc. and nothing extra on this account is admissible.

**16. WOOD WORK**

The samples of species of timber/PVC to be used shall be deposited by the contractor with the Executive Engineer before commencement of the work. The contractor shall produce cash vouchers and certificates from standard kiln seasoning plant operator about the timber section to be used on the work having been kiln seasoned by them, failing which it would not be so accepted as kiln seasoned.

16.1 Factory made shutters, as specified shall be obtained from factories to be approved by the Engineer-in-charge and shall conform to IS: 2202 (Part-I) 1991. The contractor shall inform well in advance to the Engineer-in-charge the names and address of the factory where from the contractor intends to get the shutters manufactured. The contractor will place order for manufacture of shutters only after written approval of the Engineer-in-charge in this regard is given. The contractor is bound to abide by the decision of the Engineer-in-charge and recommend a name of another factory from the approved list in case the factory already proposed by the contractor is not found competent to manufacture quality shutters. Shutters will, however, be accepted only if this meets the specified tests. The contractor will also arrange stage-wise inspection of the shutters at factory of the Engineer-in-charge or his authorized representative. Contractor will have no claim if the shutters brought at site are rejected by Engineer-in-charge in part or full lot due to bad workmanship/quality. Such shutters will not be measured and paid and the contractor shall remove the same from the site of work within 7 days after the written instructions in this regard are issued by Engineer-in-charge or his authorized representative.

**17. STEEL WORK**

All welded steel work shall be tested for quality of weld as laid down in IS: 822-1970 before actual erection.

**18. INTERNAL WATER SUPPLY AND SANITARY INSTALLATIONS**

Centrifugally cast (spun) iron S & S pipes and G.I./SS pipes wherever necessary shall be fixed to R.C.C. columns, beams etc. with rawl plugs and nothing extra shall be paid for this.

The contractor shall be responsible of the protection of the sanitary and water supply fittings and other fittings and fixtures against pilferage and breakage during the period of installation and thereafter until the building is handed over.

**19. VARIATION IN CONSUMPTION OF MATERIALS**

The variation in consumption of material shall be governed as per CPWD specifications and clauses of the contract to the extent applicable.

The contractor will have to work according to the programme work, decided by the Engineer-in-Charge. The contractor shall also construct a sample unit complete in all respects within time specified by the Engineer-in-Charge and this sample unit shall be got approved from the Engineer-in-Charge before mass construction is taken up. No extra claim whatsoever beyond the payments due at agreement rates will be entertained from the contractor on this account. The contractor shall take instructions from the Engineer-in-Charge for stacking of materials in any place.

No excavated earth or building materials shall be stacked on areas where other buildings, roads, services of compound wall are to be constructed.

If as per Municipal rules the huts for labour are not to be erected at the site of work by the contractors, the contractors are required to provide such accommodation as is acceptable to local bodies and nothing extra shall be paid on this account.

Grey cement bags shall be stacked/stored in separate godown to be constructed by contractor at his own cost as per (which is only indicative and actual size will depend on the site requirements) at page 23 of CPWD specification 2019 Vol. I with weather leak proof roofs and walls. Each godown shall be provided with single door with two locks. The keys of one lock shall remain with CPWD Engineer-in-Charge of work and that of the other lock with the authorized agent of the contractor at the site of work so that the cement is removed from the godown according to the daily requirement with the knowledge of both the parties and proper account maintained in standard proforma.

The contractor is responsible for the safe custody of the materials issued to him even if the materials are under double lock system.

The contractor shall construct suitable godowns, yard at the site of work for storing all other materials so as to be safe against damage by sun, rain, damages, fire, theft etc. at his own cost and also employ necessary watch and ward establishment for the purpose at his cost.

The standard sectional weights referred to as standard tables in Para 5.3.4 in specifications for works, 2019 Vol. I & II vide page 135 of Table-5.4 to be considered for conversion of length of various size of M.S. bars/cold twisted bars and Thermo Mechanically Treated Bars into weight are as under:[Note: These are as per clause 6.2 of IS:1786].

| <b><u>TABLE</u></b> |                    |                           |                    |
|---------------------|--------------------|---------------------------|--------------------|
| <b>Nominal Size</b> | <b>Weight KG/M</b> | <b>Size (Diameter MM)</b> | <b>Weight KG/M</b> |
| 6                   | 0.222              | 25                        | 3.85               |
| 8                   | 0.395              | 28                        | 4.83               |
| 10                  | 0.617              | 32                        | 6.31               |
| 12                  | 0.888              | 36                        | 7.99               |
| 16                  | 1.58               | 40                        | 9.86               |
| 20                  | 2.47               |                           |                    |

All materials obtained from contractor shall be got checked by the Junior Engineer-in-Charge of the works on receipt of the same at site before use.

Royalty at the prevalent rates shall have to be paid by the contractor on all the boulders, metals, shingle sand and bajri etc. collected by him for the execution of the work, direct to the Revenue authority or authorized agent of the State Government concerned or Central Government. In event of non submission of royaltychallan with bills the necessary deduction shall be made as per guideline issued from State Government.

For all kind of R.C.C. work PPC (Portland Pazzolana Cement) shall be allowed to be used.

## **21.0 TESTING OF MATERIAL**

Grey cement & Thermo-mechanically Treated Bar shall be arranged by the Contractor.

The Contractor shall produce all the materials in advance so that there is sufficient time for testing and approving of the material and clearance of the same before use in work.

## **22. INTEGRAL WATER PROOFING TREATMENT**

The contractor must associate himself with the specialized firm to be approved by the Engineer-in-Charge in writing, for integral cement based water proofing treatment for sunken floors and on roofs. A Ten (10) years Guarantee Bond in prescribed Performa as specified in this document must be given by the specialized firm on stamp paper which shall be countersigned by the contractor, in token of his overall responsibility. **In addition, 10% (ten percent) of the cost of these items would be retained as Guarantee Bond to watch the performance of the work done.** If any defect is noticed during the Guarantee period for Ten (10) years to be reckoned from the date after the maintenance period prescribed in the contract expires it should be rectified by the contractor within seven days and if not attended to, the same will be got done by another agency at the risk and cost of the contractor. However, this security deposit can be released in full, if Bank Guarantee i/c eBG of equivalent amount for Ten (10) years is produced and deposited with the department.

### **23. Road Work**

23.1 CEMENT CONCRETE PAVEMENT (UNDER ORDINARY CONDITIONS) Specifications of item 16.37 to be followed except that cement concrete of grade 1:2:4 or specified otherwise to be prepared and compacted.

#### **23.2 CEMENT CONCRETE PAVEMENT UNDER CONTROLLED CONDITIONS**

##### **23.2.1 Materials**

###### **23.2.1.1 Cement**

(a) Cement used on work shall be as per sub head cement concrete of CPWD specifications 2019 (Vol. – I).

23.2.1.2 Water : Water used on work shall conform to SH: cement concrete of CPWD, Specification 2019- Vol. I.

23.2.1.3 Coarse Aggregate : These shall be crushed or broken from hard stones obtained from approved quarry. These shall be clean strong, durable of fairly cubical shape and

free from soft, friable, thin elongated and laminated disintegrated pieces. These shall also be free from dirt, organic deleterious and any other foreign matter and adherent coatings and shall satisfy the physical requirements laid down in para 16.37.19 under quality control.

23.2.1.4 Fine Aggregate : This shall be coarse sand conforming to CPWD Specification 2019 Vol. I.

23.2.1.5 Grading of Mixed Aggregates : The grading of all aggregates (coarse and fine aggregates) to be used in the work shall be determined in the laboratory. The coarse and fine aggregates shall be mixed in suitable proportions so that the grading of the mixed aggregates shall be in the range indicated in Table 16.32.

**Table 16.32**

| I.S. Sieve Size (IS 460) | % age passing by weight |
|--------------------------|-------------------------|
| 45 mm                    | 100                     |
| 22.4 mm                  | 55 - 60                 |
| 11.2 mm                  | 45 - 50                 |
| 5.6 mm                   | 35 - 40                 |
| 2.8 mm                   | 30 - 35                 |
| 1.4 mm                   | 20 - 25                 |
| 710 microns              | 15 - 20                 |
| 355 microns              | 10 - 14                 |
| 180 microns              | 2 - 5                   |

**Mix Design for Road work :**

As per CPWD specification 2019 vol. II with upto date correction slip till completion of work.

## **24. EXPANSION JOINT SYSTEM**

### **24.1 FLOOR JOINT**

**24.1.1 General requirement of material:** The expansion joint system will be of extruded aluminum base members, self aligning /self centering arrangement and support plates etc. as per ASTM B221-02. The system shall be such that it provides floor to floor/ floor to wall expansion control system for various vertical locations in load application areas that accommodate multi directional seismic movement without stress to its components. The system shall consist of metal profiles with universal aluminum base member designed to accommodate various project conditions and finish floor treatments. The cover plate shall be designed of width and thickness required to satisfy projects movement and loading requirements and secured to base members by utilizing manufacturer's pre-engineered self centering arrangement that freely rotates/ moves in all directions. The self-centering arrangements shall exhibit circular sphere ends that lock and slide inside the corresponding aluminum extrusion cavity to allow freedom of movement and flexure in all directions including vertical displacement. Provision of moisture barrier membrane in the joint system to have water tight joint is mandatory requirement. The scope of work includes all labour,

materials, equipments and services and perform all operations required for complete installation of expansion joint system.

**24.1.2 Performance Requirement :** Material and works shall conform to the latest edition of reference specifications as specified in the item and to all applicable codes and requirement of local authorities having jurisdiction.

**24.1.3 Approval of expansion joint system :** Sample of expansion joint system along with manufacturers latest published literature for material specified herein, material test reports, shop drawings etc. shall be submitted for obtaining approval before material are delivered at the site. The expansion joint cover assembly should be from one source (from single manufacturer)

**24.1.4 Installation of expansion joint system:** In all cases the manufacturer's standard written instruction or specific instructions for installation shall be followed.

**24.1.5 Measurement :** The length of expansion joint shall be measured, correct to a cm.

**24.1.6 Rate :** The rate shall be inclusive of all material and labour involved in providing & fixing of expansion joint.

## **24.2 WALL JOINT**

**24.2.1 General requirement of material :** The expansion joint system related with wall joint (internal/ external) shall be of extruded aluminum base members, self aligning / centering arrangement and support plates as per ASTM B221-02. The material shall be such that it provides an Expansion joints systems suitable for vertical wall to wall/ wall to corner application, both new and existing construction in office buildings & complexes with no slipping down tendency amongst the components of the joint system. The Joint System shall utilize light weight aluminum profiles exhibiting minimal exposed aluminum surfaces mechanically snap locking the multicellular to facilitate movement. (Material shall confirm to ASTM 6063).

**24.2.2 Performance Requirement :** Material and works shall conform to the latest edition of reference specifications as specified in the item and to all applicable codes and requirement of local authorities having jurisdiction.

**24.2.3 Approval of expansion joint system :** Sample of expansion joint system along with manufacturers latest published literature for material specified herein, material test reports, shop drawings etc. shall be submitted for obtaining approval before material are delivered at the site. The expansion joint cover assembly should be from one source (from single manufacturer)

**24.2.4 Installation of expansion joint system :** In all cases the manufacturer's standard written instruction or specific instructions for installation shall be followed.

**24.2.5 Measurement :** The length of expansion joint shall be measured, correct to a cm.

**24.2.6 Rate :** The rate shall be inclusive of all material and labour involved in providing & fixing of expansion joint.

## **25.0 FIRE RESISTANT METAL/GLAZED DOORS**

### **25.1 GENERAL**

The Fire resistant Metal/Glazed Doors shall not collapse during the rated period of fire under the specified fire conditions and shall provide safe access to the escape route.

### **25.2 CODES & SPECIFICATIONS**

All materials, items, hardware etc. shall be subjected to approval by Engineer-In-Charge. Necessary documentation/ test certificates shall be furnished by the Contractor from the manufacturer before supply of material for approval by Engineer-in-charge. Each Door shall be provided with a small metal identification plate in suitable location indicating Fire rating, name of the Manufacturer, date of installation and details of approved test house. Each Metal/Glazing pane shall carry a permanent stamp of the manufacturer. The complete assembly of the doors i.e. frame, shutter, vision glass and hardware shall have fire rating as required and shall confirm to:

|    |           |                                                                                                                                                                                                                 |
|----|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | EN 1634-1 | Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for door and shutter assemblies and openable windows |
| 2. | EN 1364-1 | Fire resistance tests for non-load bearing elements - Part 1: Walls                                                                                                                                             |
| 3. | EN 410    | Determination of luminous and solar characteristics of glazing.                                                                                                                                                 |
| 4. | EN 12600  | Glass in Buildings - Pendulum test - Impact test and classification for flat glass                                                                                                                              |

### 25.3 TESTING AND CERTIFICATION:

The Fire resistant Metal/Glazed Doors shall be supplemented with appropriate certification by fire test lab, for applicable or higher dimension with complete description of the architectural components and hardware for Fire resistant Metal/Glazed Doors for which the approval is given. Along with the material tests, the complete system along with the framing shall be tested in accordance with the criteria of EN1634- 1 for door/window and EN1364-1 for partition. The installation of the fire rated system shall confirm to requirement of test evidence. The choice of hardware and/or glazed accessories shall be as per test evidence.

### 26 RESTROOM CUBICLE SYSTEM

Scope: - The scope of work shall include providing and fixing of cubicle partitions as per manufacturer's guide under the supervision of the Engineer-in-charge.

General: - Restroom Cubicle System shall be highly resistant against water, chemical and impact.

#### Materials

a. All accessories shall be made of powder-coated Aluminium grade 6063-T5. The doors, pilasters and intermediate partitions shall be 12 mm thick High Pressure Laminates (HPL) compact board (or phenolic board) with chamfered edges.

b. The HPL compact boards are manufactured from sheets of special kraft and decor papers, impregnated with thermosetting synthetic resins which are fused together under heat and high pressure. HPL compact boards are laminated on both sides with suede finish. Top surfaces shall be Melamine- coated which is scratch and impact resistant.

#### Doors

All doors shall be of single colour, 12 mm thick HPL compact board with chamfered edge. Each will be supported by 3 Nylon Hinges (4 for accessible restroom) affixed to the pilaster, completed with Nylon Coat Hook and Nylon Door Knob. Door stopper channel is provided at its vertical end and incorporated with Rubber Lining to dampen noise. Pilasters

All pilasters shall be of same colour as doors, 12 mm thick HPL compact board with chamfered edge, completed with Nylon thumb turn for locking doors. Colours different from the doors, if required, shall be provided as per the directions of the Engineer-in-charge. The pilaster is affixed to the Top Rail and secured from the top of the Top Rail. The floor clearance is 150 mm. all pilasters shall be supported by adjustable foot and non- corrosive steel inserts or as per approved by the Engineer-in charge. The base of the adjustable foot shall be anchored to the floor with a clearance height of 150mm. 390 Top Rail Heavy-duty Aluminium H-section Top Rail Channel, 70 mm x 125 mm x 5 mm (cross- section dimension, W x H x T), shall be anchored to the wall with Mild Steel Wall Bracket. Pilaster shall be section-fixed onto the bottom slot of the Top Rail for maximum strength, stability and alignment of the system. Intermediate Partitions All intermediate partitions shall be one continues panel without any joints and of same colour as door, 12 mm thick HPL compact board with Aluminium U channel, affixed at its ends (to the wall and pilaster) with edges chamfered. For ultimate stability of the system, the length of the intermediate panel shall not exceed 1800 mm. The intermediate panel shall be anchored to the wall with powder coated or anodized Aluminium U channel. Accessories I. II. III. IV. V. VI.

Each restroom cubicle will be equipped with the following accessories:

Nylon door knob/ nylon door knob

nylon privacy thumb turn thumb-turn with occupancy indicator.

Nylon coat hook Heat & bacteria resistant polyamide/nylon cover gravity hinges with 3 choices of standard, gravity -to-open or gravity-to-close.

Aluminum door stopper channel. Rubber door stopper lining.

Compartment Dimensions The compartment dimensions shall be as per site dimensions / detailed drawings. The contractor shall submit shop drawings for the approval of Engineer-in-charge prior to its execution at site. However, for guidance purpose, following are the representative dimensions subject to site conditions:- Width - 900 mm Door - 600 mm Depth - 1550 mm Height - 2105 mm (including 150 mm gap from bottom) Finishes HPL compact boards are available in a variety of brilliant colours and wood-grains. The contractor shall get the finishes approved before execution of work at site.

#### Installation

Installation shall be executed under the supervision of manufacturer's site supervisor(s) and shall be carried out in accordance with the manufacturer's installation instructions and in accordance with the instruction / approval of the Engineer-in-charge.

### **27. TEXTURE PAINT**

(Work to be carried out as per Manufacturer Specification)

Providing Providing and laying weather and Ultraviolet Resistant, Water Repellent, Dust, Dirt and Stain Resistant, Fungus and Algae Resistant natural none pigmented texture (95 to 98% natural crushed stone dust/powder and 2 to 5% other pigments) of approved make with final coat of texture with stone chips (attainable thickness: 0.70 to 0.90mm to offer grooved finish) applied with trowel over a coat of texture without chips (attainable thickness: 0.50 to 0.70mm to offer smooth surface as base coat) over a repair check with exterior grade putty over a coat of acrylic primer mixed with wall sealer in the ratio of 1:1 complete as approved by Engineer-in-charge.

Finally one coat of water base acrylic protection coat applied with roller and brush to make surface streak resistance.

Providing and applying External Texture finish of approved makes as per approved design and pattern. Texture finish shall be applied over the plastered surface with required thickness shall 2 to 2.5 mm thickness to form the necessary approved design by using trowel / putty blade and it should be allowed for drying minimum 12 hrs before the application of top painting , a coat of Latex Based Elastomeric, Fibre Reinforced waterproof coating, 2 coats or more of external weather proof water based emulsion shall be applied over this and a coat of primer may be applied based on the approved texture pattern including surface preparation like through cleaning, prewetting ~ 273 ~ AE/AEE EE Corrections/Omissions/Insertions – NIL & removal of loose mortars, etc. The quoted rate shall include the cost for all the above items including labours, tools & tackles, required scaffolding, platforms, etc. for all heights, all taxes, etc.

The contractor shall supply all materials, labour, tools, Ladders, scaffolding and other equipment necessary for the completion and protection of all texture work as herein specified shall be applied to all surfaces requiring texturing throughout the exterior of the building as given in the schedule of finishes or elsewhere. The texturing shall be carried out by a specialist sub-contractor, approved by the Engineer-in-charge. Care is to be taken that all surfaces to be textured are thoroughly cleaned and dry.

#### 1 Storage

Storage of materials to be used on the job shall be only in a single place approved by the Engineer-in-Charge. Such storage place, shall not be located within any of the buildings included in the contract. The paint shall be continuously stirred in the container so that its consistency is kept uniform throughout. The painted surfaces shall present uniform appearance and semi-gloss finish free from streaks, blisters etc.

#### 2 Application

For new work, the surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae, fungus or moth, grease and other foreign matter of brushing and washing, pitting in plaster shall make good, surface imperfections such as cracks, holes etc. should be repaired using white cement. The prepared surface shall have been got approved from the Engineer -in- charge after inspection, before painting is commenced.

Before pouring into smaller containers for use, the texture shall be stirred thoroughly in its container, when applying also the texture shall be continuously stirred in the smaller containers so that its consistency is kept uniform. Dilution ratio of texture with potable water can be altered taking into consideration the nature of surface climate and as per recommended dilution given by manufacturer. In all cases, the manufacturer's instructions and directions of the Engineer-in-charge shall be followed meticulously. The Lid

Soft textured tins shall be kept tightly closed when not in use as by exposure to atmosphere the texture may thicken and also be kept safe from dust.

#### 3 Additional Conditions for Painting Work:

Mechanical sanding machine (for scrubbing & preparation of surface) shall be used by the contractor.

In case of painting over old work / new work, the contractor shall give proper notice to the Engineer-in-charge after the surface is prepared & before applying of primer coat / paint. The Engineer-in-charge shall either approve the surface thus prepared or ask the contractor to rectify the defects pointed. Only after approval by Engineer-in-charge, the priming / painting coat shall be applied.

Primer coat shall be applied over cement based putty as per specifications of the paint manufacturers. If the component of primer is not included in the BOQ agreement item for painting, then payment for primer shall be made to the contractor separately.

## 28. FALSE CELINGS

### 28.1 Light Weight Calcium Silicate False Ceiling Tiles

15mm Tegular edged light weight calcium silicate false ceiling tiles

#### i. Material

15 mm thick tegular edged light weight calcium silicate false ceiling tiles with integral densified calcium silicate reinforced with fibre and natural filler false ceiling tiles of Size 595x595 mm of approved texture, design and patterns having NRC (Noise Reduction coefficient) of 0.50 (minimum) as per IS 8225:1987, Light reflectance of 85% (minimum). Non-combustible as per BS: 476 (part-4), fire performance as per BS:476 (part 6 &7), humidity resistance of 100%, thermal conductivity

#### ii.Frame

The frame work shall consist of G.I. 'T' Sections for Main runners 24x38x3000mm length, Cross runners of 24x32x1200mm & 24x32x600mm size, 0.33 mm thickness as specified in the item with galvanisation of 120 gsm (minimum) and perimeter wall angle of 0.40mm (minimum) thick gauge having equal flanges of size 24x24mm made from precoated G.I. Coil length of 3.0m fixed to the wall with the help of plastic rawl plugs at 450mm centre to centre with 40mm long dry wall SS screws. The frame work shall be executed in a manner so as to form a grid of 600x600mm as specified in the item.

#### iii Fixing of Ceiling Tiles

The frame work shall be suspended from ceiling by L shape level adjuster hangers made of G.I. Of size 85x25x25x2mm having die cut slit for sliding into main T section, also having precut hole so that 6mm fully threaded MS rod length upto 1000mm goes through it and pierces into M6 dash fasteners (Galvanising of 80 gsm minimum) of 6 mm dia 50mm long, fixed to the slab and then tightened with check nuts, subsequently the bottom of 6 mm rod will be tightened with check nuts for adjusting the line & level. The tile shall be laid on 24x32mm wide T section flanges colour white having rotary stitching on all T sections i.e. the main runner, 1200 mm & 600 mm cross Tees with a web height of 32 mm and load carrying capacity of 7.57Kgs/m<sup>2</sup>.

b. 40mm long dry wall SS screws. The frame work shall be executed in a manner so as to form a grid of 600x600mm as specified in the item. Fixing of Ceiling Tiles.

- i) Material 15mm thick integral densified micro edged light weight calcium silicate false ceiling tiles with integral densified calcium silicate reinforced with fibre and natural filler false ceiling tiles of Size 595x595 mm of approved texture, design and patterns having NRC (Noise Reduction coefficient) of 0.50 (minimum) as per IS 8225:1987, Light reflectance of 85% (minimum). Non combustible as per BS: 476 (part-4), fire performance as per BS:476 (part 6 &7), humidity resistance of 100%, thermal conductivity
- ii) Frame  
The frame work shall consist of G.I. ' T ' Sections of 25 micron hot dipped galvanised iron section of 0.40mm thick on Silhouette profile, rotary stitched double webbed white with 6mm reveal profile (white/black) compromising of Main runners 15x42x3000mm length, Cross runners of 15x42x1200mm & 15x42x600mm size to form grid module of size 600x600mm. Galvanised iron perimeter wall angle of size 22x19x0.4mm of length 3000mm to be fixed on periphery wall/partition with the help of plastic rawl plugs at 450mm C/C and 40mm long dry wall SS screws. The work shall be carried out as per specifications, drawing and as per direction of Engineer- in-Charge.
- iii) Fixing of Ceiling Tiles  
The frame work shall be suspended from ceiling by L shape level adjuster hangers made of G.I. Of size 85x25x25x2mm having die cut slit for sliding into main T section, also having precut hole so that 6mm fully threaded MS rod length upto 1000mm goes through it and pierces into M6 dash fasteners (Galvanising of 80 gsm minimum) of 6 mm dia 50mm long, fixed to the slab and then tightened with check nuts, subsequently the bottom of 6 mm rod will be tightened with check nuts for adjusting the line & level. The tile shall be laid on 15x42mm wide T section flanges colour white having rotary stitching on all T sections i.e. the main runner, 1200mm & 600mm cross Tees with a web height of 42 mm and load carrying capacity of 7.57Kgs/m2.

## **28.2 Gypsum Moisture Resistant Board False Ceiling**

WORKS GENERAL Design of grid layout shall be produced with co-ordinating suspension points in tandem with other service duct / cable tray layouts. The grid layout is to be superimposed on the ceiling service ducting / cabling layout and got approved from the Architects.

### **SUSPENSION SYSTEM & MATERIAL**

The false ceiling shall include providing and fixing USG Knauf / Saint Gobain Gyproc / Armstrong / Boral make Moisture Resistant Gypsum False Ceiling which includes galvanised ST-50™ fully knurled Perimeter Channel (0.50mm thick having one flange of 20mm and another flange of 30mm and a web of 28mm) screw fixed to brick wall/partition with the help of Nylon sleeves with steel screws at 600mm centres. Then suspending ST-50™ fully knurled Intermediate section (45mm x 0.90mm thick with two flanges of 15mm each) from the soffit at 1220mm centres with ST-50™ fully knurled Ceiling L Angle (25x10x0.50mm thick) fixed to RCC Slab/soffit with Soffit Cleat (27x25x37x1.6mm) and 8mm Dia 40mm long Approved anchor Fasteners @ 1200mm Centres respectively. ST-50™ fully knurled Ceiling profiles are rolled from GI sections of 120 GSM galvanizing as per IS 277 and 230 Mpa Yield Strength. Ceiling Section of 0.50mm thick having knurled web of 51mm and two flanges of 27mm each with lips of 10.5mm are then fixed to the Intermediate channel with the help of connecting clips (2.6 mm dia) and in direction perpendicular to the intermediate channel at 457mm centers.

12.5mm thick Moist Bloc gypsum plasterboards with water absorption < 5% as per BS1230 complies to BS476 Part 4,6&7, GreenPro certified by CII is screw fixed with 25mm long Drywall

screws at 230 mm centers. The screw fixing of gypsum boards to the metal framing at the periphery, openings and cut edges should be at 150mm centers. All the Moisture resistant Gypsum boards must be staggered. All joints to be taped & finished with Paper tape & redimix all purpose Joint Compound confirming to ASTM C475.

#### **FINISHING**

The boards are to be joined and finished so as to have a flush look which includes finishing the tapered and square edges of the board with joining compound, fibre tape and two coats of primer suitable for Gypboard (As per the recommendations / practice of India gypsum or equivalent) This includes providing the surface of false ceiling to be painted with approved quality of Plastic emulsion paint. The false ceiling surfaces shall be prepared to the satisfaction of the Architect, and shall be applied with two coats of primer, two coats of putty and touch up putty if required to achieve smooth finish. The surface shall be painted with two coats of Luxol silk emulsion paint of approved make to the satisfaction of Architects.

## MATERIALS ARRANGED BY THE CONTRACTOR

### A. CONDITIONS FOR CEMENT

1. In all contracts where departmental issue of cement and steel is not stipulated, special conditions shall be incorporated as below:

#### 1.1 Conditions for Cement (Grey Cement).

- i) The contractor shall procure 43 grade ordinary Portland cement conforming to IS 8112/Portland Pozzolana Cement (PPC) [conforming to IS:1489 (Part-I)], as required in the work, from reputed manufacturers of grey cement as mentioned in approved list of materials or from any other reputed cement Manufacturer having a production capacity not less than one million tones per annum as approved by **Chief Engineer/ Chief Project Manager for that zone**. Supply of cement shall be taken in 50 Kg. bags bearing manufacturer's name and ISI marking. Samples of cement arranged by the Contractor shall be taken by the Engineer-in-charge and got tested in accordance with provisions of relevant BIS codes. In case the test results indicate that the cement arranged by the contractor does not conform to the relevant BIS codes, the same shall stand rejected and shall be removed from the site by the Contractor at his own cost within a week's time of written order from the Engineer-in-charge to do so.
- ii) Use of Portland pozzolana/ordinary portland/ portland slag cement, admixtures in recommended proportions as per IS : 9103 shall be used in RCC structures in accordance with the circular issued by the Directorate General of Works vide No. महा. नि. /दि.द.अनु/ 20 दिनांक : 16.02.2021. The use of cement shall be regulated as per the following conditions stipulated in the circular dt. 09.04.2009:-
  - a) IS:456-2000 Code of Practice for Plain and Reinforced Concrete (as amended upto date) shall be followed in regard to Concrete Mix Portion and its production as under:
    - (i) The concrete mix design shall be done as "Design Mix Concrete" as prescribed in clause-9 of IS 456 mentioned above.
    - (ii) Concrete shall be manufactured in accordance with clause 10 of above mentioned IS:456 covering quality assurance measures both technical and organizational, which shall also necessarily require a qualified Concrete Technologist to be available during manufacture of concrete for certification of quality of concrete.
  - b) Minimum M25 grade of concrete shall be used in all structural elements made with RCC both in load bearing and framed structure.
  - c) The mechanical properties such as modulus of elasticity, tensile strength, creep and shrinkage of flyash mixed concrete or concrete using flyash blended cements (PPCs) are not likely to be significantly different and their values are to be taken same as those used for concrete made with OPC.

- d) To control higher rate of carbonation in early ages of concrete both in flyash admixed as well as PPC based concrete, water/binder ratio shall be kept as low as possible, which shall be closely monitored during concrete manufacture. If necessitated due to low water/binder ratio, required workability shall be achieved by use of chloride free chemical admixtures conforming to IS:9103. The compatibility of chemical admixtures and super plasticizers with each set OPC, fly ash and /or PPC received from different sources shall be ensured by trials.
  - e) In environment subjected to aggressive chloride or sulphate attack in particular, use of flyash admixed or PPC based concrete is recommended. In case, where structural concrete is exposed to excessive magnesium sulphate, flyash substitution/content shall be limited to 18% by weight. Special type of cement with low C3A content may also be alternatively used. Durability criteria like minimum binder content and maximum water/binder ratio also need to be given due consideration in such environment.
  - f) Wet curing period shall be enhanced to a minimum of 10 days or its equivalent. In hot & arid regions, the minimum curing period shall be 14 days or its equivalent.
  - g) Subject to General Guidelines detailed out as above, PPC manufactured conforming to IS:1489 (Part-I) shall be treated at par with OPC for manufacture of Design Mix Concrete for structural use in RCC.
  - h) Till the time, BIS makes it mandatory to print the %age of flyash on each bag of cement, the certificate from the PPC manufacturer indicating the same shall be insisted upon before allowing use of such cements in works.
  - i) While using PPC for structural concrete work, no further admixing of flyash shall be permitted.
- III. The cement shall be brought at site in bulk supply of approximately 50 tonnes or as decided by the Engineer- In- Charge. The cement godown of the capacity to store a minimum of 2000 bags of cement or as decided by NIT approving authority in case less than 100 MT cement is required for the work, shall be constructed by the contractor at site of work for which no extra payment shall be made. For small maintenance works, NIT approving authority shall decide the requirement of the storage/godown.
- IV. The contractor shall be responsible for the watch and ward and safety of the cement godown. The contractor shall facilitate the inspection of the cement godown by the Engineer-in-Charge at any time.

- V. The cement shall be got tested by the Engineer-In-Charge and shall be used on the work only after satisfactory test results have been received. The contractor shall supply free of charge the cement required for testing including its transportation cost to testing laboratories. The cost of tests of cement shall be borne by the contractor.
- VI. The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case the cement consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made after ensuring structural soundness and stability on the basis of testing. In case of excess consumption no adjustment need to made.
- VII. The cement brought to the site and the cement remaining unused after completion of the work shall not be removed from site without the written permission of the Engineer-in- charge.
- VIII. The damaged cement shall be removed from the site immediately by the contractor on receipt of a notice in writing from the Engineer-In-Charge. If he does not do so within 3 days of receipt of such notice, the Engineer-In-Charge shall get it removed at the cost of the contractor.

## **B. CONDITIONS FOR STEEL REINFORCEMENT**

1. The contractor shall procure ISI marked TMT Bars of Fe 500D grade from the steel manufacturer such as SAIL, TISCON, RINL, Jindal Steel & Power Ltd. and JSW Steel Ltd. Or their authorized dealer having valid BIS License for IS 1786-2008 (Amended – November 2012). If TMT bars of any dia of above mentioned make is not available in market at any time then the contractor on producing non availability certificate from the manufacturers may procure TMT bars of that dia from Steel manufacture as per the following guidelines:
2. The Special Director General of Project Region Kolkata of CPWD shall approve the steel manufactures subject to the guidelines for eligibility criteria and other technical parameters given below. For detailed guidelines & specifications vide OM no. CSQ/SE(TAS)/Steel/2024/262-H dated 14.08.2024 issued by Directorate, CPWD and vide OM no. CSQ/SE(TAS)/Steel/2025/86-H dated 09.04.2025 issued by Directorate, CPWD.

Credentials for eligibility criteria & other technical parameters for steel manufacturer :

The manufacturer should meet the following eligibility criteria:

- a) The Steel manufacture should have following documentary evidence:
  - i. Certificate of incorporation
  - ii. Memorandum of articles of Association
  - iii. Credit rating of the company from CARE/CRISIL/ICRA (the grading should not be C/D grade for minimum last 3 years)
- b) The Steel manufacturer must have following licenses and certificates:
  - i. ISI certificate for billets (IS 2830:2012)
  - ii. ISI certificate for TMT Bars (IS 1786:2008 (Amendment -1 November 2012))
- c) The Steel manufacturer should also preferably have the following licenses:
  - i. ISO 9001:2015
  - ii. ISO 14001:2015
  - iii. OHSAS 18001:2007
- d) The steel manufacturer should be using iron ore as the basic raw material. The entire gamut of iron and steel production is owned by the same company or its subsidiary company (ies) and the iron making capacity is sufficient matching the steel making capacity, adopting any of the refining technologies for manufacturing steel & TMT Bars as given under are eligible:
  - i. BF-BOF route
  - ii. COREX-BOF Route
  - iii. DRI-EAF Route (Each Electric Arc Furnace should be 100 MT or more)
- e) Billets produced must be ISI marked (IS 2830:2012)
- f) The TMT bars produced must be ISI marked (IS 1786:2008)
- g) The steel manufacturer should have the following in house testing facilities (NABL Accredited):
  - i. Computerized Universal Testing Machine
  - ii. Spectrometer
  - iii. Bend Re-bend facility as per IS : 1786:2008 (Amendment-1 November 2012)
  - iv. Raw material laboratory: Arrangement for testing Carbon, Sulphur & Phosphorous etc.
  - v. Other testing facilities as specified in IS : 1786:2008 & IS : 2830:2012

3. Steel can also be procured from any particular steel manufacturer who has been suo motto approved by the Special Director General of Project Region Kolkata, CPWD.
4. Samples shall also be taken and got tested by the Engineer-in-Charge as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications, the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time or written orders from the Engineer-in-Charge to do so.
5. The steel reinforcement bars shall be brought to the site in bulk supply of 10 tonnes or more, or as decided by the Engineer-in-Charge.
6. The steel reinforcement bars shall be stored by the contractor at site of work in such away as to prevent their distortion and corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.
7. For checking nominal mass, tensile strength, bend test & re-bend test etc. specimen of sufficient length shall be cut from each size of the bar at random at frequency not less than the specified below:

| <b>Size of bar</b>    | <b>For consignment below<br/>100 tones</b>    | <b>For consignment above<br/>100 tonnes</b>   |
|-----------------------|-----------------------------------------------|-----------------------------------------------|
| Under 10 mm dia bars  | One sample for each 25 tonnes or part thereof | One sample for each 40 tonnes or part thereof |
| 10mm to 16mm dia bars | One sample for each 35 tonnes or part thereof | One sample for each 45 tonnes or part thereof |
| Over 16mm dia bars    | One sample for each 45 tonnes or part thereof | One sample for each 50 tonnes or part thereof |

8. The contractor shall supply free of charge the required steel bars for testing including its transportation to testing laboratories. **The cost of tests shall be borne by the contractor.**
9. The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as per procedure prescribed in clause 38 of the contract and shall be governed by conditions laid therein. In case the consumption is less then theoretical consumption including permissible variations leading to under designing of the structure, the work shall be summarily rejected, otherwise recovery at rate so prescribed shall be made after ensuring structural soundness and stability. In case of excess consumption no adjustment need to be made.
10. Steel brought to site and remaining unused shall not be removed from site without the written permission of Engineer- in-Charge
11. The standard sectional weights referred to shall be as given in Table 5.4 in para 5.3.4 in CPWD Specification 2019 Vol.-I and will be considered for conversion of length of various sizes of TMT Bars in to standard weight. Record of actual sectional weights shall also be kept dia. And lot wise. The average sectional weight for each diameter shall be arrived at from samples from each lot of steel received at site. The decision of the Engineer-in-Charge shall be final for the procedure to be followed for determining the average sectional weight of each lot. Quantity of each diameter of steel received at site of work each day will constitute one single lot for the purpose.

The weight of steel by conversion of length of various sizes of bars based on the actual weighted average sectional weight shall be terms as Derived Actual Weight.

- a) If the derived weight is less than the standard weight, then the Derived Actual Weight shall be accepted if it is within the following tolerances specified in IS:1786-2008, otherwise whole lot will be rejected. However, deductions shall be made for the difference in derived actual weight and standard weight at the rate mentioned in clause 10CA for TMT-500D reinforcement bars. Tolerance on nominal mass shall be in accordance with Table 5.4A of CPWD Specification 2019.
- b) If the derived actual weight is found more than the standard weight, then nothing shall be paid extra for the difference in derived actual weight and standard weight.

**12.** The contractor shall submit original vouchers from the manufacturer for the total quantity of steel supplied under each consignment to be used in the work. All consignment received at the work site shall be inspected by the Site staff along with the relevant documents before acceptance. The contractor shall obtain Original Vouchers and Test Certificates and furnish the same to the Engineer-in-Charge in respect of all the lots of steel brought by him from approved supplier to the site of work. The original vouchers and test certificates shall be defaced by the Site staff and kept on record in the site office.

**13.** Guidelines for use of reinforcement bars in structures.

- 13.1 For reinforced cement concrete or pre-stressed concrete works, the reinforcement bars shall consist of the following grades conforming to IS 1786 : 2008 (Indian Standard specification for high strength deformed steel bars and wires for concrete reinforcement) : Fe 415, Fe 415D, Fe 415S, Fe 500D, Fe 500S and Fe 550D.
- 13.2 The contractor shall obtain manufacture's certificate stating the process of manufacture, chemical composition and test sheet giving result of each mechanical test applicable to the material purchased and submit it to the Engineer-in-Charge. Each test certificate shall indicate the number or identification mark to be found on the material.
- 13.3 The Engineer-in-Charge shall get each consignment tested for both chemical composition and physical properties (including bend and re-bend test) as specified in IS : 1786 from NABL accredited laboratory any Government laboratory.
- 13.4 Reinforcement bar is one of the most important building materials. Its quality directly affects the life span, resistance to earthquake and durability of the structure. In order to ensure consistent quality of rebars, the NIT approving authority may prescribe reputed bands like SAIL, RINL, Tata, JSW, JSPL in the list of preferred makes.
- 13.5 All testing charges of reinforcement (TMT) bars shall be borne by the contractor.

### **Requirement of GHAR Rating**

The building is proposed to be conforming to GHAR criterion under MNRE scheme. The contractor is required to execute the work in a befitting manner to confirm to the GHAR criterion.

#### **1 Special conditions for GHAR rating: -**

- a) The contractor shall prepare scheme for the approval of Engineer-in-charge for obtaining GHAR rating in the criteria relevant to the execution of work.
- b) The contractor shall plan and execute the work in a manner to preserve and protect the landscape during construction and shall arrange the materials/equipment and follow the procedure as per criteria of the GHAR rating as applicable.
- c) The contractor shall appoint/engage consultant/ consultancies to provide technical guidance and supervise the work for obtaining GHAR rating pertaining to the criterion related to the execution of work.
- d) The contractor shall preserve the top soil layer for supporting vegetative growth.
- e) The contractor shall comply with NBC norms on construction safety, health and sanitation as per criterion 8.
- f) The construction activity shall be done in a befitting manner and the contractor shall adopt measures to prevent air pollution at site in compliance with criterion 9 of GHAR rating as applicable.
- g) The contractor shall comply with all the instructions and schemes for execution of green building.
- h) Noting shall be paid extra for fulfillment of all these conditions except (d) of 44.1 for which joint measurements shall be taken at site and work done shall be paid on the basis of rates worked out on the terms of the agreement.

#### **2 Pre-construction Stage**

- a) Construction Vehicles, Equipment and Machinery
  - \* All vehicles, equipment and machinery to be procured for construction will conform to the relevant Bureau of India Standard (BIS) norms.
  - \* Emission from the vehicles must conform to environmental norms.
  - \* Dust produced from the vehicular movement and other site activities can be mitigated by sprinkling of water.
  - \* Noise limits for construction equipments will not exceed 75 dB (A), measured at one meter from the edge of the equipment in free area, as specified in the Environment Protection Act, 1986, schedule VI part E, as amended on 19<sup>th</sup> May, 1993. The maximum noise levels near the construction site should be limited to 65 dB (A) Leq (5 min) in project area.

#### **3 Construction Stage**

##### **a) Construction Wastes Disposal**

- \* The pre-identified dump locations will be a part of solid waste management plan to be prepared by the Contractor in consultation with Engineer-in-charge.
- \* Contractor will get approved the location of disposal site prior to commencement of the excavation on any section of the project location.
- \* Contractor will ensure that any spoils of material will not be disposed off in any municipality solid waste collection bins.

**b) Procurement of Construction Materials**

- \* All vehicles delivering construction materials to the site will be covered to avoid spillage of materials and maintain cleanliness of the roads.
- \* Wheel Types of all vehicles used by of the contractor, or any of his sub contractor or materials supplies will be cleaned and washed clear of all dust/mud before leaving the project premises.
- \* Contractor will arrange for regular water sprinkling at least twice a day (i.e. morning and evening) for dust suppression of the construction sites and unpaved roads used by his construction vehicles.

**c) Pollution**

**i) Water Pollution**

- \* The Contractor will take all precautionary measures to prevent the wastewater during construction to accumulate anywhere.
- \* The wastewater arising from the project is to be disposed off in the manner that is acceptable to the Engineer-in-charge.

**d) Air and Noise Pollution**

- \* Contractor will use dust screens and sprinkle water around the construction site to arrest spreading of dust in the air and surrounding areas.
- \* Contractor will ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that emission levels comply with environmental emission standards/norms.
- \* For controlling the noise from Vehicles, Plants and Equipments, the Contractor will confirm the following:
  - i) All vehicles and equipment used in construction will be fitted with exhaust silencers.
  - ii) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.
  - iii) Noise emission from compactors (rollers) front loaders, concrete mixers, cranes (movable), vibrators and saws should be less than 75 dB(A).

- iv) As per the standards/guidelines for control of Noise Pollution from Stationary Diesel Generator (DG) sets, noise emission in dB(A) from DG Set (15-500 KVA) should be less than  $94+10 \log_{10} (\text{KVA})$ . The standards also suggest construction of acoustic enclosure around the DG Set and provision of proper exhaust muffler with insertion loss of minimum 25 dB(A) as mandatory.

**e) Personal Safety Measures for Labour**

Contractor will provide the following items for safety of workers:

- \* Protective footwear and gloves to all workers employed for the work on mixing, cement, lime mortars, concrete etc. and openings in water pipeline/sewer line.
- \* Welder's protective eye-shields to workers who are engaged in welding works.

**4 The following provisions shall be maintained by the contractor at site:-**

- a) Provide minimum level of sanitation/safety facilities for construction workers to ensure the health and safety of the workers during construction, with effective provisions for the basic facilities such as sanitation, drinking water and safety equipments or machinery.
  - i) All the workers should be wearing helmet and shoes all the time on site.
  - ii) Masks and gloves should be worn whenever and wherever required.
  - iii) Adequate drinking water facility should be provided at site, adequate number of decentralized latrines and urinals to be provided for construction workers.
  - iv) Full time workers residing on site should be provided with clean and adequate temporary hutment. Crèche/Day-care facility should be provided to young children of labourers residing on site.
  - v) First aid facility should also be provided.
  - vi) Overhead lifting of heavy materials should be avoided. Barrow wheel and hand-lift boxes should be used to transport materials onsite.
  - vii) Tobacco and cigarette smoking should be prohibited onsite.
  - viii) All dangerous parts of machinery are well guarded and all precautions for working on machinery are taken.
  - ix) Maintain hoists and lifts, lifting machines, chains, ropes and other lifting tackles in good condition.
  - x) Use of durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
  - xi) Ensure that walking surfaces or boards at height are of sound construction and are provided with safety rails and belts. Provide protective equipments such as helmets.
  - xii) Provide measure to prevent fire. Fire extinguisher and buckets of sand to

- be provided in fire-prone area and elsewhere.
- xiii) Provide sufficient and suitable light for working during night.
  - xiv) Ensure that measures to protect workers from materials of construction, transportation, storage and other dangers and health hazards are taken.
  - xv) Ensure that the construction firm/division/company have sound safety policies.
  - xvi) Comply with the safety procedure, norms and guidelines (as applicable) as outlined in NBC 2005 (BIS 2005c).
  - xvii) Adopt additional best practices and prescribed norms as in NBC 2005 (BIS 2005).
- b) Identify roads on-site that would be used for vehicular traffic. Update vehicular roads (if these are unpaved) by increasing the surface strength by improving particle size, shape and mineral type that make up the surface base. Add surface gravel to reduce source of dust emission. Limit amount of fine particles (smaller than 0.075mm) to 10-20%. Limit vehicular speed on site 10km/h.
  - c) All material storages should be adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust/particulate emissions.
  - d) Spills of dirt or dusty materials will be cleaned up promptly so the spilled material does not become a source of fugitive dust and also to prevent of seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean-up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained/cleaned up immediately before they can infiltrate into the soil/ground or runoff in nearby areas.
  - e) Ensure that water spraying is carried out by wetting the surface by spraying water on:
    - i) Any dusty material.
    - ii) An area where demolition works is carried out.
    - iii) Any unpaved main-haul road and.
    - iv) Areas where excavation or earth moving activities is to be carried out.
  - f) The contractor shall ensure the following:
    - i) Cover and enclose the site by providing dust screen, sheeting or netting to scaffold along the perimeter of a building.
    - ii) Covering stockpiles of dusty material with impervious sheeting.
    - iii) Covering dusty load on vehicles by impervious sheeting before they leave the site.
    - iv) Transferring, handling/storing dry loose materials like bulk cement and dry pulverized fly ash inside a totally enclosed system.
    - v) Spills of dirt or dusty materials will be cleaned up promptly so that the spilled material does not become a source of fugitive dust and also to

prevent seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean-up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained/cleaned up immediately before they can infiltrate into the soil/ground or runoff in nearby areas.

- vi) Clear vegetation only from areas where work will start right away.
- vii) Vegetate/mulch areas where vehicles do not ply.
- viii) Apply gravel/landscaping rock to the areas where mulching/paving is impractical.
- g) Adopt measures to prevent air pollution in the vicinity of the site due to construction activities. There is no standard reference for this. The best practices should be followed (as adopted from international best practice documents and codes).
- h) Provide hoardings of not less than 3m heights along the site boundary, next to a road or other public area.
- i) The contractor will provide experienced personnel with suitable training to ensure that these methods are implemented. Prior to the commencement of any work, the method of working, plant equipment and air pollution control system to be used on-site should be made available for the inspection and approval of the Engineer-in-Charge to ensure that these are suitable for the project.
- j) Employ measures to segregate the waste on-site into inert, chemical or hazardous wastes. Recycle the unused chemical/hazardous wastes such as oil, paint, batteries and asbestos. The inert waste is to be disposed off to Municipal Corporation/local bodies dump yard and landfill sites.

## 5

### **Preserve and protect landscape during construction**

- a) Following provisions shall be made at site by the contractor to preserve and protect landscape. Nothing shall be paid on this account unless specifically provided for in the BOQ.

To preserve the existing landscape and protect it from degradation during the process of construction. Select proper timing for construction activity to minimize the disturbance such as soil pollution due to spilling of the construction material and its mixing with rainwater. The construction management plan including soil erosion control management plan shall be prepared accordingly for each month and got approved from the Engineer-in-Charge. The application of erosion control measures includes construction of gravel pits and tyre washing bays of approved size and specification for all vehicular site entry/ exits, protection of slopes greater than 10%. Sedimentation Collection System and run-off diversion systems shall be in place before the commencement of construction activity. Preserve and protect the existing vegetation by not disturbing or damaging to specified site areas

during construction. The trees that are identified to be retained on site are protected during the construction period using the following measures:

- i) The damage to roots is prevented during trenching, placing backfill, driving or parking heavy equipments. The dumping of trash, oil, paint and other material is detrimental to plant health. These activities should be restricted to the areas outside of the canopy of the trees.
  - ii) The trees are not used for support; their trunks should not be damaged by cutting and carving by nailing posters and advertisements or in any other way.
  - iii) The lighting of fires or carrying out heat or gas emitting construction activity within the ground covered by canopy of the trees is not permitted.
  - iv) The young trees of saplings identified for preservation within the construction site must be protected using tree guards of approved specification.
  - v) The grades of soil should be maintained around existing vegetation. Lowering or raising the levels around the vegetation should not be allowed unless specifically directed by the Architect/Engineer –in – Charge.
  - vi) Maintenance activities should be performed, as and when needed, to ensure that vegetation remain healthy.
- B) Staging is dividing a construction area into two or more sections to minimize the area of soil that will be exposed at any given time. Staging should be done to separate undisturbed land from land disturbed by construction activity and material storage. A CAD plan to be submitted indentifying the areas of sites, which shall be disturbed for the construction activity and apart from these other areas on site should not be disturbed. Measures should be followed for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels and perimeter dike/swale should be constructed to carry the pollutant-laden water directly to the treatment device or facility (municipal sewer line). The plan should indicate how the above was accomplished on site well in advance of the commencement of the construction activity.
- i) The Contractor should follow the construction plan as proposed by the architect/landscape consultant to minimize the site disturbance such as soil pollution due to spilling. Use staging and spill prevention and control plan to restrict the spilling of the contaminating material on site. Protect top soil from erosion by collection storage and reapplication of top soil, constructing sediment basin, contour trenching, mulching etc.
  - ii) Spill prevention and control plans should clearly state measures to stop the source of the spill. Measures to contain the spill and measures to

dispose the contaminated material and hazardous wastes. It should also state the designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners and petroleum products.

- c) A soil Erosion and Sedimentation Control Plan (ESCP) should be prepared prior to construction and should be applied effectively. Measures for prevention of top soil are given below:
  - i) Top Soil should be stripped to a depth of 20 cm from the areas proposed for buildings, roads, paved areas and external services. It should be stockpiled to a maximum height of 40 cm in designated areas and reapplied during plantation of the proposed vegetation. The top soil should be separated from the sub soil debris and stones larger than 50 mm in diameter. The stored top soil may be used as finished grade for planting areas post construction or cordoned off undisturbed areas on site. Stockpiled top soil should not be compacted to help process of aeration. It should be stabilized on the top by temporary seeding or plastic sheets to avoid wind and water erosion.
  - ii) Sedimentation basin, a temporary dam or basin at the lowest convenient point of the site should be constructed for collecting, trapping and storing sediment produced by the construction activities. A flow detention facility must also be constructed for reducing peak run-off rates. This would also allow most of the sediments to settle before the run-off is directed towards the outfall.
  - iii) Contour trenching is to be provided which an earth embankment or ridge-and-channel arrangement constructed parallel to the contours, along the face of the slope, at regular intervals on the lengths and slopes greater than 10% (1:10). They are used for reducing run-off velocity, increasing the distance of overland run-off flow. They are also used to hold moisture and minimize sediment loading of surface run-off.
- d) Prepare the list of trees to be felled with reference to the tree survey, Compensate the loss of vegetation (trees) due to the construction activity by compensatory plantation. Replant same native and/or non-invasive species, which existed on the site before elimination, in the proportion of 1:3 (as per the suggestion of the landscape consultant).
- e) The contractor shall prepare and submit 'Spill prevention and control plans' before the start of construction, clearly stating measures to stop the source of the spill, to contain the spill, to dispose the contaminated material and hazardous wastes, and stating designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners, and petroleum products.
- f) The contractor shall ensure that no construction leach (Ex: cement slurry) is

allowed to percolate into the ground. Adequate precautions are to be taken to safeguard against this including reduction of wasteful curing processes, collection, basic filtering and reuse. The contractor shall follow requisite measures for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant-laden water directly to the treatment device or facility (municipal sewer line).

- g) All lighting installed by the contractor around the site and at the labour quarters during construction shall be CFL bulbs of the appropriate illumination levels. This condition is a must, unless specifically prescribed.
- h) All paints, adhesives and sealants should comply with the VOC limits prescribed by GHAR, as follows:

**Table 1- VOC limits for paints, adhesives and sealants**

| <b>Paints</b>                   | <b>VOC limit (g/l)</b> |
|---------------------------------|------------------------|
| Non-flat paints                 | 150                    |
| Flat (Mat) paints               | 50                     |
| Anti-corrosive/anti-rust paints | 250                    |
| Varnish                         | 350                    |
| <b>Adhesives</b>                | <b>VOC limit (g/l)</b> |
| Wood flooring Adhesive          | 100                    |
| Tile adhesives                  | 65                     |
| Indoor carpet adhesives         | 50                     |
| Wood                            | 30                     |

- i) All the building materials and systems used on site must be as per the specifications and approved makes by the consultants.
- j) All required certificates explaining the properties of the building material/system needs to be obtained from the manufacturer/vendor as required by the green building rating authority.
  - i) The final certificates would be produced after the approval of green building consultant with necessary due diligence.
  - ii) The purchase orders of all the materials made with the manufacturers/authorized vendors should be maintained and shall be provided for the process with due diligence upon request.
- k) Water saving measures as suggested by the consultants need to be followed on site.
- l) Any other site management measures suggested by the green building consultant shall be followed on site.
- m) The contractor shall submit to the Engineer-in-Charge after construction of the buildings, a detailed as built quantification of the following:

- i) Total materials used,
  - ii) Total top soil stacked and total reused,
  - iii) Total earth excavated,
  - iv) Total waste generated,
  - v) Total waste reused,
  - vi) Total water used,
  - vii) Total electricity consumed, and
  - viii) Total diesel consumed.
- n) The contractor shall submit to the Engineer-in-Charge, before the start of on, a site plan along with a narrative to demarcate areas on site from soil has to be gathered, designate area where it will be stored, measures or top soil preservation and indicate areas where it will be reapplied after construction is complete.

### LIST OF APPROVED MAKES OF MATERIALS (Civil Work)

Specification/brands names of materials (Refer materials, whichever are applicable for the scope of work) and finishes approved by the **NIT approving authority** are listed below :-

| Sl. No. | Materials                                                          | Approved make                                                                                                               |
|---------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 1       | POLY-SULPHIDE SEALANT                                              | DR. FIXIT, FOSROC, BASF, DOW CORNING, TUFFSEAL, CHOKSEY, CICO, SIKA.                                                        |
| 2       | DAMP PROOF MATERIAL                                                | DR. FIXIT, FOSROC, BASF, IMPERMO, ULTRATECH, CICO, SIKA, BERGER.                                                            |
| 3       | STEEL                                                              |                                                                                                                             |
| (a)     | STRUCTURAL STEEL SECTIONS                                          | TATA, SAIL, RINL, JINDAL STEEL & POWER LTD., JSW STEEL LTD, APL APPOLO, TCI Tube Ltd.                                       |
| (b)     | REINFORCEMENT BAR                                                  | TATA, SAIL, RINL, JSW, JSPL.                                                                                                |
| (c)     | MS STEEL GRILL/ WINDOW/ DOOR FRAME/ TRUSS FABRICATOR               | STEELCO-RANCHI, MULTIWYN INDS CORPORATION – KOLKATA, WINDOORS – RANCHI, PERFECTSTEEL FABRICATION – NEW DELHI or equivalent. |
| 4       | CEMENT (PPC)                                                       | ULTRATECH, ACC, DALMIA, JINDAL PANTHER, JAYPEE, NOVOCO, GRASIM, AMBUJA.                                                     |
| 5       | ADMIXTURE                                                          | FOSROC, SIKKA, DR. FIXIT, BASF, CICO, BERGER.                                                                               |
| 6       | WHITE CEMENT                                                       | J.K. WHITE, BIRLA WHITE.                                                                                                    |
| 7       | WATER PROOFING COMPOUND                                            | DR. FIXIT, FOSROC, SIKA, TAPECRETE, CICO, REYNOARCH, ACCOPROOF, ULTRATECH, BERGER.                                          |
| 8       | BITUMEN                                                            | INDIAN OIL, HINDUSTAN PETROLEUM, BHARAT PETROLEUM.                                                                          |
| 9       | INJECTION GROUTING                                                 | DR. FIXIT, FOSROC, BASF, ULTRATECH, CICO.                                                                                   |
| 10      | LOCKS/LATCH, MORTISE LOCK                                          | GODREJ, HARRISON, DORSET, LINK, HETTICH, DORMA.                                                                             |
| 11      | LAMINATES                                                          | GREEN, CENTURY, MERINO, AIROLAM, DORBY ROYAL TOUCH, STYLAM                                                                  |
| 12      | SS WIRE MESH                                                       | STERLING ENTERPRISES, TRIMURTY WELDED, SPC (SELECTED PRODUCT Co.) or equivalent                                             |
| 13      | PRELAMINATED PARTICLE BOARD                                        | NOVOPAN, KITLAM, ARCHID PLY, ACTION TESA                                                                                    |
| 14      | ADHESIVE                                                           | PIDILITE, DUNLOP, VAMORGANIC, REYNOARCH, FOSROC, SIKA, NEWCRETE, JK TYLO, ULTRATECH, CICO, BASF.                            |
| 15      | EPOXY MORTAR                                                       | FOSROC, SIKA, DR. FIXIT, ULTRATECH, CICO.                                                                                   |
| 16      | DASH FASTENER                                                      | HILTI, FISHER, BOSCH, CANON.                                                                                                |
| 17      | FLUSH DOOR SHUTTERS (DECORATIVE/NON DECORATIVE).                   | CENTURY, GREENPLY, AIROLAM, GREEN PANEL.                                                                                    |
| 18      | BOARD & PLYWOOD                                                    | CENTURY, GREENPLY, AIROLAM, GREEN PANEL                                                                                     |
| 19      | HYDRAULIC DOOR CLOSER/ FLOOR                                       | HARDWYN, GODREJ, DORMA, HEFFLE, KICH, HETTICK.                                                                              |
| 20      | WOODEN DOOR FITTINGS OF BRUSHED STEEL                              | GODREJ, DORMA, HEFFLE, KICH, HETTICK, DORSET                                                                                |
| 21      | FIRE CHECK DOOR/ FIRE PROOF DOOR (Glass)                           | NAVAIR, SAINT GOBIN, TATA PRAVESH, JC FIRE DOOR, SHAKTI HORMANN, BHAWANI FIRE                                               |
|         | FIRE CHECK DOOR/ FIRE PROOF DOOR/ FIRE SHAFT DOOR(Metal)           | NAVAIR, SAINT GOBIN, TATA PRAVESH, JC FIRE DOOR, SHAKTI HORMANN, BHAWANI FIRE                                               |
| 22      | FIRE CHECK ACCESSORIES CALCIUM/ SMOKE SEAL STRIP/ DOOR CLOSER LOCK | DORSET, DORMA, GEZE, GODREJ, JC FIRE DOOR, BHAWANI FIRE, HAFFLE.                                                            |
| 23      | PREMIUM ACRYLIC INTERIOR PAINT WITH LOW VOC                        | ASIAN (ROYALE SHYNE), BERGER (LUXOL SILK GLAMOUR), NEROLAC (IMPRESSION 24                                                   |

| Sl. No. | Materials                                  | Approved make                                                                                               |
|---------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|         |                                            | CARAT), DULUX (VT PEARL GLOW)                                                                               |
| 24      | CEMENT PRIMER WITH LOW VOC                 | ASIAN, BERGER, NEROLAC, ICI-DULUX                                                                           |
| 25      | ANODISED ALUMINIUM HARDWARE (HEAVY DUTY)   | HARDIMA, EVERITE, SIGMA (ISI MARKED), CLASSIC.                                                              |
| 26      | HARDWARE FITTINGS                          | GODREJ, HAFFLE, HETTICH, KICH, DORMA, DORSET                                                                |
| 27      | TOUGHENED GLASS                            | MODI GUARD, SAINT GOBAIN, ASAHI, GOLD PLUS                                                                  |
| 28      | ALUMINIUM SECTIONS                         | HINDALCO, JINDAL.                                                                                           |
| 29      | FRICTION STAY HINGES                       | EARL-BIHARI, HETTICH, DORMA, HEFFLE.                                                                        |
| 30      | NUTS, BOLTS, DASH FASTNER AND S. S. SCREWS | HILTI, SUNDRAM FASTNER, TVS, OMNI, EXCEL                                                                    |
| 31      | EPDM GASKET                                | HANU, ANAND, NEOPRENE                                                                                       |
| 32      | STRUCTURAL SILICON, WEATHER SILICON        | DOW CORNING, WACKER, 3M, PIDILITE, ALSTONE, LOHMANN                                                         |
| 33      | ADHESIVE TAPE                              | NORTON, 3M, GYPROC.                                                                                         |
| 34      | GLAZED CERAMIC TILES                       | KAJARIYA, JOHNSON, SOMANY, RAK, VARMORA, ORIENT BELL, HOME SQUARE, OASIS, AGL.                              |
| 35      | CEMENT CONCRETE TILES/HARDONITE TILES      | NITCO, HINDUSTAN, PODDAR, ULTRA TILES, GAYATRI TILES, PARMESHWARI ENTERPRISES, HOME SQUARE, NTC.            |
| 36      | VITRIFIED TILES                            | KAJARIYA, JOHNSON, SOMANY, RAK, VARMORA, ORIENT BELL, HOME SQUARE, OASIS, AGL.                              |
| 37      | WALL PUTTY                                 | J.K. CEMENT LTD., BURGER, DR. FIXIT, ASIAN, BIRLA WHITE                                                     |
| 38      | TILE ADHESIVE                              | CICO, PIDILITE, FOSROCK, REYNOARCH, BAL ENDURA, LETECRETE, JK TYLO, ULTRATECH, NEWCRETE, BERGER.            |
| 39      | CHEQUERED TERRAZO TILES                    | NITCO, BHARAT, PODDAR, ULTRA TILES, GAYATRI TILES, SOMANY, PARMESHWARI ENTERPRISES, HOME SQUARE, HINDUSTAN. |
| 40      | CLAY TILES ON ROOF                         | KENJAI, JOHNSON, HINDUSTAN, GAYATRI TILES, PARMESHWARI ENTERPRISES, UNISOFT.                                |
| 41      | CC PAVERS                                  | ULTRA TILES, HINDUSTAN, GAYATRI TILES, PARMESHWARI ENTERPRISES, HOME SQUARE, SATI or equivalent.            |
| 42      | GRASS PAVER                                | UNISTONE, ULTRA, HINDUSTAN, GAYATRI TILES, PARMESHWARI ENTERPRISES, SATI or equivalent.                     |
| 43      | WATER-PROOF CEMENT PAINT                   | SNOWCEM, ASIAN, BERGER, NEROLAC, ICI-DULUX                                                                  |
| 44      | SYNTHETIC ENAMEL PAINT                     | BERGER (LUXOL), ASIAN (APCOLITE), ICI-DULUX (PROMISE)                                                       |
| 45      | PREMIUM ACRYLIC EXTERIOR EMULSION PAINT    | ASIAN (APEX ADVANCE), BERGER (WEATHER COAT SMOOTH), NEROLAC (EXCEL MICA MARBLE) ICI-DULUX (WEATHER SHIELD). |
| 46      | VITREOUS CHINA SANITARYWARE                | CERA, KOHLAR, JAQUAR, HINDWARE (Cat no. mentioned in item (BOQ) shall supersede this list).                 |
| 47      | FIRECLAY SINK & DRAIN BOARDS               | CERA, KOHLAR, JAQUAR, HINDWARE (Cat no. mentioned in item (BOQ) shall supersede this list).                 |
| 48      | STAINLESS STEEL SINKS                      | NIRALI, NILKANTH, SPC, M/s PRAYAG POLYMERS (P), Ltd.                                                        |
| 49      | C.P. BRASS FITTINGS                        | JAQUAR, KOHLAR, ROCA, Hindware Italian                                                                      |

| Sl. No. | Materials                                                       | Approved make                                                                                                                           |
|---------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
|         |                                                                 | Collection                                                                                                                              |
| 50      | SOIL, WASTE & VENT PIPES & FITTINGS (A) CENTRIFUGALLY CAST IRON | NECO, RIF, BIC, HEPCO, SKF, RPMF                                                                                                        |
| 51      | LA (CI) PIPES                                                   | NECO, RIF, BIC, HEPCO, SKF, RPMF                                                                                                        |
| 52      | G.I.PIPES / S.S. PIPES                                          | TATA, JINDAL (HISSAR), AQUINOX INDIA, J-PRESS                                                                                           |
| 53      | G.I.FITTINGS (MALLEABLE CAST IRON)/ S.S. PIPE FITTINGS          | UNIK, ZOLOTO, JINDAL (HISSAR), AQUINOX INDIA, J-PRESS.                                                                                  |
| 54      | GUNMETAL VALVES                                                 | LEADER, SANT, KARTAR, ZOLOTO.                                                                                                           |
| 55      | STONEWARE PIPE & GULLY TRAPS                                    | PERFECT, PARRY.                                                                                                                         |
| 56      | R.C.C. PIPES- ( NP-2/NP-3)                                      | LAKSHMI, SOOD & SOOD, JAIN & CO, HINDUSTAN.                                                                                             |
| 57      | MS PIPES                                                        | TATA, SAIL, JINDAL, APL APOLLO                                                                                                          |
| 58      | C.I. DOUBLE FLANGED SLUICE VALVES.                              | KIRLOSKAR, IVC, KARTAR, BURN                                                                                                            |
| 59      | C.I. DOUBLE FLANGED NON- RETURN VALVES                          | KIRLOSKAR, KARTAR, LEADER                                                                                                               |
| 60      | C.I. MANHOLES COVERS                                            | BIC, RIF, HEPCO, PARMESHWARI ENTERPRISES, SPC (SELECTED PRODUCTS Co.)                                                                   |
| 61      | Upvc/CPVC PIPE                                                  | SUPREME, PRINCE, FINOLEX, ASTRAL, ASHIRWAD, HINDWARE (TRUFLO), KOTHARI, KSR by Kisan irrigation, UTKARSH PIPES, PRYAG POLYMER PVT. LTD. |
| 62      | BALL VALVES                                                     | ZOLOTO, SANT, KARTAR, LEADER                                                                                                            |
| 63      | SPIDER FITTINGS                                                 | DORMA, HEFFLE, KICH, HETTICK, DORSET, GODREJ                                                                                            |
| 64      | MINERAL FIBRE FALSE CEILING                                     | ANUTONE, USG KNAUF, OCULUS, SAINT GOBAIN, HI-STEEL, ARMSTRONG                                                                           |
| 65      | LIGHT WEIGHT CALCIUM SILICATE FALSE CEILING                     | AEROLITE, HILUX, ANUTONE                                                                                                                |
| 66      | ALUMINIUM COMPOSITE PANEL                                       | ALUCOBOND, EUROBOND, ALUDECOR, REYNOARCH, REYNOBOND, ALSTONE, ALUTUFF                                                                   |
| 67      | COLOURED REFLECTIVE GLASS                                       | SAINT GOBAIN, ASAHI, MODI GUARD, GOLD PLUS                                                                                              |
| 68      | GLASS REINFORCED CONCRETE TILE/JALI                             | UNISTONE, ULTRA, GYPROC                                                                                                                 |
| 69      | uPVC WINDOW SECTION                                             | FENESTA, KOMMERLING, DUROPLAST, ENCRAFT, DIMEX, GBT, IKONISH, VEKA, PLASTONE, SCL CORA.                                                 |
| 70      | POLYCARBONATE SHEET                                             | GE PLASTICS INDIA LTD., LEXAN, PALRAM.                                                                                                  |
| 71      | STAINLESS STEEL 304 GRADE HARDWARE FITTINGS                     | KICH, INNOTEK, HAFFLE, HETTICH, DORSET, GODREJ, DORMA.                                                                                  |
| 72      | STAINLESS STEEL 202 GRADE HARDWARE FITTINGS                     | DORSET, GODREJ, CRUST, RAJBADRI, AKS, INNOTEK.                                                                                          |
| 73      | HUBLESS CENTRIFUGALLY PIPES & FITTINGS                          | NECO, RIF, BIC, HEPCO, SKF, RPMF                                                                                                        |
| 74      | SOLID PVC CUP BOARD, SOLID KITCHEN CABINET & SOLID PVC DOOR     | RAJ SHREE, ALSTONE, POLY LINE (POLY LINE EXTRUSION PVT. LTD).                                                                           |
| 75      | PVC DOORS & FRAMES                                              | POLY LINE (POLY LINE EXTRUSION PVT. LTD), RAJSHRI (RAJSHRI PLASTIWOOD), ALSTONE.                                                        |
| 76      | PTMT BATHROOM FITTINGS                                          | M/s PRAYAG POLYMERS PVT. LTD., POLYTUF (R.S INDUSTRIES), KINGSTON (PLASTOCRAFT SANITARY INDIA PVT. LTD)                                 |
| 77      | WPC BOARD, FRAMED AND DOOR SHUTTER                              | ALSTONE, RAJSHREE, CENTURY, GREEN.                                                                                                      |

| Sl. No. | Materials                                                        | Approved make                                                                                                                                                  |
|---------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 78      | PVC WATER TANK                                                   | ROTOSTORE, SINTEX, SUPREME, ASTRAL, UTKARSH, PRINCE, VOLGA, M/s PRYAG POLYMER PVT. LTD., HIMGIRI.                                                              |
| 79      | CEMENT PARTICAL BOARD                                            | BISON PANEL, SHERA, CENTURY, EVEREST                                                                                                                           |
| 80      | RMC – PLANTS                                                     | LAFARGE (NUVOCO), ULTRATECH, ACC, THIRTY M INFRA PVT. LTD., RMC INDIA.                                                                                         |
| 81      | GYPSUM BOARD/ GLASS REINFORCED GYPSUM FALSE CEILLING             | USG KNAUF, GYPROCK, WESTERN, HI-STEEL, SAINT GOBAIN, DIAMOND CEILING                                                                                           |
| 82      | METAL FALSE CEILLING                                             | USG KNAUF, HUNTERDOUGLAS, OCULUS, HI-STEEL, WESTERN, ARMSTRONG, DIAMOND CEILING                                                                                |
| 83      | ANTI TERMITE TREATMENT                                           | INTEGRATED MULTI SERVICES & SOLUTIONS PVT. LTD. (IMSS), RENTOKILL PEST CONTROL INDIA PVT. LTD. (PCI), ISS HIGH CARE PVT. LTD.                                  |
| 84      | ZINC COMPOSITE PANEL                                             | ALPOLIC, EUROBOND, VM ZINC, ALUDECOR, REYNOARCH, ALSTONE                                                                                                       |
| 85      | MS PIPES (SQUARE/ROUND)                                          | TATA, SAIL, JINDAL, APL APOLLO.                                                                                                                                |
| 86      | EXPANSION JOINT SYSTEM (ASTM 6063)                               | SCON, KANTAFLEX, Z-TECH, OCULUS, SILICA GLOBAL PD PROJECT, MNR ENGINEERING PRODUCTS.                                                                           |
| 87      | AAC BLOCK                                                        | ACC, ULTRATECH, EXCEL, FLEXI BUILD.                                                                                                                            |
| 88      | ADHESIVE FOR AAC BLOCK                                           | PIDILITE, FOSROC, SIKA, CICO, EXCEL, NEWCRETE, REYNOARCH, JK TYLO, ACC, ULTRATECH.                                                                             |
| 89      | SMC Panel Tank                                                   | SOVISY, SINTEX                                                                                                                                                 |
| 90      | EPOXY FLOORING                                                   | FOSROC, SIKA, REYNOARCH, FLOWCRETE, PIDILITE                                                                                                                   |
| 91      | SS RAILING GRADE 304                                             | JINDAL, KICH, DORMA, DORSET, OZONE                                                                                                                             |
| 92      | FLYASH BRICK                                                     | ACC, TISCON, JINDAL, HINDALCO, INLAND POWER, PARMESHWARI ENTERPRISES, HINDUTAN TILES                                                                           |
| 93      | SANDWICH PANEL                                                   | LLOYD, EPACK, KINGSPAN                                                                                                                                         |
| 94      | ROLLER BLINDS                                                    | D-DÉCOR, HUNTER DUGLUS, SEASONS                                                                                                                                |
| 95      | STP                                                              | ENVISOL / SINTEX / SEVARTH/ VENZA/ Max Tech/ Global Oxidane / Biotic/ Greentech Enviro consultant/ Ion Exchange                                                |
| 96      | SPC FLOORING                                                     | FLOOR MONK, WELSPUN, MADELEINE FLOOR, RESPONSIVE                                                                                                               |
| 97      | TOILET MODULAR CUBICALS                                          | MERINO BY BESCO, MATRIXCUBICLE SYSTEM, CENTURY, JAGUAR, GREENLAM STURDO                                                                                        |
| 98      | ALUMINUM STRUCTURAL MEMBERS – For GLAZING (Design and execution) | SCHUCO, RAYNERS, KAWNEER, SAINT GOBAIN                                                                                                                         |
| 99      | TEXTURED EXTERIOR PAINT                                          | BAKELITE HYLAM LTD, ICI (WEATHER SHIELD WITH HONEY COMB ROLLER FINISH, KANSAI, AKZONOBEL, ULTRATECH PAINTS, HERITAGE, LEXTURE, SPECTRUM, ULTRATECH, SKK SAMKEN |
| 100     | WOODEN WALL PANELING/ FALSE CEILING                              | GREENLAM / MERINO / STYLAM                                                                                                                                     |

Preference to PPP-M – II Policy (Make in India):

- (i) The Government has issued public procurement policy (Preference to Make in India) vide Ministry of Commerce and Industry Development of industrial policy and promotion (PPS) vide order No. P- 45021/2/2017-PP BE-II dated 28.05.2018, to —Encourage Make in India|| and to promote manufacturing and production of Goods and services in India with a view to enhancing income and employment. CPWD has decided to implement this policy.
- (ii) The agency shall submit list of makes of materials proposed to be used on the work from local suppliers (as defined in the above order dated 28.05.2018) along with minimum local content as specified below for approval of the department out of the approved makes kept in the tender.
- (iii) The department will be approving only makes of the materials having a minimum local content of 50% for use on this work, out of the preferred makes list.
- (iv) The minimum local content of 50% is considered for the complete item including labour component. The agency shall obtain the certificate for all items except for sundry items.

# **PART – C**

# **(Electrical**

# **Works)**

# PART – C

## PROFORMA OF SCHEDULES FOR Electrical WORK

### SCHEDULE 'A'

|                                         |                             |
|-----------------------------------------|-----------------------------|
| Schedule of quantities (as per PWD-3) : | Elect - Page No. 322 to 406 |
|-----------------------------------------|-----------------------------|

### SCHEDULE 'D'

Extra schedule for specific requirements/document for the work, if any: **As attached in tender documents.**

### SCHEDULE 'E'

|                                              |                                                                                                                                             |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Reference to General Conditions of contract. | Applicable GCC is GCC Construction Works - 2023, as modified and corrected up to previous day of the last date of submission of the tender. |
| Name of work                                 | <b>Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.</b>                                              |
| Estimated cost of work                       | <b>Rs. 43,32,58,671/-</b><br>(Civil : Rs. 32,84,66,818/-, Elect : Rs. 10,33,19,823/-) & Hort : Rs. 14,72,030/-)                             |
| (i) Earnest money                            | <b>Rs. 53,32,587/-</b>                                                                                                                      |
| (ii) Performance Guarantee (PG)              | AS PER SCHEDULE 'F' OF PART 'A'                                                                                                             |
| (iii) Security Deposit                       | AS PER SCHEDULE 'F' OF PART 'A'                                                                                                             |

### SCHEDULE 'F'

|                                                                                                                                                 |                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GENERAL RULES & DIRECTIONS:                                                                                                                     |                                                                                                                                                                        |
| Officer inviting tender:                                                                                                                        | AS PER SCHEDULE 'F' OF PART 'A'                                                                                                                                        |
| 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 (Refer Clause-12)                                                                                                                                            |
| Definitions:                                                                                                                                    |                                                                                                                                                                        |
| 2(v) Engineer-in-Charge for Electrical:                                                                                                         | EXECUTIVE ENGINEER (E) – RANCHI-I or his successor thereof                                                                                                             |
| 2(viii) Accepting Authority:                                                                                                                    | AS PER SCHEDULE 'F' OF PART 'A'                                                                                                                                        |
| 2(x) Percentage on cost of materials and labour to cover all overheads and profits :                                                            | 15%                                                                                                                                                                    |
| 2(xi) Standard Schedule of Rates                                                                                                                | <b>Electrical</b> : DSR - 2025 with up-to-date correction slips up to last date of submission of bids and Market Rates.                                                |
| 2(xii) Department                                                                                                                               | Central Public Works Department                                                                                                                                        |
| 9(ii) Standard CPWD contract Form GCC 2023, CPWD Form 7 as modified & corrected up to                                                           | Standard CPWD contract form <b>GCC Construction Works- 2023</b> , CPWD Form 7 as modified & corrected up to previous day of the last date of submission of the tender. |

Clause 1

|      |                                                                                                                                                                                                                                                            |                                 |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| (i)  | Time allowed for submission of Performance Guarantee, Programme Chart (Time and Progress) and applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board or Proof of applying thereof from the date of issue of letter of acceptance: | AS PER SCHEDULE 'F' OF PART 'A' |
| (ii) | Maximum allowable extension with late fee @ 0.1% per day of Performance Guarantee amount beyond the period provided in (i) above:                                                                                                                          | AS PER SCHEDULE 'F' OF PART 'A' |

Clause 2

|                                                    |                                 |
|----------------------------------------------------|---------------------------------|
| Authority for fixing compensation under clause 2 : | AS PER SCHEDULE 'F' OF PART 'A' |
|----------------------------------------------------|---------------------------------|

Clause 5

Authority to decide:

|       |                                                                                 |   |                                 |
|-------|---------------------------------------------------------------------------------|---|---------------------------------|
| (i)   | Authority to convey the decision of shifting of milestone and Extension of time | : | AS PER SCHEDULE 'F' OF PART 'A' |
| (ii)  | Authority to decide Rescheduling of mile stones and extension of time           | : | AS PER SCHEDULE 'F' OF PART 'A' |
| (iii) | Shifting of date of start in case of delay in handing over of site.             | : | AS PER SCHEDULE 'F' OF PART 'A' |

|                                                                                           |                      |
|-------------------------------------------------------------------------------------------|----------------------|
| Time allowed for execution of work                                                        | 18 (Eighteen) months |
| Number of days from the date of issue of letter of acceptance for reckoning date of start | 10 days              |

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

| Sl. No.                         | Description of Milestone (Physical) | Time allowed in days (from date of start) | Amount to be withheld in case of non achievement of milestone (Civil and/or electrical Tender Amount) |
|---------------------------------|-------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------|
| AS PER SCHEDULE 'F' OF PART 'A' |                                     |                                           |                                                                                                       |

**Schedule of handing over of site**

| Part   | Portion of site                              | description                            | Time period for handing over reckoned from date of issue of letter of intent. |
|--------|----------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------|
| Part A | Portion without any hindrance                | Full site is available with the Client | AS PER SCHEDULE 'F' OF PART 'A'                                               |
| Part B | Portions with encumbrances                   | NIL                                    |                                                                               |
| Part C | Portions dependent on work of other agencies | NIL                                    |                                                                               |

Clause 6

|                                                                                                           |                       |
|-----------------------------------------------------------------------------------------------------------|-----------------------|
| Computerized Measure Book (CMB) / Electronic Measurement Book (EMB)<br>(i) Mode of Measurement: CMB / EMB | Yes, eMB through ERP. |
|-----------------------------------------------------------------------------------------------------------|-----------------------|

### 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. 60.00 Lakh (Electrical) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|

### Clause 7A

|                                         |                                                                                                                                                                                                                                    |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Whether Clause 7A shall be applicable - | Yes,<br>No Running Account bill shall be paid for the work till the applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board whatever applicable are submitted by the contractor to the Engineer-in-Charge. |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Clause 8

|                                                                                                |                                 |
|------------------------------------------------------------------------------------------------|---------------------------------|
| I. Details of consultancy work/building/infrastructure project to be completed early for use : | AS PER SCHEDULE 'F' OF PART 'A' |
| II. Competent authorities to inspect and issue part / final completion plans                   | AS PER SCHEDULE 'F' OF PART 'A' |

### Clause 8A

|                                                                                             |                                 |
|---------------------------------------------------------------------------------------------|---------------------------------|
| Authority to decide compensation on account if contractor fails to submit completion plans. | AS PER SCHEDULE 'F' OF PART 'A' |
|---------------------------------------------------------------------------------------------|---------------------------------|

### Clause 10A

|                                                                                                                                                                                   |                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| List of testing equipment to be provided by the contractor at site lab<br>1. Earth Tester, 2. Test lamp, 3. Meggar, 4. Line Tester<br>5. Chese Cutting Machine, 6. Bending device | <b>All equipments required till handing over the works</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|

### Clause 10B(ii)

|                                              |                |
|----------------------------------------------|----------------|
| Whether Clause 10 B (ii) shall be applicable | Not applicable |
|----------------------------------------------|----------------|

### Clause 10C

|                                                           |                |
|-----------------------------------------------------------|----------------|
| Component of labour expressed as percent of value of work | Not Applicable |
|-----------------------------------------------------------|----------------|

|                                                                                                                                                                      |                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Clause 10CC                                                                                                                                                          | Applicable                      |
| (Applicable only for construction work)<br>Clause 10 CC to be applicable in contracts with stipulated period of completion exceeding the period shown in next column | AS PER SCHEDULE 'F' OF PART 'A' |
| Component of civil (Except materials covered under clause 10 CA/ Electrical construction materials expressed as percent of total value of work).                     |                                 |
| Component of Labor – expressed as percent of total value of work                                                                                                     |                                 |
| Component of POL expressed as percent of total value of work                                                                                                         |                                 |

# Clause 11

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specifications to be followed for execution of work | <b>CPWD GENERAL SPECIFICATIONS FOR ELECTRICAL WORKS PART-I (INTERNAL) 2023, PART-II (EXTERNAL) 2023,</b><br><b>CPWD General Specifications for Part-III-Lift &amp; Escalators - 2003</b><br><b>CPWD General Specifications for Part-IV Substation -2013,</b><br><b>CPWD General Specifications for Part-V Wet Riser &amp; Sprinkler Systems-2020,</b><br><b>CPWD General Specifications for Part-VI Fire Detection and Alarm System-2018,</b><br><b>CPWD General Specifications for Part-VII DG Sets-2013,</b><br><b>CPWD General Specifications for Heating, Ventilation &amp; Air-Conditioning (HVAC)-2024Amendments upto date AND AS PER ADDITIONAL SPECIFICATIONS, ACCEPTABLE MAKES OF MATERIALS ATTACHED WITH SCHEDULE OF WORK</b> |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|          |      |                                                                                                                                                        |                                 |
|----------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 12.2 (c) |      | Deviation Limit beyond which clauses 12.2 (c) shall apply for building work                                                                            | AS PER SCHEDULE 'F' OF PART 'A' |
| 12.4     | (i)  | Deviation Limit beyond which clauses 12.2 (c) shall apply for foundation work (except items mentioned in earth work sub-head in DSR and related items) |                                 |
|          | (ii) | Deviation Limit for items mentioned in earth work sub-head of DSR and related items.                                                                   |                                 |

# Clause 16

|                                                |                                 |
|------------------------------------------------|---------------------------------|
| Competent Authority for deciding reduced rates | AS PER SCHEDULE 'F' OF PART 'A' |
|------------------------------------------------|---------------------------------|

# Clause 18

|                                                                                       |                                                                            |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| List of mandatory machinery, tools & plants to be deployed by the Contractor at site: | <b>ALL TOOLS &amp; PLANTS AS REQUIRED TO CARRYOUT THE ELECTRICAL WORKS</b> |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------|

|             |   |                                                                 |
|-------------|---|-----------------------------------------------------------------|
| Clause 19 C | - | EE(E) Ranchi-I, CPWD, RANCHI to decide penalty for each default |
| Clause 19 D | - | EE(E) Ranchi-I, CPWD, RANCHI to decide penalty for each default |
| Clause 19 G | - | EE(E) Ranchi-I, CPWD, RANCHI to decide penalty for each default |
| Clause 19 K | - | Rs. 250 per tradesman per days                                  |

# Clause 25

## Settlement of Dispute by Conciliation and Arbitration

|         |                                 |                                 |
|---------|---------------------------------|---------------------------------|
| SI. No. |                                 |                                 |
| (i)     | Conciliator                     | AS PER SCHEDULE 'F' OF PART 'A' |
| (ii)    | Arbitrator Appointing Authority |                                 |
| (iii)   | Place of Arbitration            |                                 |

# Clause 32

## Requirement of Technical Representative(s) and recovery Rate

| SI 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) |                                                          |
|-------|---------------------------------------------------|------------|--------------------------------------------------------------|---------------------------------|--------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
|       |                                                   |            |                                                              |                                 |        | Figure                                                                                                            | Words                                                    |
| 1.    | Graduate Engineer or Diploma Engineer             | Elect      | Project /Site Engineer                                       | 5 Year or 10 Years respectively | 1      | Rs. 25,000/- (per month per person)                                                                               | Rupees Twenty Five Thousand only. (per month per person) |
| 2.    | Graduate Engineer or Diploma Engineer             | Elect      | Project Planning/ quality/ billing Engineer                  | 2 Year or 5 Years respectively  | 1      | Rs. 15,000/- (per month per person)                                                                               | Rupees Fifteen Thousand only. (per month per person)     |

# Clause 38

|      |     |                                                                                                                                           |                                       |
|------|-----|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| (i)  | (a) | Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates 2023 printed by CPWD. |                                       |
| (ii) |     | Variations permissible on theoretical quantities:                                                                                         |                                       |
|      | (a) | Cement, For works with estimated cost put to tender more than Rs. 25 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                                   |

**ELIGIBILITY Criteria for specialized E & M Works**

| Sub Head   | Description                                                                                                                                    | Estimated Amount   | Definition of similar work & eligibility criteria                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PART - C-1 | Providing Internal EI & Fans, Street Light, SITC of UPS, SITC of EV charger, SITC of Water Cooler & Purifier, SITC of Refrigeration works etc. | Rs. 2,78,75,670 /- | CPWD Contractor enlisted in appropriate class & category (B&R) are eligible to execute this work                                                                                                                                                                                                                                                                                                                                                              |
| PART - C-2 | SITC of Substation & LT Distribution                                                                                                           | Rs. 90,33,816 /-   | <p><b>The bidder should have completed similar work as under:</b></p> <p>i) Three similar works each of value not less than Rs. 36.13 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 54.20Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 72.27 Lakh</p> <p><b>Similar work shall mean "SITC of Substation &amp; LT Distribution with minimum individual capacity of transformer of 250 KVA.</b></p> |
| PART - C-3 | SITC of EPABX & LAN Work                                                                                                                       | Rs. 93,37,201/-    | <p><b>The bidder should have completed similar work as under:</b></p> <p>i) Three similar works each of value not less than Rs. 37.35 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 56.02 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 74.70 Lakh</p> <p><b>Similar work shall mean "SITC of EPABX &amp; LAN Work".</b></p>                                                                      |

| Sub Head          | Description                              | Estimated Amount        | Definition of similar work & eligibility criteria                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PART - C-4</b> | <b>SITC of CCTV Work</b>                 | <b>Rs. 20,52,904 /-</b> | <p><b>The bidder should have completed similar work as under:</b></p> <p>i) Three similar works each of value not less than Rs. 08.21 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 12.32 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 16.42 Lakh</p> <p><b>Similar work shall mean "SITC of CCTV Work".</b></p>                                       |
| <b>PART - C-5</b> | <b>SITC of DG Set</b>                    | <b>Rs. 18,25,406 /-</b> | <p><b>The bidder should have completed similar work as under:</b></p> <p>i) Three similar works each of value not less than Rs. 7.30 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 10.95 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 14.60 Lakh</p> <p><b>Similar work shall mean "SITC of DG set of minimum individual capacity of 160 KVA."</b></p> |
| <b>PART - C-6</b> | <b>SITC of Fire Fighting System Work</b> | <b>Rs. 77,86,840/-</b>  | <p><b>The bidder should have completed similar work as under:</b></p> <p>i) Three similar works each of value not less than Rs. 31.15 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 46.72 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 62.29 Lakh</p> <p><b>Similar work shall mean "SITC of Fire Fighting System Work".</b></p>                       |

| Sub Head          | Description                                | Estimated Amount         | Definition of similar work & eligibility criteria                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|--------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PART - C-7</b> | <b>SITC of Automatic Fire alarm System</b> | <b>Rs. 26,84,617/-</b>   | <p><b>The bidder should have completed similar work as under:</b></p> <p>i) Three similar works each of value not less than Rs. 10.74 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 16.11 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 21.48 Lakh</p> <p><b>Similar work shall mean "SITC of Automatic Fire alarm System".</b></p>                                         |
| <b>PART - C-8</b> | <b>SITC of Lifts Work</b>                  | <b>Rs. 70,44,749/-</b>   | <p><b>The bidder should have completed similar works as under:</b></p> <p>i) Three similar works each of value not less than Rs. 28.18 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 42.27 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 56.36 Lakh</p> <p><b>Similar work shall mean "SITC of Lifts Work".</b></p>                                                         |
| <b>PART - C-9</b> | <b>SITC of VRV/VRF AC System Work</b>      | <b>Rs. 1,40,81,254/-</b> | <p><b>The bidder should have completed similar works as under:</b></p> <p>i) Three similar works each of value not less than Rs. 56.33 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 84.49 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 112.65 Lakh</p> <p><b>Similar work shall mean "SITC of VRV/VRF AC System Work with minimum individual capacity of 160 HP".</b></p> |

| Sub Head           | Description                                    | Estimated Amount       | Definition of similar work & eligibility criteria                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PART - C-10</b> | <b>SITC of Solar Photo Voltaic System Work</b> | <b>Rs. 16,28,400/-</b> | <p><b>The bidder should have completed similar works as under:</b></p> <p>i) Three similar works each of value not less than Rs. 6.51 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 9.77 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 13.03 Lakh</p> <p><b>Similar work shall mean "SITC of Solar Photo Voltaic System Work".</b></p> |
| <b>PART - C-11</b> | <b>SITC of 50 KLD STP Work</b>                 | <b>Rs. 46,28,331/-</b> | <p><b>The bidder should have completed similar works as under:</b></p> <p>i) Three similar works each of value not less than Rs. 18.51 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 27.77 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 37.03 Lakh</p> <p><b>Similar work shall mean "SITC of 50 KLD STP Work".</b></p>               |
| <b>PART - C-12</b> | <b>SITC of Boom Barrier Work</b>               | <b>Rs. 18,12,496/-</b> | <p><b>The bidder should have completed similar works as under:</b></p> <p>i) Three similar works each of value not less than Rs. 7.25 Lakh</p> <p>OR</p> <p>ii) Two similar works each of value not less than Rs. 10.87 Lakh</p> <p>OR</p> <p>iii) One similar work each of value not less than Rs. 14.50 Lakh</p> <p><b>Similar work shall mean "SITC of Boom Barrier Work".</b></p>              |

| Sub Head           | Description                             | Estimated Amount         | Definition of similar work & eligibility criteria                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|-----------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PART – C-13</b> | <b>SITC of Audio Visual System Work</b> | <b>Rs. 1,35,28,139/-</b> | <p><b>The bidder should have completed similar works as under:</b></p> <p>i) Three similar works each of value not less than Rs. 54.11 Lakh</p> <p style="text-align: center;">OR</p> <p>ii) Two similar works each of value not less than Rs. 81.17 Lakh</p> <p style="text-align: center;">OR</p> <p>iii) One similar work each of value not less than Rs. 108.23 Lakh</p> <p><b>Similar work shall mean “SITC of Audio Visual System Work”.</b></p> |

# PART – C-1

**Name of Work : Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH : Providing Internal EI & Fans, Street Light etc.)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The Main Contractor will Associate CPWD Registered Contractor in respective Category after verification of credential & approval by the Engineer in Charge of Part-C (E&M) Works i.e. **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. In case the main contractor himself meets the required eligibility criteria as laid down by the department for any minor component(s) of work, he shall be allowed to execute the same after due verification & approval of the Executive Engineer (E).
3. The composite category contractor is also be eligible to carry out himself/herself any or all of these works without associating any specialized agency provided, he fulfills the prescribed eligibility criteria respectively for these works.
4. The composite contractor and the associated agencies is required to give affidavit to confirm their association.
5. Tender accepting authority approves the change of sub-agency in case it is required during the currency of the contract.
6. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
7. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
8. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (E&M) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.

9. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C **(E&M)** Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
10. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
11. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
12. Some milestones shall be applicable for Part-C **(E&M)** components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
13. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C **(E&M)** Work.
14. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work.

# **GENERAL COMMERCIAL CONDITIONS FOR E&M WORK**

## **1.1 Scope**

- (i) Electricity has become the lifeline of modern society. Homes, Offices, Industry, Schools, Hospitals, Transportation, Communication, Road Lighting, Markets all depend on reliable Electric Supply. Life comes to a standstill without electricity. Electricity has become an integral and inevitable part of every body's life.  
It is also necessary to remember that electricity becomes destructive and dangerous, if not handled with care, safety conforming to laid down safety standards and norms. In case of building fires, which often destroy property and lives causing sufferings to the affected people, the first culprit is often supposed to be 'Electric Short Circuit'.  
In the above context, the General Specification for Electrical Works (Internal) aims to lay down General guidelines to ensure safe, efficient, reliable and economical use of electricity.
- (ii) While these Specifications serve as general guidelines, appropriate technical sanctioning authority can depart from such guidelines to meet the particular requirements of any work or for other technical reasons.
- (iii) These General Specifications are subject to revision from time to time.

## **1.2 Related Documents**

Each work has its own particular requirements. Therefore, in addition to the General Specifications, governing BIS, I.E. Rules, Standard Contract Conditions etc. there would be necessity of additional conditions / specifications for a particular work. In case of any discrepancy such additional conditions / specifications will override these General Specifications.

## **1.3 Terminology**

- 1.3.1 The definition of terms shall be in accordance with IS 732 : 1989 (Indian Standard Code of Practice for Electrical Wiring), except for the definitions of point, circuit, and submain wiring, which are defined in this specification.

## **1.4 Rates**

- 1.4.1 The work shall be treated as on works contract basis and the rates tendered shall be for complete items of work (except the materials, if any, stipulated for supply by the department) inclusive of all taxes (including works contract tax, if any), duties, and levies etc. and all charges for items contingent to the work, such as, packing, forwarding, insurance, freight and delivery at site for the materials to the supplied by the contractor, watch and ward of all materials (including those, if any, supplied by the department) for the work at site etc.
- 1.4.2 Prices quoted shall be firm. Price adjustments shall however be governed by Clause 10C/10CC of the Conditions of Contract given in form CPWD 7 or 8 of the tender documents, for works executed under these forms. All relevant documents shall be produced by the contractor to the Engineer-in-charge, whenever called upon by him to do so, for working out such adjustments in rates.

## **1.5 Taxes and Duties**

- 1.5.1 Being an indivisible works contract, GST etc. are not payable separately.
- 1.5.2 The works contract tax shall be deducted from the bills of the contractor as applicable in the State in which the work is carried out, at the time of payments.

## **1.6 Mobilization Advance**

No mobilization advance shall be paid for the work, unless otherwise stipulated in tender papers for any individual work.

## **1.7 Completeness of Tender**

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various components of the work shall be deemed to have been included in the tender, whether such items are specifically mentioned in the tender documents or not.

### **1.8 Works to be done by the Contractor**

Unless and otherwise mentioned in the tender documents, the following works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost :-

- (i) **After award of work contractor will submit name and other documents of Technical Representative. The Technical Representative will come to discuss along with specific BIS code etc. with Engineer- in-Charge or Representative for conduit layout and calculation of LUX level etc., accordingly the contractor will submit layout of conduit for approval.**
- (ii) Foundations for equipments and components where required, including foundation bolts.
- (ii) Cutting and making good all damages caused during installation and restoring the same to their original finish.
- (iii) Sealing of all floor openings provided by him for pipes and cables, from fire safety point of view, after laying of the same.
- (iv) Painting at site of all exposed metal surfaces of the installation other than prepainted items like fittings, fans, switchgear / distribution gear items, cubicle switchboard etc. Damages to finished surfaces of these items while handling and erection, shall however be rectified to the satisfaction of the Engineer-in-charge.
- (v) Testing and commissioning of completed installation.

### **1.9 Storage and Custody of Materials**

1. Arrangement of suitable and lockable storage.
2. Accommodation and its watch and ward and their safe custody shall be his responsibility till the final taking over of the installation by the Department.

### **1.10 Electric Power Supply and Water Supply**

Unless and otherwise specified, power supply and water supply will be arranged by the contractor at the site for installation purpose. Nothing extra shall be paid for this.

### **1.11 Tools for Handling and Erection**

All tools and tackles required for handling of equipments and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

### **1.12 Payment Terms**

- 1.12.1 Unless otherwise specified in the additional conditions of the contract, the payment shall be made as per the relevant clauses of form PWD 7/8 forming a part of the tender documents.
- 1.12.2 Security deposit shall be deducted in such form and as per provisions contained in CPWD form 7/8 as amended from time to time. The earnest money deposit shall be adjusted against this security deposit. The security deposit shall be released on the expiry of guarantee/ maintenance period stipulated in the contract. However, the contractor can furnish a bank guarantee in the specified format from a scheduled bank for the full value of the security deposit, in which event no recovery shall be made towards security deposit from his bills. The bank guarantee shall be kept valid till the expiry of the above guarantee / maintenance period.

### **1.13 Co-ordination with Other Agencies**

The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in his work. Recessed conduit and other works, which directly affect the progress of building work, should be given priority.

### **1.14 Care of Buildings**

Care shall be taken by the contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of his work from the site.

### **1.15 Structural Alterations to Buildings**

- (i) No structural member in the building shall be damaged / altered, without prior approval from the competent authority through the Engineer-in-charge.
- (ii) Structural provisions like openings, cutouts, if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the contractor at his cost.
- (iii) All such openings in floors provided by the Department shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.
- (iii) All chases required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

**1.16 Addition to an Installation**

Any addition temporary or permanent to the existing electrical installation shall not be made without a properly worked out scheme/design by a qualified Electrical Engineer to ensure that such addition does not lead to overloading, safety violation of the existing.

**1.17 Work in Occupied Buildings**

- (i) When work is executed in occupied buildings, there would be minimum of inconvenience to the occupants. The work shall be programmed in consultation with the Engineer-in-charge and the occupying department. If so required, the work may have to be done even before and after office hours.
- (ii) The contractor shall be responsible to abide by the regulations or restrictions set in regard to entry into, and movement within the premises.
- (iv) The contractor shall not tamper with any of the existing installations including their switching operations or connections thereto without specific approval from the Engineer-in-charge.

**1.18 Conformity to IE Act, IE Rules, and Standards**

1.18.1 All Electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 2003 and Indian Electricity Rules, 1956 amended up to date (Date of call of tender unless specified otherwise).

**1.19 General Requirements of Components**

**1.19.1 Quality of Materials**

All materials and equipments supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at site.

**1.19.2 Inspection of Materials and Equipments**

- (a) Materials and equipments to be used in the work shall be inspected by the Departmental officers. Such inspection will be of following categories:
  - (i) Inspection of materials / equipments to be witnessed at the manufacturer's premises in accordance with relevant BIS/Agreement Inspection Procedure.
  - (ii) To receive materials at site with Manufacturer's Test Certificate(s).
  - (iii) To inspect materials at the Authorized Dealer's Godowns to ensure delivery of genuine materials at site.
  - (iv) To receive materials after physical inspection at site.
- (b) The Departmental officers will take adequate care to ensure that only tested and genuine materials of proper quality are used in work.
- (c) Similarly, for fabricated equipments, the contractor will first submit dimensional detailed drawings for approval before fabrication is taken up in the factory. Suitable stage inspection at factory also will be made to ensure proper use of materials, workmanship and quality control.
- (d) The tender specifications will stipulate the inspection requirements or their waiver for various materials/equipments including norms of inspection in specific cases.

**1.19.3 Rating of Components**

- (a) All components in a wiring installation shall be of appropriate ratings of voltage, current, and frequency, as required at the respective sections of the electrical installation in which they are used.
- (b) All conductors, switches and accessories shall be of such size as to be capable of carrying the maximum current, which will normally flow through them, without their respective ratings being exceeded.

**1.19.4 Conformity to Standards**

- (a) All components shall conform to relevant Indian Standard Specifications, wherever existing. Materials with ISI certification mark shall be preferred.

**1.19.5 Interchangeability**

Similar parts of all switches, lamp holders, distribution fuse boards, switch gears, ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

1.20 **Workmanship**

1.20.1 Good workmanship is an essential requirement to be complied with. The entire work of manufacture/fabrication, assembly and installation shall conform to sound engineering practice.

1.20.2 **Proper Supervision/Skilled Workmen**

The contractor shall be a licensed electrical contractor of appropriate class suitable for execution of the electrical work. He shall engage suitably skilled/ licensed workmen of various categories for execution of work supervised by supervisors / Engineer of appropriate qualification and experience to ensure proper execution of work. They will carry out instructions of Engineer-in-charge and other senior officers of the Department during the progress of work.

1.20.3 **Use of Quality Materials**

Only quality materials of reputed make as specified in the tender will be used in work.

1.20.4 **Fabrication in Reputed Workshop**

Switch boards and LT panels shall be fabricated in a factory / workshop having modern facilities like quality fabrication, seven tank process, powder/ epoxy paint plant, proper testing facilities, manned by qualified technical personnel.

The tender shall specify some quality makes of fabricators with modern facilities of design, fabrication and testing capable of delivering high quality LT panels and switch boards after testing as per relevant specifications.

1.21 **Testing**

All tests prescribed in these General Specifications, to be done before during and after installation, shall be carried out, and the test results shall be submitted to the Engineer-in-charge in prescribed Performa, forming part of the Completion Certificate.

1.22 **Commissioning on Completion**

After the work is completed, it shall be ensured that the installation is tested and commissioned.

1.23 **Completion Plan and Completion Certificate**

- (i) For all works completion certificate after completion of work shall be submitted to the Engineer-in-charge.
- (ii) Completion plan drawn to a suitable scale in tracing cloth with ink indicating the following, along with three blue print copies of the same shall also be submitted.
  - (a) General layout of the building.
  - (b) Locations of main switchboard and distribution boards, indicating the circuit numbers controlled by them.
  - (c) Position of all points and their controls.
  - (d) Types of fittings, viz. fluorescent, pendants, brackets, bulk head, fans and exhaust fans etc.
  - (e) Name of work, job number, accepted tender reference, actual date of completion, names of Division/Sub-Division, and name of the firm who executed the work with their signature.

1.24 **Guarantee**

The installation will be handed over to the Department after necessary testing and commissioning. The installation will be guaranteed against any defective design/workman-ship. Similarly, the materials supplied by the contractor will be guaranteed against any manufacturing defect, inferior quality. The guarantee period will be for a period of 12 months from the date of handing over to the Department. Installation/equipments or components thereof shall be rectified / repaired to the satisfaction of the Engineer-in-charge.

# **TECHNICAL SPECIFICATION FOR INTERNAL ELECTRICAL INSTALLATION I/C STREET LIGHT**

## **1.0 SITE CONDITION:**

The work is to be carried out for “Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand”.

1.1 The Tenderers are advised to visit the site for any site particular to be well acquaintance about the site requirement by him, before tendering.

## **SCOPE OF WORK AND EXCLUSIONS :**

- 1.2 General features and major components of the work are as under.  
“Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand”.
- 1.3 The work shall comprise entire labour including supervision and all materials necessary to make a complete installation to the entire satisfaction of the department. The term complete installation shall mean, not only major items of equipment covered by these specifications, but also incidental sundry components necessary for complete execution and satisfactory performance of the installation, with all labour charges, whether or not these have been mentioned in detail in the tender documents. The work shall include data entry, programming, start up test and demonstration, training of personnel for maintenance and operation, submission of construction and installation drawings and wiring diagrams, as built documents and system guarantee.

## **INTERPRETING SPECIFICATIONS**

In interpreting the specifications the following order of decreasing importance shall be followed in case of contradictions:

- a) Schedule of quantities
- b) Technical specifications of the NIT
- c) Approved Drawing (If any)
- d) CPWD General Specifications for Electrical Work Part-I (Internal) 2023, Part-II (External) 2023.
- e) Relevant IS or other international code in case IS code is not available.

## **INTERNAL ELECTRICAL INSTALLATION WORK:**

- i) The work shall be carried out in conformity with CPWD General specification Part – I (Internal) 2023 and CPWD General specification Part – II (External) 2023 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- ii) Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E) & decision of the Engineer in Charge shall be final & binding.
- iii) The contractor will ensure that all the skilled persons managed / deployed for executing the electrical work possess the wireman license issued by approved authorities. Consequences arising due to the default of the contractor to comply with this condition would be contractor’s responsibility only.
- iv) The contractor will make his own arrangement for storage of material arranged by him and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, fittings, cables etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- v) All the DB’s switchgears shall have identification marking on them written in white paint/ identification ferrule. Nothing extra shall be paid on this account.
- vi) Earth points with studs are to be provided on each of the switchboards / DBs.
- vii) The MCBDB made of MS sheet should not be less than 1.6 mm thick and left out MCB outlets of the sheet steel enclosures (not occupied by the MCBs) shall be covered with blanking plates. MCB will be of 10 KA breaking capacity.
- viii) The drawing showing dimension layout of the main board, allied equipment SLD, Connection diagram etc shall be got approved by the contractor from the Engineer-in-Charge before fabrication and execution.
- ix) All hardware, fastening material viz. nuts, bolts, washers and screws etc. to be used on work shall be of Zinc / cadmium plated iron.
- x) All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.

- xi) The contractor shall have to furnish the insulation test report, earth report, along with all required details of electrical load on the prescribed Performa for the electric connection from Supply Company.
- xii) The contractor shall submit the completion certificate and completion plan as per Clause 1.26 of General specifications for Electrical Works Part-I, Internal 2013 after completion of work.
- xiii) All earthing material (GI plate, strip, wire) should be hot dip galvanized. All concealed works and earthing shall have to be done in the presence of Engineer-in-Charge or his authorized representative.
- xiv) The chases in walls shall be done by chase cutting machines, for which contractor shall arrange adequate numbers of chase cutting machines (Chase Cutters) for cutting chases in walls etc. for laying of conduits.
- xv) The fans & fittings to be supplied by the contractor shall be procured & brought to site not before “finishing” works so that these fans & fittings are not damaged & do not lose their manufacturers warranty.
- xvi) MCCBs shall have Ics = 100%Icu.
- xvii) The department reserves the right to inspect the Panel Boards/Rising Main at the manufacturer’s premises for which the contractor should give 15 days advance notice.
- xviii) The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- xix) The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No.DG/MISC.(ELECT.)/1 dated 30.03.2017.**
  - a) Authorization certificate.
  - b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- xx) **As per Office Order No.DG/SE(E)TAS/miscellaneous /12 Dated 03.09.2019.**
  - (a) All the LED Bulbs / LED Fittings shall be guaranteed for a period of 5 years from date of record of completion certificate by competent authority.
  - (b) While returning the Performance Guarantee on completion of work as per agreement, 50% of the proportionate portion of this PG related to LED Fittings items of the schedule of work shall be retained by department.
  - (c) This Performance Guarantee retained shall be refunded year wise proportionately (only after satisfaction of E-in-C. On failure to do needful during this period of 5 years, the E-in-C shall be free to do the same at risk and cost of contractor).
  - (d) In case of discontinuation of model and non – availability of spares, the agency shall replace the fittings with equivalent / high end model in case of manufacturing defect during the warranty period of 5 years.
- xviii) Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge.
- xix) Main board and main distribution board:- The contractor shall have to get the sample approved before the whole lot is brought to site and it shall include all inter connections etc. The main board, distribution board shall be properly labeled.
- xx) The wiring and conduit route shall be marked by the contractor in the drawing first, and shall be got approved from the Engineer-in-charge.
- xxi) Make of MCB/MCCB shall be the same as the make of MCB DB as per approved make of list.
- xxii) The contractor shall on demand by the Engineer-in-charge, furnish the proof to the satisfaction of Engineer-in-charge regarding purchase of Wires, Modular switches & accessories, MCBs MCBDB, MCCB, LED fitting and accessories and other items, from the manufactures authorized outlets.
- xxiii) All the sub main and circuits wiring includes loose wire for connections inside switch boxes and MCB DBs. No payment for these loose wires shall be made.
- xxiv) The connection between incoming switch/isolator and bus bar shall be made with suitable size of thimble and cable at no extra cost.
- xxv) Copper conductor of insulated cables of size 1.5 Sq.mm and above shall be stranded and terminals provided with crimped lugs.
- xxvi) Any conduit which is not be wired by the contractor shall be provided with GI fish wire for wiring for some other agency subsequently. Nothing extra shall be paid for the same.
- xxvii) While laying conduit, suitable size junction boxes shall be provided for pulling the wire as per the decision of the Engineer-in-Charge.
- xxviii) Where switches/sockets/regulator/telephone/TV/internet outlets are to be provided, the same shall be of only one make.
- xxix) Defect Liability Period: All the installations shall be guaranteed for a period of 12 months from the date of completion. Any defective materials and equipment shall be replaced free of cost at the direction of the Engineer-in-Charge.

- xxx) The firm should arrange guarantee of LED fitting from OEM/ Authorized dealer for a period of 5 years from the date of completion of work. The certificate in this regard shall be deposited in the office prior to installation of fittings.
- xxxi) The LED fitting proposed to be installed shall be of following specification.
  - (a) Luminous efficacy(luminous/watt) > 100
  - (b) Correlated colour temperature (CCT) > 55000 K or otherwise specified.
  - (c) Colour rendering index (CRI) ≥80% (For Indoor applications)
  - (d) LM 79 and LM 80 test report to be submitted.
- xxxii) 50% of the Performance Guarantee shall be refunded to the contractor soon after the completion of the work and recording of the completion certificate.
- xxxiii) 50% of the Performance Guarantee shall be retained as Security Deposit.
- xxxiv) 50% of the Performance Guarantee retained as Security Deposit plus 2.5% Security already deducted from running bills (total 2.5 + 2.5 = 5%) shall be refunded year wise proportionately.
- xxxv) All hardware items such as screws, thimbles, GI wire etc. which are essentially required for completing an item as per specification will be deemed to be included in the item even when the same have not been specifically mentioned.

**EARTHING:** As per CPWD specification for electrical works 2023 (Internal) and 2023 (External) and as amended up to date and in accordance with Indian Electricity Rules, 1956, India Electricity Act, 2003 as amended upto date and as per instructions of the Engineer-in-Charge.

**LED FITTINGS:** LED fittings shall have IESNA certification i.e. LM 79 (Luminaire), LM 80 (LED) & LM70 >= 50,000 Burning Hours. The copy of same must be submitted before placing order to the manufacturer and their dealer.

**FEEDER PILLAR/PANEL:** Feeder Pillar/Panel and components shall be fabricated and installed as per CPWD General Specifications for Electrical Works Part-I Internal 2013 and conforming to the requirements of the latest revision including amendments of the IS codes and standards.

The feeder pillar shall be divided into distinct vertical sections each comprising of:

- i) The fabrication will be done out of 2 mm thick CRCA sheet with double door and inbuilt locking arrangement.
- ii) All connections (incoming and outgoing) will be taken out in cable alley with suitable rated solid copper conductor.
- iii) The depth of panel shall be as per requirement.
- iv) Aluminium bus bars shall be fitted on insulated DMC support.
- v) Sizes and arrangement shall be as per site requirement.
- vi) The panel should be provided with terminal blocks for incoming & outgoing cables. From MCCB to terminal block wiring will be done with copper conductor/suitable cable.
- vii) Incoming/outgoing UG cable will be terminated in terminal block.

## **ADDITIONAL SPECIFICATION OF UPS WORK**

- i) The work shall be carried out in conformity with CPWD General specification Part – I (Internal) 2013 and CPWD General specification Part – II (External) 2023 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- ii) Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E), & decision of the Engineer in Charge shall be final & binding.
- iii) The contractor will make his own arrangement for storage of material arranged by him, and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- iv) All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.
- v) The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- vi) The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No. DG/MISC.(ELECT.)/1 dated 30.03.2017**.
  - a) Authorization certificate.
  - b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- vii) Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge.

## **TECHNICAL SPECIFICATION OF UPS WORK**

- Online UPS- Input supply: Three Phase, Output supply: Three Phase
- Capacity at full load (Unity Power Factor) at operating temperature 0 to 40 deg C, Relative humidity 0 to 95%, Online double conversion true sine wave Uninterrupted hot swappable(allow for the replacement or addition of battery modules without shutting down the entire system) modular Power Supply (UPS)system with N+1 modules (N denotes total number of modules required for rated capacity).
- The UPS shall include a Rectifier, inverter, battery bank suitable for 30 minutes back up (Battery VAH capacity shall not be less than 1600 VAH per KVA of UPS rating per Hour backup time) on full load (Battery shall be VRLA, SMF in ABS Container) and Static Bypass switch along with manual bypass, suitable isolation transformer for additional protection against neutral faults etc.
- UPS shall have inbuilt phase sequence correction. The UPS systems offered are to be of the latest technology with Digital Control Microprocessor based for reliable operation using Insulated Gate Bipolar Transistor (IGBT)'s both for the rectifier & inverter(3 Level) with PWM (Pulse Width Modulation). The quality of design, manufacturing and inspection process should confirm to the relevant Inter-national standards such as IEC/EN/VDE.
- The operating efficiency of the UPS systems shall be >96% while operating on battery mode and delivering quality power to the 100% non-linear loads. Current total harmonic effect(THD) on the input grid shall be < 5% at 50 %load. (The required LC (inductor (L) and a capacitor (C)) filters shall be included in UPS cost), extreme power factor kit to be included to limit the input power factor (PF) to 0.99 and output power factor shall be unity (i.e. kw rating of the UPS shall be kva rating x 1), however UPS shall be suitable to take load at 0.7 lagging to 0.7 leading power factor loads.
- UPS shall be suitable for incoming supply AC :3Phase 400V +/-20%, 50 Hz +/-5 Hz, AC Output voltage:3Phase 415 Volt, 50 Hz +/- 0.2Hz, Overload capacity of 120%for 10 mins, Sine wave output. Non condensing, noise level less than 60db at 1 meter distance, protections: Input Under voltage over voltage, abnormal out voltage, battery overcharging, output over current, short circuit protection, battery deep discharge protection, 10KV surge. UPS must comply with low voltage electromagnetic compatibility (EMC) achieved as per EN 6204, EN6204 Part I and Part 2, it shall be a Voltage and Frequency Independent (VFI)-type UPS. Communication RS232/RS485/SNMP port open protocol for BMS integration, all hardware & software for IoT Communication as per approved by Engineering in charge.

- Required battery racks and interconnecting copper conductor cables of suitable size and connectors and all required accessories are inclusive of the cost).This system must provide a means for logging and alarming of all monitored points plus email notification.
- Forced air-cooling with integral inbuilt fans with redundancy (if one fan fail UPS should be able to handle at least 80% of the load, Noise Level 65 DB at 1 meter distance.
- The system shall be in compliance IEC 62040- 1,2 & 3, IS: 16242 and CPWD Specification. Display Panel (minimum) (In-build 5 inch or more LC Display / LED ) to display : a) Input: Voltage, current, Frequency. b) Bypass: Voltage, Frequency. c) Output: Voltage, frequency, Current. d) Battery: Voltage, Capacity. e) Load: KVA, KW, Percentage. f) Temperature: STS, Inverter, PFC. g) Event Logging & Statistical Data (On LCD/LED): UPS should capture and display up to 3000 events like: Over temperature / DC Bus Fail / Fan Fail / Fuse Fail / Overload / Short-circuit / Device Fail / Inverter Fail / Rectifier Fail / Bypass Fail, etc. h) Statistical Data: No. of power failures / Transfers to Bypass / Total Running time, etc. i) Mains Mode of Operation / Battery Mode of Operation / Bypass feeding the load / UPS Fault / Battery charging and discharging, overload, battery voltage and battery capacity. j) Audible Alarms: Mains Failure, Battery Low Alarm, UPS Overload, Fault, Shutdown, Input Over, Under Voltage, Output Over, Under Voltage, Battery Over, Under Voltage, Over Load and short-circuit, Over Temperature. The UPS should have QR code which should contain drawing, test report OEM manual, Geo-Tag of manufacturing location etc.

## TECHNICAL SPECIFICATION OF EV Charger

1. These chargers will be installed for charging the electrical vehicles.
2. To control the use of charging facility, a charging management software is required, which should have following minimum features.
  - a) Mapping of RFID card with chassis number or battery management system of the vehicle.
  - b) Log details of charging facility use with vehicle number / chassis number / owner name, number of hours, energy consumed.
  - c) Charging should only be possible by the use of RFID card or online approval / authentication from Central Server through Wi-Fi / mobile application.
  - d) Should have a facility to calculate total energy consumed during any specified period as when as required and to submit monthly consumption to this office.
  - e) Charges to be levied on charging of vehicle by the vehicle owner @ Rs.15 / Unit consumed and the amount collected by online payment through CMS provider is to be deposited to EE(E) Faridabad CPWD via Bharatkosh on or before 7<sup>th</sup> of every month failing which Rs.1000 / per day fine will be levied on the contractor.
3. EV charger shall have broad range of connectivity options including Wi-Fi / RFID / Ethernet for easy control with integration with the existing infrastructure.
4. The charger shall have protection for over current, overvoltage and under voltage, Ground fault, Surge protection etc.
5. The EV charger shall have Built-in energy meter, set up for external energy meter integration for dynamic load management, ready for integration with advanced smart building energy system.
6. Software shall have interlock facility on EV charges i.e. charging should only be possible, only when electrical vehicle battery management data matches with the RFID card details.
7. This facility is required is prevent misuse of the RFID card to charging the different vehicle, not belonging to the Govt.
8. The EV charger software shall have a facility for calculating the tariff or charges of electricity.
9. The cost of application or phone app. is included in the cost of EV charger, nothing extra will be paid.
10. The cost of license and software Upgradation of the application for initial three years is included in the cost of EV charger.
11. Scope of work includes providing the suitable foundation to the EV charger and its covered with 20mm granite in all sides, height, depth and width of the foundation will be decided by engineer-in-charge/OEM, nothing will be paid extra.
12. Agency has to procure the materials from authorized agency of equipment and details will be submitted if required by the engineer-in-charge.
13. Agency has to submit the invoices, delivery Challan to the JE/AE of the all equipment's.
14. Scope of work includes the providing of reducers / couplers / L bends/ T Bends/ Socket of the DWC pipe nothing will be paid extra. Agency has to fix the HDPE pipe on the existing wall with suitable rust proof clamps at suitable intervals as per the direction of engineer in charge.
15. Agency has to submit the foundation details of EV charger to the engineer-in-charge for approval.
16. Pole should be painted with epoxy paint in approved shade as per direction of engineer-in-charge.
17. Agency has to submit the 1 year on site guarantee certificate for the EV chargers from OEM during the guarantee period any defect / fault in the charger have to be rectified by the OEM / Bidder, free of cost. The security deposit of 2.5% deducted from the bills will be clubbed with 2.5% performance guarantee i.e. total 5% will be withheld on A/c of Security deposit and will be released after successful completion of one year guarantee period.
18. Contractor / OEM has to undergo an agreement with the department after one year of installation of comprehensive maintenance and to deposit the electricity consumption through the EV Charger to the department on monthly basis with all records of consumption. Security deposit will only be released after under going this agreement.
19. On completion of work, contractor has to submit MoU with OEM of charger of carrying out comprehensive maintenance for one year from the date of handing over of installation for beneficial use.
20. Scope of work includes licenses, software's for 3rd party mobile application and all accessories etc. as required for smooth operation of the system nothing will be paid extra.
21. Agency has to attend the breakdown calls within 24 hours & submit the quarterly service report during guarantee period, otherwise get it repaired by OEM/authorized agency at your risk and cost.
22. The scope of work includes software, Licenses for Comprehensive CMS applications, mobile application.
23. Since the charges of electricity will be warned by the Govt., so a separate record is to be maintained for the consumption of electricity for charging the electrical vehicles.

## Technical Specification of Water Cooler & Purifier

| DESCRIPTION                         | PARAMETERS                                                       |
|-------------------------------------|------------------------------------------------------------------|
| Water Storage capacity              | 120 Liters                                                       |
| Water Cooling Rate (17°C/Hr)        | 80 LPH                                                           |
| No of Faucets                       | 3 (Cold-2, Normal-1)-(not be push type)                          |
| Outer Body Material                 | minimum SS 204 CU                                                |
| Storage Tank Material               | Food grade SS 304 with outer body graphics for longer durability |
| Outer Body dimension (LxWxH)        | 750 x 570 x 1350 mm (Approx.)                                    |
| Weight                              | 85 kg ± 2 kg                                                     |
| Compressor                          | Copeland / Tecumseh                                              |
| Operating Temperature               | 5°C to 45°C ± 2°C                                                |
| Refrigeration                       | R134A or Non CFC refrigerant                                     |
| Dispensed Water Temperature Setting | 17°C                                                             |
| Operating Voltage                   | 230±10% V AC, 50Hz                                               |
| <b>REVERSE OSMOSIS PURIFICATION</b> |                                                                  |
| RO Purification Capacity            | 50 LTR/HOUR                                                      |
| Maximum Inlet Water TDS             | 1500 ppm                                                         |
| Rejection of Salts (TDS)            | 90%                                                              |
| Pure Water Recovery                 | 30 to 40%                                                        |
| Auto Flush                          | Power Flushing of Filter Elements @ Every 15 minutes interval    |
| <b>PURIFICATION STAGES</b>          |                                                                  |
| Sediment Filter                     | 10 micron 10" Sediment Filter                                    |
| Carbon Filter                       | 10" Activated Carbon Block Filter                                |
| RO Membrane                         | 300 GPD x 1                                                      |
| UV Module                           | 11 watts                                                         |
| Stand                               | With lockable wheels for hygiene purpose                         |
| Wheels                              | Front with locks and Back with free moving                       |
| Certifications                      | USEPA & IS 10500, ISO 9001, ISO-14001                            |
| Auto sanitizing                     | Facility of auto sanitizer storage tank from bacteria            |

### **Additional Terms & Conditions for Refrigeration**

1. The equipment shall be **new, unused and of current production**, complete with all standard accessories required for satisfactory operation.
2. The freezer shall be capable of maintaining the specified temperature range under normal operating conditions.
3. R290 refrigerant shall be factory charged and the refrigeration circuit shall be leak-free.
4. The equipment shall be suitable for continuous operation on 230 V, 50 Hz, single-phase supply.
5. All electrical connections, interconnecting cables, plugs, protective devices and other accessories necessary for commissioning shall be included.
6. The equipment shall be supplied with minimum two separate compartments/baskets as applicable to the manufacturer's standard configuration.
7. Castor wheels shall be robust and at least suitable for locking the freezer securely in position.
8. The contractor/supplier shall carry out Installation, Testing and Commissioning (ITC) at site and demonstrate satisfactory performance to the Engineer-in-Charge.
9. Any minor accessory, fitting or component required for proper functioning of the equipment, even if not specifically mentioned, shall be deemed included in the quoted price.
10. The supplier shall submit a valid purchase invoice/invoice issued by the Original Equipment Manufacturer (OEM) or its authorized distributor/dealer, clearly indicating the make, model and quantity of the offered equipment, as documentary proof of OEM genuineness/authorized supply. The Engineer-in-Charge shall have the right to verify the invoice and OEM authorization from the concerned manufacturer.

## Technical Specification of Refrigeration

| Sl. No. | Parameter             | Minimum Technical Requirement                                                                                            |
|---------|-----------------------|--------------------------------------------------------------------------------------------------------------------------|
| 1       | Type                  | Hard Top / Chest Type Deep Freezer                                                                                       |
| 2       | Rated Capacity        | <b>Minimum 500 Litres</b>                                                                                                |
| 3       | Energy Rating         | <b>Minimum 3-Star energy efficiency rating</b> or better, as applicable                                                  |
| 4       | Temperature Range     | Adjustable temperature range approximately <b>+10°C to -26°C</b> or wider                                                |
| 5       | Refrigerant           | <b>R290 (Propane), environmentally friendly refrigerant</b>                                                              |
| 6       | Compressor            | Hermetically sealed, high-efficiency compressor suitable for continuous commercial operation                             |
| 7       | Condenser             | Air-cooled condenser with adequate heat dissipation arrangement                                                          |
| 8       | Evaporator            | Heavy-duty evaporator suitable for maintaining the specified low temperature                                             |
| 9       | Lids                  | <b>2 Nos. insulated hard-top lids</b> , with durable hinges and suitable handles                                         |
| 10      | Compartments          | <b>Minimum 2 compartments</b> , with suitable internal baskets/dividers                                                  |
| 11      | Cabinet               | Rigid, corrosion-resistant and adequately insulated cabinet suitable for commercial/ institutional use                   |
| 12      | Insulation            | High-density polyurethane (PUF) insulation or equivalent, with adequate thickness to minimize heat loss                  |
| 13      | Temperature Control   | Adjustable thermostat/digital temperature controller with suitable temperature indication                                |
| 14      | Temperature Display   | Digital temperature display preferred, clearly visible to the operator                                                   |
| 15      | Defrosting            | Manual defrost arrangement with suitable drain facility                                                                  |
| 16      | Internal Lining       | Easy-to-clean, corrosion-resistant and hygienic internal surface                                                         |
| 17      | External Finish       | Durable powder-coated/pre-painted or equivalent corrosion-resistant finish                                               |
| 18      | Mobility              | <b>Floor mounted with lockable castor wheels</b> , suitable for movement and positioning                                 |
| 19      | Electrical Supply     | <b>230 V ±10%, 50 Hz, single phase AC</b>                                                                                |
| 20      | Electrical Protection | Suitable MCB/fuse, overload and thermal protection for compressor and electrical components                              |
| 21      | Starting System       | Suitable starting device/relay and capacitor arrangement as required for reliable compressor operation                   |
| 22      | Door/Lid Seal         | High-quality magnetic/food-grade gasket or equivalent sealing arrangement to minimize cold-air leakage                   |
| 23      | Refrigeration System  | CFC/HCFC-free refrigeration system using R290 refrigerant                                                                |
| 24      | Noise Level           | Low-noise operation suitable for indoor institutional installation                                                       |
| 25      | Safety                | Electrical earthing and all necessary safety provisions shall be provided                                                |
| 26      | Accessories           | Baskets, handles, keys/locks, drain plug, thermostat/controller and all standard accessories as supplied by manufacturer |

| Sl. No. | Parameter     | Minimum Technical Requirement                                                                                                                                      |
|---------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 27      | Installation  | Complete installation, levelling, electrical connection and commissioning at site                                                                                  |
| 28      | Testing       | Testing shall include checking of temperature performance, compressor operation, thermostat/controller, electrical safety and proper functioning of all components |
| 29      | Documentation | Operation & Maintenance Manual, warranty certificate, technical literature and test/commissioning report shall be supplied                                         |
| 30      | Warranty      | Minimum 3 year comprehensive warranty from the date of successful installation/commissioning, unless otherwise specified in the tender                             |

## Approved Makes of Material For E & M Components

| SL. NO. | ITEM                                                     | MAKE                                                                                                                                                                                                                                             |
|---------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | MS Conduit                                               | BEC / AKG/ATUL/ STEEL KRAFT/RMCON (Note : The make of accessories will be same that of conduit pipe & will comply to IS / 4768 part 2 2003)                                                                                                      |
| 2       | MS Conduit accessories                                   | As per ISI mark BEC / AKG/ATUL/ STEEL KRAFT/RMCON                                                                                                                                                                                                |
| 3       | GI Pipe (ISI Marked)                                     | Tata / Jindal (Hissar)                                                                                                                                                                                                                           |
| 4       | MCCB, MCB                                                | Siemens / ABB / Schneider Electric /BCH/ Legrand / L&T/ C&S Electric/ Honeywell /Hevells                                                                                                                                                         |
| 5       | MCBDB                                                    | Siemens / ABB / Schneider / Legrand/ L&T/ Malhotra/ BCH/ C&S Electric/ Honeywell / Hevells                                                                                                                                                       |
| 6       | FRLS PVC insulated copper conductor (ISI Marked)         | Polycab / RR Kabel / Havells / NITCAB/ AKG/ Konstruct/ Rajnigandha/ Paraflex/ Jivah/ BatraHenlay/ Finolex/V-Marc / Fort Gloster Industries limited/KEI/HPL                                                                                       |
| 7       | Modular Switch / Socket/ Electronic stepped Regulator    | Legrand / Schneider / ABB / L&T / Wipro / C&S Electric / Honeywell                                                                                                                                                                               |
| 8       | TV & Telephone Cables / Wires (ISI Marked)               | Havells / Finolex / Polycab / KEI / RR Kabel /HPL                                                                                                                                                                                                |
| 9       | LED light fitting / fixtures                             | Philips / Bajaj / Crompton / Havells / Jivah/Instapower/ K-Lite/Jaquar                                                                                                                                                                           |
| 10      | Electrical light fittings / lamp                         | Philips / Bajaj / Crompton / Havells/ Jivah/Instapower/K-Lite/ Jaquar                                                                                                                                                                            |
| 11      | Ceiling Fan (BLDC)                                       | Usha / Orient / Havells / Jivah/Bajaj/ Crompton                                                                                                                                                                                                  |
| 12      | Wall Fan / Exhaust Fan                                   | Usha / Orient / Havells / Jivah/Bajaj/ Crompton                                                                                                                                                                                                  |
| 13      | Split AC Unit                                            | Hitachi / O-general / Daikin / Mitsubishi / Carrier (Toshiba)                                                                                                                                                                                    |
| 14      | Voltage Stabilizer                                       | V-Guard / Hitachi / Servokon / Sen &Pandit / Microtek                                                                                                                                                                                            |
| 15      | Geyser                                                   | Jaquar / Racold / Venus / AO Smith/ Crompton/ Havells                                                                                                                                                                                            |
| 16      | LT / HT Cables (ISI Marked)                              | Havells / Finolex / Polycab / Paraflex/ BatraHenlay/ Fort Gloster Industries limited/ KEI /V-Marc / RR Kabel                                                                                                                                     |
| 17      | Cubical type LT Panel / Feeder Pillar                    | RST / SPC / ASES/ Masstech Switchgears / Industrial Switchgears / S. K. Engineering / BCH/ Electric Point /Pristine /Precision/ Ultimate Power Control/ Vdeal system/ Stech Power Industries / RP control/ Aarnav Powertech (Only CPRI Approved) |
| 18      | Energy Meter                                             | L&T / HPL / Secure / Bentec / Schneider/GENUS                                                                                                                                                                                                    |
| 19      | Digital type Ammeter / Voltmeter / Multifunctional meter | ABB / Siemens / Schneider / Legrand / L&T / Automatic Electric / C&S Electric / Kappa                                                                                                                                                            |
| 20      | LED Type Indicating Lamps                                | ABB / Siemens / ASES /Schneider / Bajaj/ Legrand / Instapower/L&T / C&S Electric                                                                                                                                                                 |
| 21      | Selector Switch                                          | ABB / Siemens / ASES /Schneider / Legrand / L&T / Kaycee / BCH/ C&S Electric                                                                                                                                                                     |
| 22      | Control fuses with base                                  | Siemens / BCH / L&T / GE/ C&S Electric                                                                                                                                                                                                           |
| 23      | Push Buttons                                             | ABB / Siemens / ASES /Schneider / Legrand / L&T / C&S Electric                                                                                                                                                                                   |
| 24      | CT / PT                                                  | As per manufacturer's practice.                                                                                                                                                                                                                  |
| 25      | MS Octagonal Pole / Decorative Pole                      | Bajaj / Crompton / Philips/ Royal Infra/ Surya / Volmont/                                                                                                                                                                                        |

| SL. NO. | ITEM                                | MAKE                                                                                  |
|---------|-------------------------------------|---------------------------------------------------------------------------------------|
|         |                                     | Jivah/K- lite                                                                         |
| 26      | Pole Bracket / street light bracket | Bajaj / Crompton / Philips/ Royal Infra/ Surya / Volmont/ Jivah/K- lite               |
| 27      | CAT 6 I/O Port, CAT 6 Cable         | Legrand / Derwiser /Molex / Polycab/ Havells/Genius                                   |
| 28      | PVC conduit Pipe & accessories      | Supreme /Prince /Atul /AKG / JPPL/ Malhotra/ Konstruct/ NORPACK                       |
| 29      | DWC Pipe                            | Rex / Duraline / Konstruct / Jain Elegation                                           |
| 30      | Cable gland                         | Comet / Jainsons/ Barco /Dowells                                                      |
| 31      | Thembles                            | Dowells/ Action/Comet/Barco                                                           |
| 32      | Cable Tray                          | Atul/ Dynamic/ Steel Kraft /AKG/DG Automation                                         |
| 33      | Raceway                             | Legrand / Honeywell / OBO                                                             |
| 34      | Commercial Refrigerator             | Blue Star/ Voltas/ Godrej/ Haier                                                      |
| 35      | Fire Extinguisher and Accessories   | Life Guard/ Getech/Omex/ Fire Shield/ Flameklog/KALPEX/Atasee/ ASES/Minimax/ Ceasfire |

#### **ACCEPTABLE MAKES FOR UPS SYSTEM**

| S. No. | ITEMS | MAKES                                                                  |
|--------|-------|------------------------------------------------------------------------|
| 1      | UPS   | Schneider (APC) / Numeric (Legrand) / Delta / Vertiv (Emerson) / EATON |

#### **ACCEPTABLE MAKES FOR EV Charger**

| Sl. No. | Item                               | Acceptable makes                          |
|---------|------------------------------------|-------------------------------------------|
| 1       | AC / DC Electric Vehicle Charger : | ABB/Delta/Labotek/Havells/Schneider/Eaton |
| 2       | EV charger Stands :                | ASPL / Mk Electricals / SPC Electrotech   |
| 3       | DWC HDPE Pipe :                    | Duraline/Kamat/Pioneer/Gemini/Rex         |
| 4       | Glands & Lugs:                     | Dowells/Comet/Barco/HMI/Jainson           |
| 5       | Pole/Angular Iron Frame:           | Jindal/Tata/Sail                          |

#### **ACCEPTABLE MAKES OF WATER COOLER CUM PURIFIER**

| SL. NO. | ITEMS                     | MAKES                                                                  |
|---------|---------------------------|------------------------------------------------------------------------|
| 1.      | Water Cooler cum purifier | Voltas / Blue Star / Ion Exchange (Zero B) / Aquaguard (Eureka Forbes) |

#### **ACCEPTABLE MAKES OF DEEP FREEZER**

| SL. NO. | ITEMS        | MAKES                           |
|---------|--------------|---------------------------------|
| 1.      | Deep Freezer | Blue Star /Voltas / Godrej / LG |

#### **Preference to PPP-M - II Policy (Make in India):**

- The Government has issued public procurement policy (Preference to Make in India) vide Ministry of Commerce and Industry Development of industrial policy and promotion (PPS) vide order No.P-45021/2/2017-PP BE-II dated 28.05.2018, to—Encourage Make in India and to promote manufacturing and production of Goods and services in India with a view to enhancing income and employment. CPWD has decided to implement this policy.
- The agency shall submit list of makes of materials proposed to be used on the work from local suppliers (as defined in the above order dated 28.05.2018) along with minimum local content as specified below for approval of the department out of the approved makes kept in the tender.
- The department will be approving only makes of the materials having a minimum local content of 50% for use on this work, out of the preferred makes list.
- The minimum local content of 50% is considered for the complete item including labour component. The agency shall obtain the certificate for all items except for sundry items

# PART C-2

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH : SITC of Substation & LT Distribution)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of Substation & LT Distribution”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                                                               |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works                                        | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| I                                                                                                     | <b>SITC of Substation &amp; LT Distribution (315 KVA X 2)</b> | 90,33,816/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall mean <b>“SITC of Substation &amp; LT Distribution with minimum individual capacity of transformer of 250 KVA”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) should also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.

**OR**

- ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

### **ADDITIONAL CONDITIONS FOR SUB-STATION**

1. **Specification:** The work shall be carried out strictly in accordance with CPWD specification for electrical works 2023 (Internal) and 2023 (External) and as amended up to date and in accordance with Indian Electricity Rules, 1956, India Electricity Act, 2003 & Part-IV-2013 for Sub-Station. Indian Standards as amended upto date and as per direction of Engineer-in-Charge. The additional specifications are to be read with above and in case of any variations, specifications given along with the tender shall apply.
2. **Location:** The contractor is advised to visit the site before submission of their tender and ensure that equipment being offered by them shall be accommodated in the spaces available.
3. **Terms of Payments:**  
Following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein.
  - (i) No advance payment shall be made.
  - (ii) 75% after initial inspection and delivery at site in good condition at site alongwith test report and other relevant papers, on pro-rata basis.
  - (iii) 15% after completion of installation in all respect.
  - (iv) Balance 10% will be paid after Testing, Commissioning & Handing Over to the department for beneficial use.
4. **Rates:**
  - 4.1 The rates quoted by the tenderer, shall be firm and inclusive of all taxes, etc. and all charges for packing forwarding, insurance, freight and delivery, installation, testing, commissioning etc. at site including temporary construction of storage, risks, over head charges, general liabilities/ obligations.
5. **Completion Period :**  
The Completion period indicated in the tender documents is for the entire work of planning, designing, approval of drawings etc., arrangement of materials & equipments, delivery at site including transportation, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge.
6. **Storage:** Responsibility for storage space for execution of work shall be of main contractor.
7. **Power & Water Supply:** Responsibility for supply of power & water for execution of work shall be of main contractor.
8. **Indemnity -:**  
The successful tenderer shall at all times indemnify the department, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the contractor shall be responsible for any accident or damage incurred or claims arising three from during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer on account of the above.
9. **Insurance and Storage:**  
All consignments are to be duly insured upto the destination from warehouse at the cost of the contractor. The insurance covers shall be valid till the equipment is handed over duly installed, tested and commissioned.
10. **Inspection by CEA-:** After completion of the work, the contractor will offer the same for inspection of Central Electricity Authority, if required. The contractor will extend all help including test facilities to the representative of Central Electricity Authority. In case the contractor fails to make desired facilities available during inspection, the department reserve the right to provide the same at the risk & cost of the contractor. The observation of Central Electricity Authority which is a part of agreement will be attended by the contractor promptly. The installation will be commissioned only after receiving clearance from Central Electricity Authority. Inspection fees of Central Electricity Authority will be borne by the department.
11. The material in required quantity to be used in the work shall be got approved from the Engineer-in-charge before its use at site. The Engineer-in-charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.
12. Contractor shall preserve the copies of invoices, test certificates, gate passes etc. to prove the genuineness of material/purchases. The responsibility of procurement, genuine material of specialized works shall rest with the contractor.
13. **No inspection out side the country is permissible if required so the same will be deemed to be waived off and necessary test reports shall be submitted before the dispatch of equipment.**

## TECHNICAL SPECIFICATION FOR SUBSTATION WORK

- 1.0 SITE CONDITION:** The work is to be carried out for “Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.”
- 1.1 The Tenderers are advised to visit the site for any site particular to be well acquaintance about the site requirement by him, before tendering.
- 1.2 The work shall comprise entire labour including supervision and all materials necessary to make a complete installation to the entire satisfaction of the department. The term complete installation shall mean, not only major items of equipment covered by these specifications, but also incidental sundry components necessary for complete execution and satisfactory performance of the installation, with all labour charges, whether or not these have been mentioned in detail in the tender documents. The work shall include data entry, programming, start up test and demonstration, training of personnel for maintenance and operation, submission of construction and installation drawings and writing diagrams, as built documents and system guarantee.

### **Interpreting Specification**

In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:

- (a) Schedule of quantities
- (b) Technical specifications
- (c) Drawing (if any)
- (d) General specifications
- (e) Relevant BIS or other international code in case BIS code is not available

### **1.0. SPECIFICATION OF 11 KV HT PANEL**

11 KV HT Panel shall be as per CPWD specifications. **The HT panel manufacture shall be manufacturer of VCB also.**

### **CABLE TERMINATION**

The switchboard panel shall be complete with suitable cable end termination for XLPE insulated cables. Cable and sealing box shall preferably be mounted inside the panel. For XLPE cables adequate space and clearances shall be made for heat shrinkable termination.

Two earthing terminals shall be provided in each panel in cable box / cabling chamber for earthing armour / screen.

Where more than one core is terminated on each phase, links suitably designed and properly supported shall be provided to avoid unnecessary bending of cable cores without decreasing the length of insulated cable tail. Electrical clearances that would normally be required when using one core per phase shall be maintained.

Compression type cable glands shall be provided for power and control cables with XLPE insulated cables.

### **TESTING & INSPECTION**

After completion of all work at the manufacturer's works the switchboards shall be inspected and tested in presence of the Engineer in Charge or his authorized representative. The contractor shall arrange the inspection and testing of the equipments at the manufacturer's premises and at site of work after installation. All the expenses for testing and inspection shall be borne by the contractor, however expenses of lodging and boarding in respect of the Engineer in Charge or his authorized representative shall be borne by the department. Stage inspection may also be carried out from time to time to check the progress of the work and workmanship. Contractor shall intimate the date of inspection after confirmation from the Manufacturer at least fifteen days advance.

The following tests shall be carried out:

- i) All routine tests specified in relevant Indian shall be carried out on all circuit breakers.
- ii) Test for protective relay operation by primary or secondary injection method.
- iii) Operation of all meters.
- iv) Secondary wiring continuity test.
- v) Insulation test with 5000 Volts megger, before and after voltage test.
- vi) HV test on secondary wiring and components on which such test is permissible (2 KV for one minute)
- vii) Simulating external circuits for remote operation of breaker, remote indicating lights and other remote operations, if any.
- viii) Measurement of power required for closing / trip coil of the breaker.
- ix) Pick up and drop out voltages for shunt trip and closing coils.
- x) CT Polarity test.

Vendor shall provide all facilities such as power supply, testing instruments and apparatus required for carrying out the tests. Required copies of test certificates for all the tests carried out along with copies of type test certificates and certificates from Sub-Vendor for the components procured from them are to be submitted before dispatch of

switchboards.

### **DRAWINGS AND INFORMATION**

The contractor shall furnish following drawings / documents in accordance with enclosed requirements:

- i) General Arrangement drawing of the Switchboard, showing front view, plan, foundation plan, floor cutouts / trenches for external cables and elevations, transport sections and weights.
- ii) Sectional drawings of the circuit breaker panels, showing general constructional features, mounting details of various devices, bus bars, current transformers, Potential transformer, cable boxes, terminal boxes for control cables etc.
- iii) Schematic and control wiring diagram for circuit breaker and protection including indicating devices, metering instruments, alarms, space heaters etc.
- iv) Terminal plans showing terminal numbers, ferrules markings, device terminal numbers, function etc.
- v) Relay wiring diagrams.
- vi) Equipment List with details of make and type.

Contractor shall furnish required number of copies of above drawings for reviews by the Engineer in Charge or his authorized representatives; fabrication of switchboards shall start only **after approval of drawings by the Engineer in Charge.**

The following information shall be furnished:

- i) Technical literature giving complete information of the equipment.
- ii) Erection, Spare Parts Catalogues, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.
- iii) A comprehensive spare parts catalogue.

#### HV PANEL-11 KV

- |    |                      |   |                                                                                                                                                        |
|----|----------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Applicable Standard: | : | IS: 13118 amended upto date.                                                                                                                           |
| 2. | Rating:              | : | 630 A, 12 KV, 18KA.                                                                                                                                    |
|    | Degree of Protection | : | IP – 4X                                                                                                                                                |
| 3. | Execution:           | : | Indoor Metal Clad, horizontal drawout, horizontal isolation.                                                                                           |
| 4. | Circuit Breaker      | : | Vaccum Circuit Breaker one interrupter per phase.                                                                                                      |
| 5. | Operating Mechanism  | : | Manual charging.                                                                                                                                       |
| 6. | Tripping arrangement | : | Shunt trip.                                                                                                                                            |
| 7. | Busbar:              | : | Copper bus bar suitable for 630 Amps. Provided with heat shrinkable sleeve.                                                                            |
| 8. | C.T.                 | : | <u>Dual Core Dual Ratio, Cast Resin</u><br>(a) 15 VA Burden with 5 P 10 accuracy for protection<br>(b) 15 VA Burden with Class-I accuracy for metering |
| 9. | P.T.                 | : | Dry type Epoxy.<br>3 Phase, 3 Links 11 KV/110 V<br>Withdrawable with automatic Shutters. Not less than 100 VA Burden                                   |

## 10. Relays & Accessories

| Sl. No | Description                                         | Incoming Panel | Outgoing Panel |
|--------|-----------------------------------------------------|----------------|----------------|
| (i)    | IDMT characteristics of micro-processor based Relay | Y              | Y              |
| (ii)   | Trip Circuit Supervision Relays                     | Y              | Y              |
| (iii)  | Master Tripping Relays                              | Y              | Y              |
| (iv)   | P.T. + Voltmeter with selector switch.              | Y              | -              |
| (v)    | CT for Metering and Protection.                     | Y              | Y              |
| (vi)   | Ammeter with selector switch                        | Y              | Y              |

Note:- 'Y' stands for 'yes' that is to be provided

11. Indicating Lamps/ Push Button : All standard indicating lamp like Phases, ON/OFF, breaker charged etc. heater, heater switch, emergency trip, breaker control switch, etc.
12. Ammeter/Voltmeter : Digital Type 96 x 96 sq.mm.size
13. Cable Termination : XLPE HT Cable of suitable size.  
(Both incoming & outgoing)
- Power Pack : 12 Volt, 150AH Capacity maintenance free battery for 220V A.C Input and 110 / 24 Volt D.C Continuous output.
14. Testing. : Routine Acceptance Test as per BIS / IEE / IS as is relevant.

## 2.0 TECHNICAL SPECIFICATION OF DISTRIBUTION TRANSFORMER WITH OFF LOAD TAP CHANGER

Indoor transformer shall be step down transformer from 11 KV to 0.433 KV three phase 50 cycles copper wound. Transformer shall be having high efficiency and low impedance, shall be as per latest IS. It shall be double wound core type with ON-AN cooling having delta connection on HT side and star connection on secondary side neutral brought out having arrangements for earthing or Bus trunking, off load tap changing device in high tension side for tapping in steps of + 5% to - 15% step of 2.5% (**as per IS 1180**). Transformer shall be as per relevant BIS and CPWD specifications. The transformer shall be complete with the following accessories.

- (i) Off load tap changer with mechanical manual operating device with locking arrangement.
- (ii) Oil conservator with sump and drain valve, cover plate & oil level indicator.
- (iii) Dehydrating breather with silica gel and oil seal.
- (iv) Oil filling valve 32mm with cover plate.
- (v) Thermometer pockets.
- (vi) Diagram, rating plate, terminal marking plate.
- (vii) Two earthing terminals.
- (viii) Lifting lugs for active part only.
- (ix) Four uni-directional plain rollers.
- (x) First filling of dehydrated transformer oil.
- (xi) Double diaphragm explosion vent with sight glass.
- (xii) 150 mm dial type winding temperature indicator with maximum reading pointer.
- (xiii) Plain oil level gauge with minimum level marking.
- (xiv) Air release plug on tank cover.
- (xv) Detachable radiator with top and bottom stop valves and drain and air release plugs.
- (xvi) 150mm dia type oil temperature indicator with maximum reading pointer.
- (xvii) Jacking pads with haulage holes.

- (xviii) Base channel with viewing holes.
- (xix) Drain cum bottom filter valve 32mm with cover plate.
- (xx) 11 KV cable end box suitable for 3 core suitable size XLPE cable.
- (xxi) LT 0.433 KV TP&N cable end box with extended suitable size tinned copper bus bar / Bus trunking on all four bushings to facilitate 3.5 core suitable size cable connection.
- (xxii) Extra neutral bushing for solid earthing.

The transformer shall be rated for a maximum temperature rise of 50 Deg. C for oil and 55 Deg. C for winding over 45 Deg. C ambient temperatures. The transformer shall conform to the latest IS.

#### **CONTROL WIRING**

The Contractor shall supply and install, test and commission all control/instruments wiring as found necessary. The job is turnkey and shall remain the responsibility of Contractor to ensure its functioning in useful and defined manner.

All the indoor control wiring shall have copper conductor and PVC insulated.

The indoor control wiring shall conform to latest IS for voltage grade of 1.1 KV for A.C./230 V for D.C.

The conductor cross sectional is shall not be less than 2.5 Sq mm or as per OEM recommendation.

The indoor wiring shall be in surface conduit neatly placed on wall or ceiling either in horizontal or vertical run.

The control wiring which are to be placed indoor or which are to run in cable trench shall be of 650/1100 voltage grade and shall conform to latest IS. The cable shall have minimum dia of conductor to 2.5 sq. mm.

#### **VECTOR GROUP**

Transformer shall have vector group of Dy 11

#### **TESTS:**

Transformers shall be subjected to routine tests at manufacturer works as specified in IS 2026, IS 1180 (latest amendment) given below:

##### **Routine tests:**

- Turns ratio measurement at various taps
- HV and LV winding resistance
- Checking of vector group
- Insulation Resistance Test
- No Load Loss & No Load current measurement.
- Measurement of Load losses
- Impedance voltage and impedance.
- Separate source voltage withstand test
- Induced over voltage withstand test.

##### **Type tests (Documents are to be submitted only, no type test will be done)**

- Heat Run Test.
- Impulse voltage withstand test.
- Short circuit test.
- Measurement of acoustic noise level.
- Leakage Test (tank).
- High Frequency withstand test.

The power frequency test voltage for the secondary winding shall be 2.5 KV R.M.S. The transformer shall be **charged only after the tests are conducted and approval of local authorities is obtained.**

Tenderer may submit type test certificates conducted on similar rated transformers for bid validation.

#### **TESTING AND INSPECTION:**

The Contractor shall draw up and carry out a comprehensive inspection and testing programmed during manufacture and commissioning of the transformer. The Engineer in Charge shall approve the Programme for the Inspection and witness of tests. Contractor shall ensure that type tested equipment is only offered and routine test shall be conducted as per relevant standards in presence of the Engineer in Charge or his authorized representative at the manufacturer work place. The supplier shall only dispatch the Transformer after inspection and approval for acceptance of the tests by the Engineer in charge.

## **DRAWING AND INFORMATION**

The vendor shall furnish following drawings / documents in accordance with enclosed requirement.

General arrangement of transformer

General arrangement of HV cable box with connection diagram

General arrangement of LV cable box / bus trunking and connection arrangement

General arrangement of marshalling box and wiring diagram

Rating and diagram plate indicating % impedance etc.

Type test and guaranteed technical parameters

Reactance, resistance and capacitance

The initial charging current (in rush current)

Calculation for transformer such as core sizing, flux density, turns ratio & sizing of transformer

## **QUALITY ASSURANCE**

Quality Assurance shall follow the requirements of the Engineer in Charge as applicable. Quality assurance involvement will commence at enquiry and follow through to completion and acceptance thus total conformity to Purchaser's requirements.

## **DEVIATION**

Deviation from specifications must be stated in writing at the quotation stage.

In the absence of such a statement, it will be assumed that the requirements of the specifications are met without exception.

## **SPECIFICATION OF 11/0.433 KV ONAN TRANSFORMER**

1. Voltage Ratio : 11/0.433 KV.
2. Type : Dy 11, ONAN, Indoor
3. Type of tap changer : at HT side.
4. Tapping on HV : OFF Load + 5% to - 15% step of 2.5%
5. Termination : i) Cable end box on 11 KV side for 3 core of suitable size.  
ii) Cable end box on LT side.
6. Fittings/Accessories : As per latest IS as under.  
i) Lifting lugs  
ii) Roller (Bi directional)
7. Losses : Losses as per BEE 3 Star (Corresponding Level as per BIS amended upto date of receipt of tender) under BIS Guidelines.
8. Installation : To be installed in accordance with IS 10028 (part II & III) code of practice for installation. Necessary support channels should be grouted in the flooring.  
Control cables from transformer to LT/HT Panel to be provided, including supply and laying cable, termination with lugs, thimbles etc as reqd.
9. Testing : Routine acceptance test as per IS to be witnessed by the representative of Engineer in Charge at his discretion.
10. Commissioning : All mandatory test as per IS and or manufacturer's recommendations to be conducted before commissioning.

### 3.0 TECHNICAL SPECIFICATION OF LT PANEL

Cubicle type switchboards and components shall be fabricated and installed as per CPWD General Specifications for Electrical Works Part-IV Substations 2013 and conforming to the requirements of the latest revision including.

#### PAINTING OF ALL STEEL WORK (FACTORY FABRICATION WORK)

- a) Degreasing: All the steel components, to be painted, should be effectively cleaned by alkaline degreasing.
- b) Pickling: Oxide scale rust formation is to be removed in a hot bath of sulphuric acid. Pitting of the surface is to be prevented by the use of pickling inhibitors.
- c) Cold rinsing: The parts are then to be washed with cold water to remove all traces of acidic solution.
- d) Phosphate: In order to attain durable paint coating the metal surface is to be given phosphatic treatment by development a phosphate layer on the surface. Preferably hot grenadite solution is to be used in the phosphate plant.
- e) Passivating: This process is to be carried out by using dedicated solution.
- f) Drying: The treated parts should be dried in a hot chamber in dust free atmosphere to ensure that they are absolutely clear and dry before the paint is applied.
- g) Primer Coating: The treated and dried parts are to be sprayed with high corrosion resistance primer.
- h) Stove Drying: The primer coating is to be packed in an electrically heated, air circulated area type storing over.
- i) Finishing Coat: The final finishing coat shall be powder coating of approved shade.

### 4.0 EARTHING

Earthing of system shall be as per CPWD specification and relevant BIS.

### 5.0 CABLE LYING WORK:

The work shall be carried out as per CPWD General Specifications for Electrical works part II External 2023 as amended up to date, relevant IE rules, and as per directions of Engineer- in Charge.

### 6.0 CABLE TERMINATION

Compression type cable glands shall be provided for power and control cables with XLPE insulated cables.

### 7.0 SAFETY REQUIREMENTS

Safety provisions shall be generally in conformity of CPWD General Specifications of Electrical Works (Part I – Internal), 2013.

**Fire Extinguishers** – CO2 conforming to IS:15683

**Fire Buckets** – Fire buckets conforming to IS 2546:1974 shall be installed with the suitable stand for storage of water and sand.

### 8.0 DANGER NOTICE PLATES

As per provisions of IE Rules 1956, Danger Notice Plates in Hindi or English and, in addition, in the local language with the sign of skull and bones are required to be provided on power line supports and other installations.

#### Standards

1. The Danger Notice Plates shall comply with IS:2551-1982.

#### Dimensions

- I. Two sizes of Danger Notice Plates as follows are recommended:
  - For display at 415 V installations – 200x150mm
  - For display at 11 KV (or higher voltages) installations – 250x200mm
- II. The corners of the plate shall be rounded off.
- III. The location of fixing holes is provisional and can be modified to suit the requirements.

#### Lettering

1. All letterings shall be centrally spaced. The dimensions of the letters, figures and their respective position shall be as per directives of Engineer – In charge.
2. The size of letters in the words in each language and spacing between them shall be so chosen that these are uniformly written in the space earmarked for them.

#### Languages

1. Under Rule No. 35 of Indian Electricity Rules, 1956, the owner of every medium, high and extra high voltage installation is required to affix permanently in a conspicuous position a danger notice in Hindi or English and, in addition, in the local language, with the sign of skull and bones.
2. Adequate space should be provided in the specimen danger notice plates for having the letterings in local language for the equivalent of 'Danger', '415V', '11000V' and 'Volts'

#### Material & Finishing

1. The plate shall be made from mild steel sheet of at least 1.6mm thick and vitreous enameled white, with letters, figures and the conventional skull and cross-bones in signal red color (refer IS:5-1978) on the front side. The rear side of the plate shall also be enameled.

**Danger boards:**

2. All supports carrying HV lines shall be fitted with danger plates confirming to IS 2551 at height of 3 M from ground indicating the voltage of line. The script shall be both in 'English/Hindi'.

**TECHNICAL SPECIFICATION FOR FIRE EXTINGUISHERS**

| ITEM NO.  | PARAMETER                         | SPECIFICATIONS AS PER NIT      |
|-----------|-----------------------------------|--------------------------------|
| <b>I</b>  | <b>CO2 Type Fire Extinguisher</b> |                                |
| 1         | Conforming IS                     | IS: 15683                      |
| 2         | Capacity                          | 4.5 Kg                         |
| 3         | Filling Ratio                     | 0.66                           |
| 4         | Type                              | Portable                       |
| 5         | Expellant                         | Self                           |
| 6         | Efficiency Discharge              | Minimum 95%                    |
| 7         | Discharge Time                    | More Than 8 Sec & 15 Sec       |
| 8         | Throw                             | Minimum 2 Mtrs. for 4.5 Kg     |
| 9         | Operating Position                | Upright                        |
| 10        | Operating Valve                   | Wheel / Squeeze Grip type      |
| 11        | Operating Temperature Range       | -30 Deg C To +55 Deg C         |
| 12        | Fire Rating                       | 21B, C                         |
| <b>II</b> | <b>Electrical Matting</b>         |                                |
| 1         | Conforming IEC                    | IEC 61111                      |
| 2         | Class                             | Class - 1 PV tested upto 10 KV |

**GENERAL CONDITIONS**

- 1) After completion of the works, firm/contractor has to arrange inspection from C.E.A., if required and obtain no objection certificate and also arrange releasing of connection from local supply company / electricity board for which nothing extra will be paid.
- 2) All the pre-commissioning, testing, calibration of relays etc to be done in presence of the Engineer-in-charge before commissioning of system. All the test results should be recorded and report to be signed by authorized person and as well by CPWD officials who will witness the results (EE / AE / JE).
- 3) Material shall be got inspected by the Engineer-in-charge or his authorized representative at manufacturer work prior to dispatch.
- 4) Manufacturer's test certificates of all equipments such as transformers, LT panel, relays, CTs should be submitted by the firm at the time of supply.
- 5) Testing shall be carried out as per CPWD General Specifications for Electrical Works Part-IV Substations 2013. All pre-commissioning tests shall be carried out at site in the presence of the Engineer-in-charge or his authorized representative.

**Interpreting specifications:** In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:

- a) Schedule of quantities
- b) Technical specifications
- c) Drawings (if any)
- d) General specifications
- e) Relevant BIS or other international code in case BIS code is not available.

**Inspection and testing as per CPWD general specification for electrical works Part-IV sub-station 2013**

## **ADDITIONAL CONDITIONS**

### **Compliance with Regulations and Indian Standards**

All work shall be carried out in accordance with relevant regulation both statutory and those specified by the Indian standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:-

- (i) Factories act
- (ii) Indian Electricity Rules.
- (iii) B.I.S & other standards as applicable.
- (iv) Workmens compensation Act
- (v) Statutory norms prescribed by local bodies like CEA, Power Supply Co.etc.

After completion of the installation, the same shall be offered for inspection by the representatives of the Central Electricity Authority. The contractor will extend all help including test facilities to the representatives of CEA. The observations of CEA will be attended by the contractor. The installation will be commissioned only after getting clearance from CEA.

Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the design, manufacture and installation of the equipment with all accessories in accordance with currently applicable statutory regulations and safety codes.

Successful tenderer shall arrange for compliance with statutory provisions of safety regulations and departmental requirements of safety codes in respect of labour employed on work by the tenderer. Failure to provide such safety requirement would make the tenderer liable for penalty of RS-----/- for each default. In addition the department will be at liberty to make arrangement for the safety requirements at the cost of tenderer and recover the cost thereof from him.

**ACCEPTABLE MAKES OF SUBSTATION EQUIPMENTS**

| <b>SL. No.</b> | <b>Item</b>                                                 | <b>Makes</b>                                                                                                      |
|----------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 1              | Transformer                                                 | Kirloskar / Crompton / ABB / Schneider/Voltamp/ ITE-Gurgaon                                                       |
| 2              | HT Panel / VCB                                              | Kirloskar / Crompton / ABB / Schneider / Siemens / L&T/ ITE-Gurgaon<br>[OEM or Authorised channel partner of OEM] |
| 3              | Makes of accessories of HT Panel                            | As per standard practice of manufacturer.                                                                         |
| 4              | Air Circuit Breaker, MCCB, MCB, Contactor etc.              | ABB / Siemens / Schneider / Legrand / L&T                                                                         |
| 5              | Cubical type LT Panel Board / Feeder Pillar (CPRI approved) | As per Part C - 1                                                                                                 |
| 6              | Selector Switch                                             | ABB / Siemens / Schneider / Legrand / L&T / Kaycee / BCH                                                          |
| 7              | Digital type Ammeter / Voltmeter / Multifunction meter      | ABB / Siemens / Schneider / Legrand / L&T / Automatic Electric / Kappa                                            |
| 8              | LED Type Indicating Lamps                                   | ABB / Siemens / Schneider / Legrand / L&T                                                                         |
| 9              | Push Buttons                                                | ABB / Siemens / Schneider / Legrand / L&T                                                                         |
| 10             | Control fuses with base                                     | Siemens / BCH / L&T / GE                                                                                          |
| 11             | CT / PT                                                     | As per manufacturer's practice.                                                                                   |
| 12             | FRLS PVC insulated copper conductor (ISI Marked)            | As per Part C - 1                                                                                                 |
| 13             | HT / LT Cable (ISI Marked)                                  | As per Part C - 1                                                                                                 |
| 14             | Cable jointing kit                                          | 3M / Raychem                                                                                                      |
| 15             | Cable Lugs / Glands                                         | Dowels /Asian / Comet                                                                                             |
| 16             | GI Pipe (ISI Marked)                                        | Tata / Jindal (Hissar)                                                                                            |
| 17             | Fire Extinguisher and Accessories                           | As per Part C - 1                                                                                                 |
| 18             | DWC HDPE Pipes                                              | Tirupati (Gemini) / Rex / Duraline                                                                                |

# PART C-3

**Name of Work : Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.(SH : SITC of EPABX & LAN Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Electrical work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. “**SITC of EPABX & LAN Work**”. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                          |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------|--------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works   | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| I                                                                                                     | SITC of EPABX & LAN Work | 93,37,201/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means “<b>SITC of EPABX &amp; LAN Work</b>”.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.
  - OR**
  - ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.

4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.

13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## **ADDITIONAL CONDITIONS FOR EPABX & LAN SYSTEM**

### **1. Specification:-**

The work shall be executed as per CPWD's general specification for Electrical Works Part – I (Internal) – 2023, Part – II (External) – 2023, I.E. Rules, Indian Standards amended up to date and as per direction of Engineer-in charge.

### **2. Terms of Payments:-**

Following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein on pro – rata basis.

- (v) No advance payment shall be made.
- (vi) 70% after initial inspection and delivery at site in good condition on pro-rata basis.
- (vii) 20% after completion of installation in all respect.
- (viii) Balance 10% will be paid after Testing, Commissioning & Handing Over to the department for beneficial use.

### **3. Storage:-** Responsibility for storage of material for execution of work shall be of main contractor.

4. The material in required quantity to be used in the work shall be got approved from the Engineer-in-charge before its use at site. The Engineer-in-charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.

### **TECHNICAL SPECIFICATION OF E&M WORK**

- i) The work shall be carried out in conformity with CPWD General specification Part – I (Internal) 2023 and CPWD General specification Part – II (External) 2023 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- i) Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E), & decision of the Engineer in Charge shall be final & binding.
- ii) The contractor will make his own arrangement for storage of material arranged by him, and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- iii) All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.
- v) The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- vi) The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No. DG/MISC.(ELECT.)/1 dated 30.03.2017**.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- vii) Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge.

## **TECHNICAL SPECIFICATIONS FOR EPABX&LAN WORK**

**1.0 SITE CONDITION:**The work is to be carried out for Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

1.1 The Tenderers are advised to visit the site for any site particular to be well acquaintance about the site requirement by him, before tendering.

### **SCOPE OF WORK AND EXCLUSIONS:**

1.2 General features and major components of the work are as under Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

### **COMPLIANCE WITH REGULATIONS AND INDIAN STANDARDS**

All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

- (i) CPWD Specification for Internal (2023) and External Specification (2023) as amended up to date.
- (ii) Prevailing factories Act. as amended up to date.
- (iii) Indian Electricity Rules as amended up to date.
- (iv) B.I.S. & other standards as applicable as amended up to date.
- (v) Workmen's compensation Act. as amended up to date.
- (vi) Water works manual as amended up to date.

### **Interpreting Specifications:**

In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:

- (a) Schedule of quantities
- (b) Technical specifications
- (c) Drawing (if any)
- (d) General specifications
- (e) Relevant BIS or other international code in case BIS code is not available.

### **TECHNICAL SPECIFICATION OF LAN WORK**

|           |                                          |                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>I</b>  | <b>24 PORT PoE / PoE+ L3 CORE SWITCH</b> |                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>a)</b> | <b>Architecture</b>                      |                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                          | 1) The Switch Shall be 19" Rack Mountable                                                                                                                                                                                                                                                                                                                                          |
|           |                                          | 2) The switch should have Min 24 x10/100/1000 Base - T PoE / PoE+ port,8 x 1GbSFP ports upgradeable to 10Gb SFP+ (SFP unpopulated & upgradeable to 10Gb Ethernet via licensing). Includes Base Software License.                                                                                                                                                                   |
|           |                                          | 3) The switch should have 1 dual-personality (RJ-45 or USB) serial console port                                                                                                                                                                                                                                                                                                    |
|           |                                          | 4) Shall have switching capacity of 128 Gbps or better                                                                                                                                                                                                                                                                                                                             |
|           |                                          | 5) Shall have up to 95 million pps switching throughput or better                                                                                                                                                                                                                                                                                                                  |
|           |                                          | 6) The Switch should support 16000 MAC address                                                                                                                                                                                                                                                                                                                                     |
|           |                                          | 7) The switch should have minimum 370 Watt PoE/PoE+ power budget.                                                                                                                                                                                                                                                                                                                  |
|           |                                          | 8) The switch should be based on IEEE 802.3af/IEEE 802.3at, RPS Support.                                                                                                                                                                                                                                                                                                           |
| <b>b)</b> | <b>Features</b>                          |                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                          | Supports intelligent Layer 2 switching, as well as advanced Layer 3 routing services, role-based policy capabilities, Provider Bridges, bidirectional Access Control Lists, ingress/egress bandwidth control. It enable fine-grained control over traffic flows, as well as controlled access to specific network services and application. Layer 3 services include IPv4 and IPv6 |

|            |                                                                                                                                               |                                                                                                                                                                                                          |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                                                                                                                               | dynamic routing, as well as IP multicast services.                                                                                                                                                       |
|            |                                                                                                                                               | Support for L2 protocols as well as L3 protocols like RIP and static routing are included in the base license.                                                                                           |
|            |                                                                                                                                               | Support is available for IPv6 management.                                                                                                                                                                |
| <b>c)</b>  | <b>Environmental Features</b>                                                                                                                 |                                                                                                                                                                                                          |
| 1          | Operating temperature                                                                                                                         | 0°C to 45°C                                                                                                                                                                                              |
| 2          | Certification                                                                                                                                 | CB / IEC / EN / UL / RoHS                                                                                                                                                                                |
| <b>d)</b>  | OEM should be leaders in Gartner magic quadrant report (wired and wireless). Switch, module, wireless components should be from the same OEM. |                                                                                                                                                                                                          |
| <b>II</b>  | <b>24 PORT PoE / PoE+ L2 SWITCH</b>                                                                                                           |                                                                                                                                                                                                          |
| <b>a)</b>  | <b>Architecture</b>                                                                                                                           |                                                                                                                                                                                                          |
|            |                                                                                                                                               | 1) The Switch Shall be 19" Rack Mountable                                                                                                                                                                |
|            |                                                                                                                                               | 2) The switch should have should have Min 24 x10/100/1000 Base - T PoE / PoE+ port, 4 x 1/10GbE SFP/SFP+ (SFP unpopulated & upgradeable to 10Gb Ethernet via licensing). Includes Base Software License. |
|            |                                                                                                                                               | 3) The switch should have 1 dual-personality (RJ-45 or USB) serial console port                                                                                                                          |
|            |                                                                                                                                               | 4) Shall have switching capacity of 128 Gbps or better                                                                                                                                                   |
|            |                                                                                                                                               | 5) Shall have up to 95 million pps switching throughput or better                                                                                                                                        |
|            |                                                                                                                                               | 6) The Switch should support 16000 MAC address                                                                                                                                                           |
|            |                                                                                                                                               | 7) The switch should have minimum 370 Watt PoE/PoE+ power budget.                                                                                                                                        |
|            |                                                                                                                                               | 8) The switch should be based on IEEE 802.3af/IEEE 802.3at, RPS Support.                                                                                                                                 |
| <b>b)</b>  | <b>Features</b>                                                                                                                               |                                                                                                                                                                                                          |
|            |                                                                                                                                               | 1) Support for L2 protocols as well as L3 protocols IPv4 Routing Services, Multicast, Qos & Filtering.                                                                                                   |
| <b>c)</b>  | <b>Environmental Features</b>                                                                                                                 |                                                                                                                                                                                                          |
| 1          | Operating temperature                                                                                                                         | 0°C to 45°C                                                                                                                                                                                              |
| 2          | Certification                                                                                                                                 | CB / IEC / EN / UL / RoHS                                                                                                                                                                                |
| <b>d)</b>  | OEM should be leaders in Gartner magic quadrant report (wired and wireless). Switch, module, wireless components should be from the same OEM. |                                                                                                                                                                                                          |
| <b>III</b> | <b>SFP MODULE</b>                                                                                                                             |                                                                                                                                                                                                          |
| <b>a)</b>  | <b>Features</b>                                                                                                                               | Compatibility with 24 Port L3 Core Switch & L2 Access Switches, it should from same OEM.                                                                                                                 |
|            |                                                                                                                                               | 1 G SFP Module should be compatible with supplied 24 Port L2 Access / L3 core Switches Interface SFP                                                                                                     |
| <b>b)</b>  | <b>Environmental Features</b>                                                                                                                 |                                                                                                                                                                                                          |
| 1          | Operating temperature                                                                                                                         | 0°C to 45°C                                                                                                                                                                                              |
| <b>IV</b>  | <b>NETWORKING RACK</b>                                                                                                                        |                                                                                                                                                                                                          |
| <b>a)</b>  | <b>12U Wall Mount Rack</b>                                                                                                                    |                                                                                                                                                                                                          |
| 1          | Racks manufactured out of steel sheet punched, formed, welded and Powder coated                                                               |                                                                                                                                                                                                          |
| 2          | Rack should be manufactured by ISO 14001 & IS18001 Certified Company & Should be UL Certified                                                 |                                                                                                                                                                                                          |
| 3          | Standard for Racks configuration will be welded frame and vented top cover                                                                    |                                                                                                                                                                                                          |
| 4          | Rack should have Front Toughened Glass Door with lock & Key                                                                                   |                                                                                                                                                                                                          |
| 5          | Rack should be 1U=44.45 mm                                                                                                                    |                                                                                                                                                                                                          |

|           |                                                                                                                                           |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 6         | Rack should Conform to DIN 41494 or Equivalent EIA /ISO / EN/CEA Standard                                                                 |
| 7         | Rack should have Adjustable mounting depth                                                                                                |
| 8         | Rack should have 100% assured compatibility with all equipments conforming to DIN 41494 (General industrial standard for equipments)      |
| 9         | Powder coated finish with seven Tank pretreatment process meeting IS                                                                      |
| 10        | Rack should have Proper Grounding & Bonding                                                                                               |
| 11        | Rack should have one catilever shelf                                                                                                      |
| 12        | Rack should have Fan module Mount Provision on top Cover with fan                                                                         |
| 13        | Power Distribution Unit - 06 Amp Universal - 06 Socket - 16 Amp Switch with Indicator - 06 Amp Fuse - 06 Amp 3 Pin Plug with Power Cable. |
| 14        | Rack should have 1 No Horizontal Cable Organizer with Plastic Loops.                                                                      |
| 15        | Rack should have provision for cable entry Exit from Both top & Bottom.                                                                   |
| 16        | Rack should have 1 Packet of Mounting hardware, Pack of 10 or more                                                                        |
| <b>b)</b> | <b>9U Wall Mount Rack</b>                                                                                                                 |
| 1         | Racks manufactured out of steel sheet punched, formed, welded and Powder coated                                                           |
| 2         | Rack should be manufactured by ISO 14001 & IS18001 Certified Company & Should be UL Certified                                             |
| 3         | Standard for Racks configuration will be welded frame and vented top cover                                                                |
| 4         | Rack should have Front Toughened Glass Door with lock & Key                                                                               |
| 5         | Rack should be 1U=44.45 mm                                                                                                                |
| 6         | Rack should Conform to DIN 41494 or Equivalent EIA /ISO / EN/CEA Standard                                                                 |
| 7         | Rack should have Adjustable mounting depth                                                                                                |
| 8         | Rack should have 100% assured compatibility with all equipments conforming to DIN 41494 (General industrial standard for equipments)      |
| 9         | Powder coated finish with seven Tank pretreatment process meeting IS                                                                      |
| 10        | Rack should have Proper Grounding & Bonding                                                                                               |
| 11        | Rack should have one catilever shelf                                                                                                      |
| 12        | Rack should have Fan module Mount Provision on top Cover with fan                                                                         |
| 13        | Power Distribution Unit - 06 Amp Universal - 06 Socket - 16 Amp Switch with Indicator - 06 Amp Fuse - 06 Amp 3 Pin Plug with Power Cable. |
| 14        | Rack should have 1 No Horizontal Cable Organizer with Plastic Loops.                                                                      |
| 15        | Rack should have provision for cable entry Exit from Both top & Bottom.                                                                   |
| 16        | Rack should have 1 Packet of Mounting hardware, Pack of 10 or more                                                                        |

| ITEM NO     | PARAMETER                                              | SPECIFICATIONS                                                                                                                                                                                              |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>V</b>    | <b>6 Core Outdoor Armored Multimode Cable, OM3/OM4</b> |                                                                                                                                                                                                             |
| 1           | Cable Type                                             | 6 fiber Multi Mode, Armoured, Loose-tube, Gel filled cable complying to ISO/IEC 11801, EN50173, ANSI/TIA 568-C.3 and Telcordia GR-20; suitable for use in direct burial, outdoor ducts and backbone cabling |
| 2           | Fiber type                                             | 50/125/250, primary coated buffers                                                                                                                                                                          |
| 3           | Fiber Attenuation                                      |                                                                                                                                                                                                             |
|             | @850nm                                                 | <=2.5 dB / Km Max                                                                                                                                                                                           |
|             | @1300nm                                                | <=0.7dB / Km Max                                                                                                                                                                                            |
| 4           | Bandwidth                                              |                                                                                                                                                                                                             |
|             | @850nm                                                 | >1500 MHz-KM                                                                                                                                                                                                |
|             | @1300nm                                                | >500 MHz-KM                                                                                                                                                                                                 |
| 5           | Loose Tube construction                                | Single PBTP loose tube filled with water blocking gel.                                                                                                                                                      |
| 6           | Outer Sheath                                           | HDPE                                                                                                                                                                                                        |
| 7           | Tensile rating                                         | 1000N or better                                                                                                                                                                                             |
| 8           | Maximum Crush resistance                               | 2000N or better                                                                                                                                                                                             |
| 9           | Operating Temperature                                  | -10 Degree C to +70 Degree C                                                                                                                                                                                |
| 10          | Compliance                                             | RoHS                                                                                                                                                                                                        |
| <b>VI</b>   | <b>Fully Loaded Fiber LIU, Multimode</b>               |                                                                                                                                                                                                             |
| 1           | Fiber Management shelf                                 | The fiber management shelf shall have compact design and be ideal for high density front patching applications.                                                                                             |
|             |                                                        | Should be fully loaded and factory fitted assembly with no assembling required during installation at site                                                                                                  |
|             |                                                        | High Density: 1U: 6/12/24 Fiber terminations                                                                                                                                                                |
|             |                                                        | Should be supplied loaded with LC adapters, splice trays, LC/UPC OM3 Pigtailed and fiber management rings                                                                                                   |
|             |                                                        | Pigtail shall be made of bend insensitive multimode fiber                                                                                                                                                   |
| 2           | Drawer style shelf                                     | Easy access to splicing tray & connectors                                                                                                                                                                   |
|             |                                                        | Should have front locking latches on both side of shelf                                                                                                                                                     |
| 3           | Accessories                                            | Fiber management guides, radius controls & secure tie downs provided                                                                                                                                        |
|             |                                                        | Pre loaded with labeling strips, 2 grounding lugs                                                                                                                                                           |
|             |                                                        | Sealed cable inlets for dust and rodent protection                                                                                                                                                          |
| 4           | Material                                               | Min 16 gauge CRCA Sheet steel with powder coating                                                                                                                                                           |
| 5           | Compliance                                             | ROHS /EU Compliant                                                                                                                                                                                          |
| <b>VII</b>  | <b>LC to LC Patch Cord, Multimode</b>                  |                                                                                                                                                                                                             |
| 1           | Make and Type                                          | LC/UPC to LC/UPC Duplex tuned Fiber Optic Patch Cord, 50/125 Micron, Bend Insensitive OM3/OM4                                                                                                               |
| 2           | Cable Sheath                                           | LSZH                                                                                                                                                                                                        |
| 3           | Approval                                               | UL Listings                                                                                                                                                                                                 |
| 4           | Cable Diameter                                         | 1.6 mm duplex cord                                                                                                                                                                                          |
| 5           | Insertion Loss                                         | MAX 0.3 db at 850nm                                                                                                                                                                                         |
| 6           | Temperature Range                                      | -10 Degree C to +60 Degree C                                                                                                                                                                                |
| 7           | Compliant                                              | ROHS                                                                                                                                                                                                        |
| <b>VIII</b> | <b>CAT6 UTP FULLY LOADED PATCH PANEL</b>               |                                                                                                                                                                                                             |
| 1           | Type                                                   | 19" 24-port, loaded with Jack. The IDC section consists of V shape contacts that flex not fatigue when terminated. Each port should have shutter and can be colour coded to match jack outlets.             |
|             |                                                        | 24-port, Modular, 1U, PCB based, Unshielded Twisted Pair, Category 6, ANSI/TIA 568-C.2 and ISO/IEC 11801                                                                                                    |
| 2           | Port arrangement                                       | Configured as 6 Port Module with individually                                                                                                                                                               |

|            |                                              |                                                                                                                                                                                                                                                                                                              |
|------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                              | replaceable CAT-6 Jacks                                                                                                                                                                                                                                                                                      |
| 3          | Circuit Identification                       | Front of each module shall be capable of accepting 9 mm to 12 mm labels                                                                                                                                                                                                                                      |
| 4          | Port Identification                          | 9mm or 12mm Labels on each of 24-ports (to be included in supply                                                                                                                                                                                                                                             |
| 5          | Modular Jack                                 | 750 mating cycles                                                                                                                                                                                                                                                                                            |
| 6          | <b>Materials</b>                             |                                                                                                                                                                                                                                                                                                              |
|            | Housing                                      | Polyphenylene oxide, 94V-0 rated                                                                                                                                                                                                                                                                             |
|            | Wiring blocks                                | Polycarbonate, 94V-0 rated                                                                                                                                                                                                                                                                                   |
|            | Contact Plating                              | 50μ" Gold/100μ" Nickel                                                                                                                                                                                                                                                                                       |
| 7          | Approvals                                    | UL listed. Must be part of the registered 4 connector channel certified by ETL.                                                                                                                                                                                                                              |
| 8          | Compliance                                   | ROHS compliance                                                                                                                                                                                                                                                                                              |
| 9          | Termination Pattern                          | TIA / EIA 568 A and B                                                                                                                                                                                                                                                                                        |
| <b>IX</b>  | <b>PATCH CHORD</b>                           |                                                                                                                                                                                                                                                                                                              |
| 1          | Type                                         | Unshielded Twisted Pair, Category 6, ANSI/TIA 568-C.2 & ISO/IEC 11801                                                                                                                                                                                                                                        |
| 2          | Conductor                                    | 24 AWG                                                                                                                                                                                                                                                                                                       |
| 3          | Length                                       | Shall be available in multiple length and jacket color.                                                                                                                                                                                                                                                      |
| 4          | Plug Protection                              | Factory fitted strain relief boots on either side                                                                                                                                                                                                                                                            |
| 5          | Jacket                                       | LSZH                                                                                                                                                                                                                                                                                                         |
| 6          | Wiring                                       | Shall be available in universal B-wiring                                                                                                                                                                                                                                                                     |
| 7          | Compliance                                   | ROHS compliance                                                                                                                                                                                                                                                                                              |
| 8          | Approval                                     | Intertek - ETL 4 connector channel compliant.                                                                                                                                                                                                                                                                |
| <b>X</b>   | <b>CAT 6 I/O PORT, JACK &amp; FACE PLATE</b> |                                                                                                                                                                                                                                                                                                              |
| <b>(a)</b> | <b>CAT 6 I/O PORT, JACK</b>                  |                                                                                                                                                                                                                                                                                                              |
| 1          | I/O PORT                                     | RJ45                                                                                                                                                                                                                                                                                                         |
| 2          | Type                                         | Cat6 Modular Jacks shall meet and exceed channel specification of Category 6 transmission requirements for connecting hardware, as specified in Commercial building telecommunications Cabling standard and ISO/IEC 11801:2002 second edition. when used as a component in a properly installed UTP channel. |
| 3          | Front Connection                             | Lead Frame : Copper Allow with 50u inch Gold over Nickel                                                                                                                                                                                                                                                     |
| 4          | Connector Body                               | Plastic: UL94V-0                                                                                                                                                                                                                                                                                             |
| 5          | Housing                                      | Encapsulated Lead Frame technology                                                                                                                                                                                                                                                                           |
| 6          | Accessories                                  | Jack should support uniform hassle free termination technology and be able to ensure performance in each termination without dependency on expertise of technician.                                                                                                                                          |
|            |                                              | Integrated bend-limiting strain-relief unit for cable entry with locking facility at IDC contact point                                                                                                                                                                                                       |
|            |                                              | Support cable pair termination process on the jacks at 90 degree angle.                                                                                                                                                                                                                                      |
| 7          | Insertion life                               | 750 cycles.                                                                                                                                                                                                                                                                                                  |
| 8          | IEEE Specification (PoE)                     | IEEE 802.3at type 1 and 2 (up to 30W).                                                                                                                                                                                                                                                                       |
| 9          | Termination Pattern                          | TIA / EIA 568 A and B                                                                                                                                                                                                                                                                                        |
| 10         | Approvals                                    | UL Listed                                                                                                                                                                                                                                                                                                    |
| 11         | RoHS                                         | Compliant                                                                                                                                                                                                                                                                                                    |
| <b>(b)</b> | <b>FACE PLATE</b>                            |                                                                                                                                                                                                                                                                                                              |
| 1          | Material                                     | Fire -retardant Plastic, ABS, White color.                                                                                                                                                                                                                                                                   |
| 2          | Acceptability                                | Should be able to accept Cat6A, Cat6 and Cat5e information outlets                                                                                                                                                                                                                                           |
| 3          | Approvals                                    | UL94V0                                                                                                                                                                                                                                                                                                       |
| <b>XI</b>  | <b>CAT 6 CABLE</b>                           |                                                                                                                                                                                                                                                                                                              |
| 1          | Type                                         | 23 AWG Solid Bare Copper, Unshielded Twisted 4 Pair, Category 6                                                                                                                                                                                                                                              |
| 2          | Conductors                                   | Solid Bare Copper                                                                                                                                                                                                                                                                                            |

|   |                |                                                                                                                                                                                                                    |
|---|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | Insulation     | Polyethylene / Polyolefin                                                                                                                                                                                          |
| 4 | Jacket         | LSZH jacket complying to:<br><ul style="list-style-type: none"> <li>• Fire rating IEC 60332-3-22</li> <li>• Halogen IEC 60754 -1</li> <li>• Acid Gas IEC 60754 -2</li> <li>• Smoke density IEC 61034 -2</li> </ul> |
| 5 | Pair Separator | Cross-member (+) fluted Spline.                                                                                                                                                                                    |
| 6 | Approvals      | ETL verified to ANSI/TIA-568-C.2 Cat 6 horizontal cable.<br>ETL verified to ISO/IEC 11801 Cat 6 horizontal cable.                                                                                                  |
| 7 | Packing        | Box of 305 meters                                                                                                                                                                                                  |
| 8 | Compliance     | ROHS compliance                                                                                                                                                                                                    |

**ACCEPTABLE MAKES FOR EPABX & LAN WORK**

| Sl. No. | ITEMS                                                                                           | MAKES                                       |
|---------|-------------------------------------------------------------------------------------------------|---------------------------------------------|
| 1.      | Workstation                                                                                     | Dell / HP / IBM / FUJITSU                   |
| 2.      | Display                                                                                         | Sony / LG / Samsung / Panasonic             |
| 3.      | Networking Switch, SFP Module                                                                   | Extreme / Cisco / Juniper / Nexxus          |
| 4.      | Networking Rack                                                                                 | WQ / Rittal / Valrack (Legrand) / APW       |
| 5.      | Fiber Optic Cable, CAT 6 Cable, CAT 6 I/O Port, Face Plate, Jack, Patch Panel, Patch Chord etc. | Belden / Commscope / Systimax / AMP / Molex |

# PART C-4

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand (SH : SITC of CCTV Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-B of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of CCTV Work”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                        |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------|------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| I                                                                                                     | SITC of CCTV Work      | 20,52,904/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means <b>“SITC of CCTV Work”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.
  - OR**
  - ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.

4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the

**EE&SM(C)-I, SIMBO, CPWD, RANCHI** in charge of major component for including in the final bill for composite work.

13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in procession of valid electrical contractor license before tart of work

## **ADDITIONAL CONDITIONS FOR CCTV SYSTEM**

### **1. Specification:-**

The work shall be executed as per CPWD's general specification for Electrical Works Part – I (Internal) – 2023, Part – II (External) – 2023, I.E. Rules, Indian Standards amended up to date and as per direction of Engineer-in charge.

### **2. Terms of Payments:-**

Following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein on pro – rata basis.

- (i) No advance payment shall be made.
- (ii) 70% after initial inspection and delivery at site in good condition on pro-rata basis.
- (iii) 20% after completion of installation in all respect.
- (iv) Balance 10% will be paid after Testing, Commissioning & Handing Over to the department for beneficial use.

### **3. Storage:-** Responsibility for storage of material for execution of work shall be of main contractor.

4. The material in required quantity to be used in the work shall be got approved from the Engineer-in-charge before its use at site. The Engineer-in-charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.

### **TECHNICAL SPECIFICATION OF E&M WORK**

- i The work shall be carried out in conformity with CPWD General Specification Part – I (Internal) 2013 and CPWD General Specification Part – II (External) 2023 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- ii Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E), & decision of the Engineer in Charge shall be final & binding.
- iii The contractor will make his own arrangement for storage of material arranged by him, and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- iv All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.
- v The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- vi The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No. DG/MISC.(ELECT.)/1 dated 30.03.2017**.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- vii Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge.

## **TECHNICAL SPECIFICATIONS FOR CCTV**

**1.0 SITE CONDITION:** The work is to be carried out for Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

1.1 The Tenderers are advised to visit the site for any site particular to be well acquaintance about the site requirement by him, before tendering.

### **SCOPE OF WORK AND EXCLUSIONS:**

1.2 General features and major components of the work are as under Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

### **COMPLIANCE WITH REGULATIONS AND INDIAN STANDARDS**

All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

- (i) CPWD Specification for Internal (2023) and External Specification (2023) as amended up to date.
- (ii) Prevailing factories Act. as amended up to date.
- (iii) Indian Electricity Rules as amended up to date.
- (iv) B.I.S. & other standards as applicable as amended up to date.
- (v) Workmen's compensation Act. as amended up to date.
- (vi) Water works manual as amended up to date.

### **Interpreting Specifications:**

In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:

- (a) Schedule of quantities
- (b) Technical specifications
- (c) Drawing (if any)
- (d) General specifications
- (e) Relevant BIS or other international code in case BIS code is not available.

### **TECHNICAL SPECIFICATION OF CCTV WORK**

| ITEM NO  | PARAMETER             | SPECIFICATIONS                                                                                                                                                       |
|----------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>I</b> | <b>IP DOME CAMERA</b> |                                                                                                                                                                      |
| 1        | Image Sensor          | 1/2.8" 4MP / 5MP Progressive Scan CMOS <b>or better</b>                                                                                                              |
| 2        | Lens Type             | Motorized Varifocal lens                                                                                                                                             |
| 3        | Minimum Illumination  | 0.03 lux color/0 lux with IR LEDs <b>on or better</b>                                                                                                                |
| 4        | IR Distance           | 30 M <b>or better</b>                                                                                                                                                |
| 5        | Shutter Speed         | 1 to 1/100,000 s                                                                                                                                                     |
| 6        | Day/Night Mode        | Auto / Day / Night / Schedule                                                                                                                                        |
| 7        | Noise Reduction       | 3DNR / 3D DNR                                                                                                                                                        |
| 8        | WDR                   | 120 dB WDR                                                                                                                                                           |
| 9        | Edge Base Storage     | Supports up to 128 GB Micro SD                                                                                                                                       |
| 10       | Event triggering      | Motion Detection, Line Crossing Detection, Intrusion Detection, Unattended Baggage Detection, Object Removal Detection, Face Detection                               |
| 11       | Audio                 | In / Out                                                                                                                                                             |
| 12       | Video Compression     | H.265 / H.264 / MJPEG                                                                                                                                                |
| 13       | Video Streaming       | Triple Stream                                                                                                                                                        |
| 14       | Supported Protocols   | IPv4/IPv6, ARP, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP, SMTP, DHCP, NTP, DNS, DDNS, QoS, SNMP, 802.1X, UDP, ICMP, IGMP, TLS, Bonjour, SIP, PPPoE, VLAN, DSCP |
| 15       | Compatibility         | ONVIF Profile S, Profile G                                                                                                                                           |

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                      |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16         | Ingression Protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | IP 66/67, IK10 Housing                                                                                                                                               |
| 17         | Operational Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (-40 °C To +60 °C)                                                                                                                                                   |
| 18         | Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0% to 95%, non-condensing                                                                                                                                            |
| 19         | Power Supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 12VDC +/-10%, 24VAC +/-10%, PoE IEEE 802.3af                                                                                                                         |
| 20         | Certificates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | BIS , UL, FCC, CE / RoHS                                                                                                                                             |
| <b>II</b>  | <b>IP BULLET CAMERA</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                      |
| 1          | Image Sensor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1/2.8" 4MP / 5MP Progressive Scan CMOS <b>or better</b>                                                                                                              |
| 2          | Lens Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Motorized Varifocal lens                                                                                                                                             |
| 3          | Minimum Illumination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.03 lux color/0 lux with IR LEDs on <b>or better</b>                                                                                                                |
| 4          | IR Distance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 50 M <b>or better</b>                                                                                                                                                |
| 5          | Shutter Speed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1 to 1/100,000 s                                                                                                                                                     |
| 6          | Day/Night Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Auto / Day / Night / Schedule                                                                                                                                        |
| 7          | Noise Reduction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3DNR / 3D DNR                                                                                                                                                        |
| 8          | WDR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 120 dB WDR                                                                                                                                                           |
| 9          | Edge Base Storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Supports up to 128 GB Micro SD                                                                                                                                       |
| 10         | Event triggering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Motion Detection, Line Crossing Detection, Intrusion Detection, Unattended Baggage Detection, Object Removal Detection, Face Detection                               |
| 11         | Audio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | In / Out                                                                                                                                                             |
| 12         | Video Compression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | H.265 / H.264 / MJPEG                                                                                                                                                |
| 13         | Video Streaming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Triple Stream                                                                                                                                                        |
| 14         | Supported Protocols                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | IPv4/IPv6, ARP, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP, SMTP, DHCP, NTP, DNS, DDNS, QoS, SNMP, 802.1X, UDP, ICMP, IGMP, TLS, Bonjour, SIP, PPPoE, VLAN, DSCP |
| 15         | Compatibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ONVIF Profile S, Profile G                                                                                                                                           |
| 16         | Ingression Protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | IP 66/67, IK10 Housing                                                                                                                                               |
| 17         | Operational Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (-40 °C To +60 °C)                                                                                                                                                   |
| 18         | Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0% to 95%, non-condensing                                                                                                                                            |
| 19         | Power Supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 12VDC +/-10%, 24VAC +/-10%, PoE IEEE 802.3af                                                                                                                         |
| 20         | Certificates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | BIS , UL, FCC, CE / RoHS                                                                                                                                             |
| <b>III</b> | <b>NVR WITH STORAGE &amp; VMS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                      |
| <b>a)</b>  | <b>Recorder with storage</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                      |
| 1          | It should connect up to 64 cameras including license.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                      |
| 2          | OS : Linux / Windows                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                      |
| 3          | It should support streaming live/recorded video up to 100 simultaneous PC clients or better                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                      |
| 4          | It should support two-way audio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                      |
| 5          | For 64 Channel HDD Storage : Up to 64 TB, USB Port : minimum 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                      |
| 6          | Incoming bandwidth 320 Mbps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                      |
| 7          | Power Supply : Single Phase 100 - 240 VAC, 50/60Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                      |
| 8          | Pre-loaded Operating System must be on windows/Linux platform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                      |
| 9          | Should be BIS, UL, FCC, CE / RoHS certified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                      |
| <b>b)</b>  | <b>VMS Client for live view</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                      |
| 1          | The Video Management System (VMS) software shall be used to view live and recorded video from capture cards and IP devices connected to local and wide area networks. The VMS software shall have a client/server-based architecture that can be configured as a standalone VMS system with the client software running on the server hardware and/or the client running on any network-connected TCP/IP workstation. Multiple client workstations shall be capable of simultaneously viewing live and/or recorded video from one or more servers. Multiple servers shall also be able to simultaneously provide live and/or recorded video to one or more workstations. |                                                                                                                                                                      |

|           |                                                                                                                                                                                                                                                                                                                                             |                                                                                            |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 2         | VMS and Recorder should be from single OEM                                                                                                                                                                                                                                                                                                  |                                                                                            |
| 3         | Recording of all video transmitted to the VMS shall be continuous, uninterrupted and unattended                                                                                                                                                                                                                                             |                                                                                            |
| 4         | It should also provide following feature: Electronic Image Stabilizer (EIS)                                                                                                                                                                                                                                                                 |                                                                                            |
| 5         | The VMS system shall manage the video it has been configured to monitor. Loss of video signal shall be configured to annunciate on VMS client by an on-screen visual indication alerting operators of video loss.                                                                                                                           |                                                                                            |
| 6         | The VMS client software shall be able to view live video and audio, recorded video and audio and be able to configure the complete system all from a single application                                                                                                                                                                     |                                                                                            |
| 7         | The VMS client software shall have the same functionality when connected remotely as it does when it is run locally on the same computer as the server software                                                                                                                                                                             |                                                                                            |
| 8         | The VMS client software shall operate on all of the following operating systems: Windows, Linux, Mac OSX etc.                                                                                                                                                                                                                               |                                                                                            |
| 9         | The VMS shall also allow an authorized user to view video through a web client interface. The web client interface shall allow authorized users to view live video, view recorded video, control pan-tilt zoom (PTZ) cameras and activate triggers. The web client interface shall allow connections to multiple VMS servers simultaneously |                                                                                            |
| 10        | The web client interface shall operate with/without requiring installation of any software                                                                                                                                                                                                                                                  |                                                                                            |
| 11        | When using the web client interface, the VMS server shall transcode the video into a JPEG file of the size as the browser screen before sending it to the browser                                                                                                                                                                           |                                                                                            |
| 12        | The web client interface shall support the following browsers: IE, Firefox, Opera, Safari, Chrome                                                                                                                                                                                                                                           |                                                                                            |
| 13        | The VMS server software shall record and retrieve video, audio and alarm data and provide it to the VMS clients upon request.                                                                                                                                                                                                               |                                                                                            |
| 14        | The VMS software shall provide a purpose built mobile application capable of viewing multiple simultaneous live video streams and playing a recorded video stream. Application shall be provided for both iOS and Android operating systems. Min. 5 mobile clients to be supplied at each location.                                         |                                                                                            |
| <b>IV</b> | <b>WORKSTATION</b>                                                                                                                                                                                                                                                                                                                          |                                                                                            |
| 1         | Processor                                                                                                                                                                                                                                                                                                                                   | 10th Generation Intel core I7- 10700K Processor or higher                                  |
| 2         | Memory                                                                                                                                                                                                                                                                                                                                      | Minimum 32 GB RAM 2666 MHz or higher.                                                      |
| 3         | Hard Disk Drives                                                                                                                                                                                                                                                                                                                            | Minimum 2 TB SATA 7200 RPM                                                                 |
| 4         | Graphics                                                                                                                                                                                                                                                                                                                                    | Minimum 2GB Graphics Card                                                                  |
| 5         | Audio                                                                                                                                                                                                                                                                                                                                       | HD integrated audio with internal speaker                                                  |
| 6         | Ports                                                                                                                                                                                                                                                                                                                                       | 2 x USB 3.2 + 2 x USB 2.0, 1 x Display Port, 1 x HDMI Ports, 1 x RJ 45 Ports, Audio Ports. |
| 7         | Keyboard & Mouse                                                                                                                                                                                                                                                                                                                            | Provided                                                                                   |
| 8         | Compliance / Certification                                                                                                                                                                                                                                                                                                                  | BIS, CE, CSA, FCC B, RoHS, Energy Star®                                                    |
| 9         | OS / Driver                                                                                                                                                                                                                                                                                                                                 | Windows 10 Professional preloaded with driver media                                        |
| <b>V</b>  | <b>LED DISPLAY</b>                                                                                                                                                                                                                                                                                                                          |                                                                                            |
| 1         | Screen Size                                                                                                                                                                                                                                                                                                                                 | 55" or Higher                                                                              |
| 2         | Aspect Ratio                                                                                                                                                                                                                                                                                                                                | 16 : 9                                                                                     |
| 4         | Native Resolution                                                                                                                                                                                                                                                                                                                           | 3840 x 2160 (4K - UHD)                                                                     |
| 5         | Viewing Angle                                                                                                                                                                                                                                                                                                                               | 178 °/178 ° (H/V)                                                                          |
| 6         | Speaker                                                                                                                                                                                                                                                                                                                                     | In Built                                                                                   |
| 7         | Rated Power Consumption                                                                                                                                                                                                                                                                                                                     | 200 Watt or Better                                                                         |
| 8         | Standby Power Consumption                                                                                                                                                                                                                                                                                                                   | 0.5 Watt                                                                                   |
| 9         | Input / Output Connectivity                                                                                                                                                                                                                                                                                                                 | 3 x HDMI, DVI-D, DP, USB, Audio, RJ45                                                      |
| 10        | Compliance / Certification                                                                                                                                                                                                                                                                                                                  | BIS, CE, FCC                                                                               |

### ACCEPTABLE MAKES FOR CCTV

| Sl. No. | ITEMS                                                                                           | MAKES                                                     |
|---------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| 1.      | IP Camera                                                                                       | Honeywell / Bosch / Tyco / Sony                           |
| 2.      | NVR With Storage & VMS                                                                          | Camera, Recorder & VMS should be from single OEM          |
| 3.      | Surveillance Hard Disk                                                                          | WD / Seagate / Toshiba                                    |
| 4.      | Workstation                                                                                     | Dell / HP / IBM / FUJITSU                                 |
| 5.      | Display                                                                                         | Sony / LG / Samsung / Panasonic                           |
| 6.      | Fiber Optic Cable, CAT 6 Cable, CAT 6 I/O Port, Face Plate, Jack, Patch Panel, Patch Chord etc. | Belden / Commscope / Systimax / Derwiser / Molex / Genius |

#### **Preference to PPP-M – II Policy (Make in India):**

- (i) The Government has issued public procurement policy (Preference to Make in India) vide Ministry of Commerce and Industry Development of industrial policy and promotion (PPS) vide order No. P-45021/2/2017-PP BE-II dated 28.05.2018 & Amended up to date 21.10.2024-Revision to –Encourage Make in India|| and to promote manufacturing and production of Goods and services in India with a view to enhancing income and employment. CPWD has decided to implement this policy.
- (ii) The agency shall submit list of makes of materials proposed to be used on the work from local suppliers (as defined in the above order dated 28.05.2018) along with minimum local content as specified below for approval of the department out of the approved makes kept in the tender.
- (iii) The department will be approving only makes of the materials having a minimum local content of 60% for use on this work, out of the preferred makes list.
- (iv) The minimum local content of 60% is considered for the complete item including labour component. The agency shall obtain the certificate for all items except for sundry items.

# PART C-5

**Name of Work : Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH :- SITC of DG set)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Electrical work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. “**SITC of DG set**”. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                          |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works   | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| I                                                                                                     | SITC of DG set (200 KVA) | 19,09,286/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means “<b>SITC of DG set of minimum individual capacity of 160 KVA</b>”.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.

**OR**

- ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## **TERMS, CONDITIONS AND SPECIFICATIONS OF DG SET WORK**

### **1.0 SITE CONDITION:-**

- 1.1 The work of installation of DG sets is to be carried out for “Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand”.
- 1.2 The DG Sets with acoustic enclosures shall be installed outdoor on the CC platform.
- 1.3 The Tenderers are advised to visit the site to be well acquaintance about the site requirement by him, before tendering.

### **1.4 General features and major components of the work are as under.**

Work shall be consisting of Supply, Installation, Testing and Commissioning of One No. Diesel Generating set of prime power rating with suitable capacity.

DG Sets shall comprising of suitable capacity of Diesel Engine, coupled with Alternator mounted on common base plate fabricated with MS Channel, Acoustic Enclosure complying CPCB norms for noise control & emission norms as per design type tested by approved laboratory. DG Sets shall be installed on suitable size of Cement Concrete foundation. The DG Sets shall be fitted with inbuilt / separate AMF Panel, Diesel storage tank & other accessories as per schedule of work & specifications specified in the NIT. Earthing for Body Earth & Neutral Earthing, interconnections with XLPE insulated, PVC sheathed, Aluminium Conductor, Armoured Cable from Alternator to AMF Panel & Load for three phase distribution with the existing panel boards shall be installed as directed by the Engineer-in-Charge & as per requirement of client.

### **1.5 PRIME POWER RATING:**

Prime power rating is applicable for supplying electric power in lieu of commercially purchased power. Prime power is the power available at variable load for an unlimited number of hours. A 10% overload capacity is available at intermittent periods. Overload of 10% for one hour in 12 hours of operation shall be tested in the workshop of the manufacturer or at site as the case may be.

Rating is in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1 BS5514, AS2789 and DIN 6271.

The Department shall not issue any T & P for carrying out the work. Nothing extra shall be paid on account of engagement of T&P by the supplier / Contractor to carryout the work at site.

### **2.0 SPECIFICATIONS FOR DG SETS:**

- 2.1 This specification is intended to cover the complete installation of Diesel Generating Set in a first class workmanlike manner and to include all work and materials in accordance with the drawings and specifications as specified. The work shall be carried out in accordance with the CPWD General Specifications for Electrical Work Part-I (Internal) 2023, Part-II (External) 2023 & part-VII (DG sets) 2013 as amended up to date, relevant I.S. Specifications, National building Code 2016, National Electric Code, Indian Electricity Act & Rules which govern the requirements of the DG Set installation and as per direction of Engineer-in-Charge including amendments up to date of the specifications, standards and regulations. These specifications are to be read in conjunction with above and in case of variations; specifications given in these additional conditions shall apply. However nothing extra shall be paid on account of the additional specifications and conditions as the same are to be read along with schedule of quantities for the work.

## **GENERAL CONDITIONS AND COMMERCIAL CONDITIONS**

This specifications cover manufacture, testing as may be necessary before dispatch, delivery at site, all preparatory work, assembly and installation, commissioning, seeking approval & license from the local authorities, putting into operation of DG Sets for beneficial use of client as per satisfaction & direction of the Engineer-in-Charge.

### **LOCATION**

The DG Set shall be installed at NABARD, Ranchi for entire essential load.

**TYPE OF CONTRACT:** The work to be awarded by this tender shall be treated as individual work contract.

### **SUBMISSION OF TENDERS:**

- (i) Tender documents shall be downloadable to only eligible & specialized agencies.
- (ii) The tenderers are advised not to deviate from the technical specifications / items, commercial terms and conditions of NIT like terms of payment, guarantee, arbitration clauses, escalation etc.
- (iii) Scrutiny / evaluation of the "Tender" shall be done by the department. In case it is found that the tenderer is not in line with NIT specifications, requirements and / or contains many deviations, the department reserves the right to reject the tender of such firm(s) without making any reference to the tender(s).
- (iv) Necessary clarifications required by the department shall have to be furnished by the tenderers within the time given by the department for the same. The tenderers will have to depute their representative to discuss with the officer(s) of the department as and when so desired. In case, if in the opinion of the department a tenderer is delaying in furnishing the desired clarifications beyond reasonable time, his tender will be rejected without making any reference.
- (v) The department reserves the right to reject any or all the "Price Bids" / "Revised Price Bids" and call for fresh prices / tenders as the case may be without assigning any reason.

**TERMS OF PAYMENT:** The following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein.

- (i) 85% against supply of Diesel Generating Sets (**ENGINE-ALTERNATOR SET & AMF Panel**) as per item of the schedule of work after initial inspection and delivery at site in good condition on pro-rata basis. [ For Other items: -75%]
- (ii) 10% On Completion of Pro-Rata installation of DG Set (**ENGINE-ALTERNATOR SET & AMF Panel**) at specified locations in all respect. [For Other items:-20%]
- (iii) Balance 5% will be paid after testing, commissioning trial run & handing over of the DG Sets to client for their beneficial use.
- (iv) Tenderers may quote the breakup of their prices for individual components for assessment of part payment against supply of materials in parts for any reason subject to acceptability to the department.
- (v) Payments for other items in the schedule of work shall be made as per assessment of progress of work assessed by the Engineer-in-Charge or his Authorized Representative (The Assistant Engineer Electrical / Junior Engineer Electrical).

**SECURITY DEPOSIT:** Security Deposit shall be deducted from each running bill and the final bill to the extent of 2.5% of the gross amount payable as per GCC-2020. The security deposit shall be released after completion of work & expiry of guarantee period stipulated in the contract and as per relevant clauses of "General conditions of Contracts for Central PWD Works 2020" which shall be part of agreement.

### **RATES:**

- (i) Rates quoted by the tenderer, shall be firm and inclusive of all taxes and all charges for packing forwarding, insurance, freight and delivery, installation, testing, commissioning etc. at site. Fee paid for inspections of authorities for local clearance shall be borne by the department by reimbursement on submission original receipt issued from the office of the inspection authority.
- (ii) The contractor has to carry out routine & preventive maintenance for 12 months from the date of handing over. Nothing extra shall be paid except consumables for carrying out such work.

### **COMPLETION OF TENDER:**

1. All sundry equipment, fittings, unit assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections, and all other items which are useful and necessary for efficient assembly and installation of equipment and components of the work shall be deemed to have been included in the tender irrespective of the fact whether such items are specifically mentioned in the tender documents or not.
2. Diesel Generating Sets shall be inspected by the Engineer-in-Charge or his Authorised Representative (Assistant Engineer Electrical / Junior Engineer Electrical) in the workshop / factory of the manufacturer or OEM. The contractor will intimate the date of inspection & witnessing of testing of equipments at the manufacturer's works / OEM before dispatch. The department also reserves the right to inspect the fabrication

job at factory and the successful tenderer has to make the arrangement for the same. The successful tenderer shall give sufficient advance notice regarding the dates proposed for such tests / inspection to the department's Engineer-in-Charge or his representative(s) to facilitate his presence during testing / fabrication. The Engineer-in-Charge at his discretion may witness such testing / fabrication. The cost of the Engineer's visit to the factory on account of traveling & lodging expenses will be borne by the Department. Also equipment may be inspected at the Manufacturer's premises, before dispatch to the site by the contractor. Department may also wave off such inspection at its discretion.

#### **STORAGE AND CUSTODY OF MATERIALS:**

The Diesel Generating Sets are to be installed in the open space in the campus of client. No space shall be provided for storage of sundry materials and erection equipments. The agency has to make his arrangement at his own. Watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the completion of work with entire satisfaction of the Engineer-in-Charge and final taking over of the installation by client for their beneficial use.

#### **CARE OF THE BUILDING:**

Care shall be taken by the contractor while handling and installing the various equipments and components of the work to avoid damage to the building. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove all unwanted and waste materials arising out of the installation from the site of work on day to day basis at his cost.

#### **COMPLETION PERIOD:**

The completion period of **as per civil work** indicated in the tender documents is for the entire work of planning, designing, supplying, and installation, testing, commissioning and handing over the entire system to the satisfaction of the Engineer-in-Charge.

#### **PERFORMANCE GUARANTEE:**

1. The Tenderer shall guarantee among other things, the following
  - (a) Quality, strength and performance of the materials used.
  - (b) Safe mechanical and electrical stress on all parts under all specified conditions of operation.
  - (c) Satisfactory completion of work as per contract, handing over DG Sets for operation during the maintenance period.

**GUARANTEE:** All equipments shall be guaranteed for a period of 12 months from the date of record of completion certificate by competent authority and taking over by the client. Against unsatisfactory performance and / or break downs due to defective design, workmanship of material, the equipments or components, or any part thereof, so found defective during guarantee period shall be forthwith repaired or replaced free of cost, to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that the contractor in doing this repair or replacement of part(s) is causing undue delay, the department at the risk and cost of the contractor will do the same. The decision of the Engineer-in-Charge in this regard shall be final & binding to the contractor.

**POWER SUPPLY:** Electric service connection of 230 Volts single phase / 415 V, 3 phases, 4 wires, 50 Hz, AC supply is to be arranged by the agency free of cost in the existing building for installation purposes.

**WATER SUPPLY:** Water supply is to be made available by the agency free of cost.

#### **DATA MANUAL AND DRAWINGS TO BE FURNISHED BY THE TENDERERS:**

1. The tenderer shall furnish detailed technical literature, pamphlets and performance data for appraisal and evaluation of the offer along with the tender. The tenderer will also submit the power calculation for Alternator & Diesel Engine considering de-rating factor at 50°C and as per tropical location of Ranchi for assessment of actual load the DG Set can meet out in case of normal power failure. De-rating data shall be provided from the manufacturer of the Alternator & Diesel Engine. Details of AMF panel with drawings indicating capacities of components & controls shall be provided. Detailed drawing with type test approval for the Acoustic Enclosure shall be attached with the tender.  
De-rating calculations varies manufacturer to manufacturer & tenderer shall have to submit their calculation as per data from the manufacturer.
2. The successful tenderer would be required to submit the following drawings within fifteen days of award of work for approval before commencement of installation.
  - (a) All make and model / technical specification with general arrangement drawings as per site
  - (b) locality.
  - (c) Details of foundation for the equipment, load data, location etc. of various assembled equipment as may be needed generally by other agencies for purpose of their work.

- (d) Complete layout with dimensions for every unit / group of units with dimensions required for erection purposes.
- (e) Any other drawing/information not specifically mentioned above but deemed to be necessary for the job to be carried by the contractor.

All the drawings shall be submitted immediately after award of work for the approval from the Engineer-in-Charge and before the work is started at site.

3. The successful tenderer should furnish well in advance three copies of detailed instructions and manuals of manufacturers for all items of equipments regarding installation, adjustments operation and maintenance i/c preventive maintenance & trouble shooting together with all the relevant data sheets, spare parts catalogue and workshop procedure for repairs, assembly and adjustment etc. All the documents shall be bound in form of booklets in three sets. If the original documents shall not be available in three copies, one booklet shall be consisting of original documents and other two shall be neatly photocopied. All relevant information regarding addresses & telephone contacts of authorized service stations in the Jharkhand state shall be provided in the documents.

#### **EXTENT OF WORK:**

- (i) The work shall comprise and include of entire labour including supervision and all materials necessary to make a complete installation and such tests the department may require adjustments and commissioning etc. The term complete installation shall not only mean major items of the plant and equipments covered by specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in details in the tender documents in connection with this contract.
- (ii) Minor building works necessary for installation of equipment, foundation, marking of opening in walls or in floors and restoring to their original condition, finish and necessary grouting etc. as required.
- (iii) Maintenance (Routine & preventive) except consumables like fuel, lubricating oil, fuel filters, air filters & oil filters etc. for one year from date of completion and handing over.
- (iv) The work is turnkey project. Any item required for completion of the project but left inadvertently shall be executed with in the quoted rates & scope of the agreement.

#### **INSPECTION AND TESTING:**

- (i) Copies of all documents of routine and type test certificates of the equipment, carried out at the manufacturers premises shall be furnished to the Engineer-in-Charge and consignee.
- (ii) After completion of the work in all respect the contractor shall offer the installation for testing and trial run operation.

#### **VALIDITY**

Tenders shall be valid for acceptance for a period as prescribed in CPWD-6 from the date of opening of price bid.

#### **COMPLIANCE WITH REGULATIONS AND INDIAN STANDARDS:**

- 1) All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:
  - (i) Factories Act.
  - (ii) Indian Electricity Rules.
  - (iii) I.S. & BS Standards as applicable.
  - (iv) Workmen's compensation Act.
  - (v) Statutory norms prescribed by local bodies like CEA, Local State Government Authorities etc.
- 2) Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the design, manufacture and installation of the equipment with all accessories in accordance with currently applicable statutory regulations and safety codes.
- 3) Successful tenderer shall arrange for compliance with statutory provisions of safety regulations and departmental requirements of safety codes in respect of labour employed on the work by the tendered. Failure to provide such safety requirement, department will, at its liberty to make arrangement for the safety requirements at the cost of tenderer and recover the cost thereof from him / his bill / security deposit as deemed fit.

**INDEMNITY:** The successful tenderer shall at all times indemnify the department, consequent on this work contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the department shall not be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer due to the above.

## **ERECTION TOOLS**

No Tools and tackles either for unloading or for shifting the equipments or for erection purposes or for trial run would be made available by the department. The successful tenderer shall make his own arrangement for all these facilities. No extra payment shall be made on account of arranging tools & Plants by the tenderer for carrying out the work at site.

## **COOPERATION WITH OTHER AGENCIES**

The successful tenderer shall co-ordinate with other Contractors, Agencies engaged in the construction of building, if any, and exchange freely all technical information so as to make the execution of this works contract smooth. No remuneration should be claimed from the department for such technical cooperation. If any unreasonable hindrance is caused to other Agencies and any completed portion of the work has to be dismantled and re-done for want of cooperation and coordination by the successful tenderer during the course of work, such expenditure incurred will be recovered from the successful tenderer if the restoration work to the original condition or specification of the dismantled portion of the work was not undertaken by the successful tenderer himself.

**MOBILISATION ADVANCE:** No mobilization advance shall be paid for this work.

## **INSURANCE AND STORAGE**

All consignments are to be duly insured upto the destination from warehouse to warehouse at the cost of the supplier. The insurance covers shall be valid till the equipment is handed over duly installed, tested and commissioned position at site of work.

## **VERIFICATION OF CORRECTNESS OF EQUIPMENT AT DESTINATION**

The contractor shall have to produce all the relevant records to certify that the genuine equipment from the manufacturers have been supplied and erected. All relevant documents such as equipment dispatch invoices / bills, Excise Gate Pass, test certificate form the manufacturer / authorized testing laboratories etc. shall be made available as required by the department for verification at any stage.

## **PAINTING**

This shall include cost of painting of entire exposed ironwork complete in the installation. All equipments shall be painted at the works before dispatch to the site. Final painting shall be carried out as per direction of the Engineer-in-Charge.

## **TRAINING**

The scope of work includes on the job technical training to two / three persons at site for proper day to day maintenance & operation of the DG Set for the beneficial use of client, Jharkhand State. The operating staff engaged by the client / CPWD shall be trained for "Do" & "Do Not Do" for up-keeping the DG Set as per recommended conditions of the manufacturer.

## **MAINTENANCE**

- (i) Sufficient trained and experienced staff shall be made available by the tenderer / contractor as and when called for to meet out any exigency of work during the guarantee period of one year from the handing over of the installation.
- (ii) Maintenance (Routine & preventive) as per manufacturer's recommendation except consumables like fuel, lubricating oil, fuel filters, air filters & oil filters etc. for one year from date of completion and handing over shall be carried out by the agency free of cost. The manufacturer shall undertake to make availability of after sales service and spare parts on contractual payment basis (Contract shall be executed after completion of work and expiry of free maintenance service between service centre of the manufacturer and client / CPWD as per requirement).

## **OPERATION & TRIAL RUN:**

After installation & testing of the DG Sets on load at site as per NIT conditions of the specification, the DG Set shall be put on trial run by the tenderer for ensuring reliable operation & training to departmental operators to be well acquaintance with sequence of operation. The DG Sets shall be operated by the qualified operator of the manufacturer / contractor for at least one week. Period of trial run of the DG Set can be extended for further next week if required by the department. The manufacturer shall issue fitness certificate of the equipment for putting the DG Sets in regular operation for beneficial use of client. Diesel fuel for testing the DG sets on load as per NIT conditions shall be provided by the tenderer / contractor however for operation & trial run all consumables including fuel shall be provided by client / CPWD.

**WORKS TO BE DONE BY THE CONTRACTOR:**

1. The work shall comprise of entire labour i/c supervision and all materials necessary to make a complete installation and such tests, adjustments and commissioning as may be required by the department. The term complete installation shall not only mean major items of the plants and requirements covered by specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation, all labour charges whether or not those have been mentioned in details in the tender documents in connection with this contract.
2. In addition to supply, installation, testing and commissioning of equipments, as per schedule of works and specifications, the following works shall be deemed to be included within the scope of work to be executed by the contractor. Nothing extra shall be paid.
  - (i) All minor building works for the installation such as cutting and making good the damages.
  - (ii) Construction of Plain Cement Concrete Platform as per CPWD General Specifications part-VII (DG set) 2013 and installation of DG Sets on the same and including providing necessary anti vibration mountings.
  - (iii) All supports, insulation, conduits, cables, cable trays, etc as necessary, the external support structure required to support the equipments shall be robust enough to take care of the dynamic loads, external wind pressure etc. as per satisfaction of the Engineer-in-Charge.
  - (iv) Tools and plants required for handling and installation of equipments.
  - (v) Protection required for the equipments from rain, dust storm during transportation such as provision of polythene cover, tarpaulin, etc.
  - (vi) Necessary equipments for the commissioning / site testing.
  - (vii) Fuel, lubricating oil and other consumable items required for testing in factory and also for testing and commissioning at site.
  - (viii) Necessary control cables.
  - (ix) The equipment must be insured towards transit from manufacturer's place of work till installation, handing over to the department.
  - (x) Safe custody of material and installation till the same is taken over by the department.

**EXCLUSION OF WORKS TO BE DONE BY OTHER AGENCIES (IF REQUIRED):**

- 1 Major dismantling of any existing building work.

**CIVIL WORK TO BE DONE BY THE CONTRACTOR (INCLUDED IN THE CONTRACT)**

- a) To carry out minor civil work, such as modification and making good the pocket / cutout in wall / ceiling for cables, Distribution Boards, Wiring, conduits, or any other work required for smooth operation & commissioning of DG Set.

**TROPICAL LOCATION / ENVIRONMENT SITE CONDITIONS:**

The tenderer will submit the power calculation for Alternator & Diesel Engine considering de-rating factor at 50°C inside the acoustic enclosure and as per tropical location of Ranchi as per following environment conditions for assessment of actual load the DG Sets can meet out in case of normal power failure. De-rating data shall be provided from the manufacturer of the Alternator & Diesel Engine. The environmental conditions under which the DG Sets are to function and approximately as detailed below:

- a) Height above Mean sea level – 700 M.
- b) Maximum temp. 40.0 Degree C.
- c) Minimum temp. 4.5 Degree C.
- d) Relative humidity (R.H.) - 65 to 90%
- e) Working temperature inside the acoustic enclosure at 50°C.

## TECHNICAL SPECIFICATIONS

The Work shall be carried out as per CPWD General Specifications for DG Set Works, 2013 as amended up to date along with the following changes, CPWD General Specifications for Electrical Works Part-I, II & IV, as amended up to date, relevant IE rules and as per directions of Engineer-in-Charge. For electrical panels, CPWD General Specifications for Electrical Works Part-IV shall be applicable.

### **A) DIESEL ENGINE:**

Diesel Engine shall be of multi cylinders, vertical type, 4- stroke cycle, water-cooled, Natural Aspiration / turbo charged, diesel engine developing suitable BHP for giving power rating as per ISO 8528 – Part – 1 in KVA at the load terminals of alternator at 1500 rpm at actual site conditions.

The engine shall be capable for delivering specific prime power rating at variable loads for PF of 0.8 lag with 10% overload available in excess of specified output for one hour in every 12 hours. The average load factor of the engine over period of 24 hours shall be 0.85 (85%) for prime power output.

#### **The engine shall be fitted with following accessories subject to the design of the manufacturer:**

- a) Dynamically balanced fly wheel.
- b) Necessary flexible coupling with guard between alternator and engine.
- c) Air cleaner (dry / Oil bath type).
- d) A Mechanical / electronic governor to maintain engine speed at all conditions of load.
- e) Fuel service tank as per standard design of the manufacturer. Tenderers are to specify the capacity of the fuel tank. Fuel tank should have the provisions of inlet, outlet connection, air-vent, drain plug and level indicator. MS fuel piping from tank to engine with valves, unions, reducers, flexible hose connection and floor mounting pedestals, twin fuel filters and fuel injectors.
- f) Dry exhaust manifold with suitable exhaust residential grade silencer to reduce the noise level.
- g) Suitable self – starter for 12 V / 24 V DC.
- h) Battery charging alternator unit and voltage regulator, suitable for starting batteries, battery racks with interconnecting leads and terminals.
- i) Necessary gear driven oil pump for lubricating oil, priming of engine bearing as well as fuel systems as per manufacturer recommendations.
- j) Naturally aspirated / turbo charger (as per manufacturer standard).
- k) Lubrication oil cooler.
- l) Lubrication oil filters with replaceable elements.
- m) Crank case heater as per manufacturer recommendations.
- n) Fuel injection: Engine should have suitable fuel injection system in order to achieve low fuel consumption.
- o) Fuel control solenoid.
- p) Fuel pump with engine speed adjustment.
- q) Engine control panel : Fitted and having digital display for following :-
  - I. Start / Stop switch
  - II. Lube oil pressure indication
  - III. Water temperature indication.
  - IV. RPM indication
  - V. Engine hour indications
  - VI. Battery charging indication
  - VII. Low lub. Oil trip indication
  - VIII. High water temperature indication
  - IX. Over speed indication
- r) All moving parts of the engine shall be mechanically guarded.
- s) Radiator / Heat Exchanger System / Remote Radiator.
- t) Any other item not included / specified but is a standard design of the manufacturer.

### **GOVERNOR:**

Mechanical governor of class A2 for up to and including 200 KVA capacity and Electronic governor of class A1 for capacity above 200 KVA, as per ISO 3046 / BS 5514 with actuator shall be provided as per standard design of manufacturer. Governor shall be a self contained unit capable of monitoring speed.

**FREQUENCY VARIATION:**

The engine speed shall be so maintained that frequency variation at constant load including no load shall remain within a band of 1% of rated frequency.

**FUEL SYSTEM:**

Fuel system for the engine shall be fed through engine driven fuel pump. The daily service tank shall be complete with necessary support, gauges, connecting pipe work etc. In case of Top Mounted tanks, non return valves are must in fuel supply and return line of specified value. Pipe sealant should be used for sealing for all connections. No Teflon tape to be used.

**LUBRICATING OIL SYSTEM:**

Necessary lubricating oil system shall be so designed that when the engine starts after a long shut down lubrication failure does not occur. Necessary priming pump for lubricating oil circuit as per recommendation of manufacturer shall be installed, to keep bearings primed. This pump shall be normally automatically operative on AC / DC supply available with the set.

**STARTING SYSTEM:**

Starting System of the Engine shall comprise of necessary heavy-duty battery of 12V / 24V DC (as per manufacturer standard), and suitable starter motors, axial type gear to match with the toothed ring on the flywheel. A bimetallic relay protection to protect the starter motor from excessively long cranking runs suitably integrated with the engine protection system shall be included within the scope of the work & requirements of control panel, indications and auxiliaries etc. The scope shall cover all cabling, terminals, including initial charging etc. The system shall be capable of starting the DG set within 20 – 30 Sec. even in winter condition with an ambient temperature down to 0° C.

**BATTERY CHARGER:**

The battery charger shall be suitable to charge required numbers of batteries at 12 V / 24 V complete with transformer, rectifier, charge rate selector switch, indicating ammeter & voltmeter etc. connections between the battery charger and batteries shall be provided with suitable copper leads with lugs.

**PIPING WORK:**

MS Pipe (medium class) of adequate size shall be used for fuel line connections. M.S. black pipes will be permitted for the exhaust and water lines. The pipe work shall be inclusive for all fittings and accessories such as valves, bends, reducers, elbows, flanges, flexible connection and all necessary hardware etc. as required. The installation shall cover clamps, supports, hangers etc, as are necessary for completing the work. However, the installation shall be sectionalized with flanged connections as are necessary for easy isolation for maintenance of the units.

**COMMON BED PLATE:**

Engine and alternator shall be directly coupled or coupled by means of flexoplate / flexible coupling as per manufacturer standard design and both units shall be mounted on a common bed plate together with all auxiliaries to ensure perfect alignment of engine and alternator with minimum vibrations. The bed plate shall be suitable for installation on suitable anti – vibration mounting system.

**EXHAUST SYSTEM:**

1) Exhaust Piping: All MS pipes for exhaust lines shall be conforming to relevant IS. The runs forming part of factory assembly on the engine flexible connections up to exhaust silencer shall be exclusive of exhaust piping item.

- a) The piping for the exhaust should have minimum back pressure.
- b) Number of bends should be kept minimum and smooth bends should be used to minimize back pressure.
- c) Pipe sleeve of larger dia. should be used while passing the pipe through concrete wall and gap should be filled with felt lining.
- d) Exhaust piping inside the Acoustic Enclosure / Genset room should be lagged with asbestos rope along with aluminium sheet cladding / insulated to avoid heat input to the room.
- e) Exhaust flexible shall have it's free length when it is installed. For bigger engines, 2 flexible bellows can be used.
- f) For engine up to 500 KVA, only one bellow is required. However, if exhaust pipe length is more than 7 Mtrs then additional bellow / provision for expansion should be provided.
- g) MS pipes and long bend / elbows should be used.
- h) The exhaust outlet should be in the direction of prevailing winds and should not allow exhaust gasses to enter air inlet / windows etc.

- i) When tail end is horizontal, 45 Degree downward cut should be given at the end of the pipe to avoid rain water entry into exhaust piping.
- j) When tail end is vertical, there should be rain trap to avoid rain water entry. If rain cap is used, the distance between exhaust pipe and rain cap should be higher than diameter of pipe. Horizontal run of exhaust piping should slope downwards away from engine to the condensate trap. Silencer should be installed with drain plug at bottom.

**SILENCER:**

Residential type silencer suitable for outdoor mounting shall be provided with all relevant accessories required as per manufacturer's design.

**AIR SYSTEM:**

It is preferable to provide vacuum indicator with all engines to indicate choked filter. Maximum air intake restrictions with clean and choked filters should be within prescribed limit as per OEM / manufacturer recommendation for the particular model of the engine. Gen sets should be supplied with medium duty / heavy duty air cleaners.

**COOLING SYSTEM:**

System should be designed for ambient temperature of 40 Deg. C

Water softening / demineralizing plants should be used, if raw water quality is not acceptable.

Coolant should be used mixed with additive as per recommendation of OEM / Manufacturer for various engine models.

Radiator fan flow should be free from any obstruction.

**B) ALTERNATOR:**

The alternators shall be self excited, screen protected, self regulated, brushless, horizontal foot mounted in single / double bearing construction suitable for the following:

|                              |   |                                                       |
|------------------------------|---|-------------------------------------------------------|
| Rated PF                     | : | 0.8 (Lag)                                             |
| Rated voltage                | : | 415 Volts                                             |
| Rated frequency              | : | 50 Hz                                                 |
| No. of Phases                | : | 3                                                     |
| Enclosure                    | : | SPDP                                                  |
| Degree of Protection         | : | IP – 23                                               |
| Ventilation                  | : | Self ventilated air cooled                            |
| Ambient Temperature          | : | 40 Deg C Maximum                                      |
| Insulation Class             | : | F / H                                                 |
| Temperature Rise             | : | Within class F / H limits at rated load               |
| Voltage Regulation           | : | +/- 1%                                                |
| Voltage Variation            | : | +/- 5%                                                |
| Overload duration / capacity | : | 10% for one hour in every 12 hours of continuous use. |
| Frequency Variation          | : | As defined by the Engine Governor (+/- 1%)            |
| Excitation                   | : | Self / separately excited                             |
| Type of AVR                  | : | Electronic                                            |
| Type of bearing and          |   |                                                       |
| Lubrication arrangement      | : | Anti – friction bearing with Grease lubrication       |
| Standard                     | : | IS 4722 & IEC : 34 as amended upto date               |

Alternator should be able to deliver output rating at actual site condition.

**EXCITATION:**

The alternator shall be brushless type and shall be self / separately excited, self – regulated having static excitation facility. The exciter unit is mounted on the control panel or on the alternator assembly. The rectifier shall be suitable for operation at high ambient temperature at site.

**AUTOMATIC VOLTAGE REGULATORS (AVR):**

In order to maintain output terminal voltage constant within the regulation limits i.e. +/- 1%, Automatic voltage regulator unit shall be provided as per standard practice of manufacturer.

**FAULT TRIPPING:**

In the event of any fault e.g. over voltage / high bearing temperature / high winding temperature or an external fault, the AVR shall remove the excitation voltage to the alternator. An emergency trip shall also be provided.

#### **STANDARDS:**

The alternator shall be in accordance with the following standards as are applicable:

- a) IS 4722 / BS 2613: 1970 The performance of rotating electrical machine.
- b) IS 4889 / BS 269 rules for method of declaring efficiency of electrical machine.

#### **PERFORMANCE:**

Voltage dip shall not exceed 20% of the rated voltage for any step load or transient load as per ISO 8528 (Part – I). The winding shall not develop hot spots exceeding safe limits due to imbalance of 20% between any two phases from no load to full load.

The generator shall preferably be capable of withstanding a current equal to 1.5 times the rated current for a period of not more than 15 seconds as required of IS 4722 : 1992.

The performance characteristics of the alternator shall be as below:

- a) Efficiency at full load 0.8 PF
  - i. Upto 25 KVA – not less than 82%
  - ii. Above 25 KVA and upto 62.5 KVA – not less than 86%
  - iii. Above 62.5 KVA & upto 250 KVA – not less than 90%
  - iv. Above 250 KVA – not less than 93.5%
- b) Total distortion factor - Less than 3%
- c) (i) 10 % Overload - One hour in every 12 hour of continuous use.  
(ii) 50% Overload - 15 Seconds

#### **TERMINAL BOXES:**

Terminal boxes shall be suitable for UG cables / Bus trunking. The terminal box shall be suitable to withstand the mechanical and thermal stresses developed due to any short circuit at the terminals.

#### **EARTH TERMINALS:**

2 Nos. earth terminals on opposite side with vibration proof connections, non – ferrous hardware etc. with galvanized plate and passivated washer of minimum size 12 mm dia. Hole shall be provided.

#### **SPACE HEATERS:**

Alternator of capacity more than 500 KVA shall be provided with suitable space heaters to maintain the winding temperature automatically such that it does not absorb moisture during long idle period. The heater terminals shall be brought to a separate terminal box suitable for 230 V AC supply and a permanent caution notice shall be displayed.

#### **TESTS ON GENERATING SETS:**

Following tests shall be conducted on the DG Set before these are put into operation.

- i. The routine tests as per relevant IS standards at manufacture's works. Copies of such test certificates are to be enclosed.
- ii. Insulation resistance tests.
- iii. Operational checks.
- iv. Full load run test for continuous 12 hours including 10% overload allowed for 1 hour at Contractor's / OEM / Manufacture's premises in the presence of representative of Engineer-in-charge. Hourly readings for all important parameters shall be taken during the test run. These readings must be certified to be acceptable by the OEM / Manufacturer's of D.G. set. All consumables like fuel, lubricating oil, coolant etc shall be provided by the tenderer. Adjustable Electrical Load shall be arranged by the tenderer. The contractor shall intimate department for the testing dates & place at least fifteen days earlier. All expenses for conducting tests except traveling, lodging & boarding of the representative of the Engineer-in-Charge shall be paid by the contractor. In addition to the above tests in the workshop of contractor's / OEM / Manufacturer's premises, load run test for at least 6 hours shall be carried out at the site of work on available load.
- v. If, however, due to any reason the department can not send their representative to attend the testing, the full load testing shall be done at site with artificial load to be arranged by the contractor.
- vi. All the expenses to be incurred for testing i/c cost of POL / Consumables and artificial load shall have to be borne by the successful tenderer within his quoted rates. Nothing extra shall be payable.

#### **C) AMF CONTROL PANEL:**

AMF control panel shall be fabricated by the manufacturer of the DG Set / OEM as per standard manufacturing practice. OEM recommendation in respect of AMF panel is also acceptable.

The control panel shall be fabricated out of 1.6 mm thick sheet steel, totally enclosed, dust, damp and vermin proof free standing floor mounted type and front operated. It shall be made into section such that as far as feasible, there is no mixing of control, power, DC and AC functions in the same section and they are sufficiently segregated except where their bunching is necessary. Hinged doors shall be provided preferably double leaf for access for routine inspection from the rear. The degree of protection required will be IP – 42 conforming to IS 2147.

#### **EQUIPMENT & REQUIREMENT:**

The AMF control cubicle panel shall incorporate assembled equipment duly wired and as per systems requirement and OEM recommendation. However the system shall generally comply with the following requirements as under:

- i. Back up protection for mains & DG sets supply with suitable capacity and KA rating of 4 poles for electromechanical over load, short circuit & earth fault protection shall be provided.
- ii. Mains & Alternator power 4P contractor of suitable Amps capacity, 415 Volts, 50 Hz with auxiliary contacts for AMF panel for interlocking & indications shall be provided. The DG Set contractor shall have adjustable thermal overload relay in each case to suit the capacity of the DG Set.
- iii. 415 Volts, 4 strip Aluminium Bus Bars for AMF panel with colour coded heat shrinkable insulation shall be provided.
- iv. Flush mounted digital voltmeters of nominal size 96 mm square of suitable range with selector switch.
- v. Flush mounted digital ammeters of nominal size 96 mm square of suitable range with selector switch & CTs.
- vi. Flush mounted digital frequency meter.
- vii. Energy meters (KWH) suitable for 415 V, three phases, 4 wires system (flush mounted)
- viii. Power meters (KW) suitable for 415 Volts, three phases, 4 wires systems.
- ix. Equipment and relay with visual indications for testing the healthiness of the generating set with test mode and with "load on" mode.
- x. Suitable capacity battery charger with trickle & boost charging facility (with automatic cut off system while battery is charged through the Gen. Set) with voltmeter, ammeter, with shunt, surge suppressor.
- xi. Indicating lamps for "Mains ON", "GEN ON" & LOAD ON"
- xii. Instrument fuses for circuit protection.
- xiii. Audio visual annunciation for
  - a. Low lubricating oil pressure.
  - b. High water temperature.
  - c. Engine over speed.
  - d. Set fails to start
  - e. Over current trip of alternator
  - f. Earth fault.
- xiv. Test / Auto / Manual selector switch.
- xv. Push button for engine start / stop / re-set,
- xvi. Suitable range of C.T's 15 VA burden, class-I for metering & class 15P10 for protection.
- xvii. All internal wiring for various meters / equipment, battery charger etc, shall be done with insulated copper wire of not less than 2.5 sq mm. cross sectional area and with markers for easy identification.
- xviii. Three phase monitoring relay.
- xix. Hooter for engine stop.
- xx. Hooter cancel switch.
- xxi. Control fuses.
- xxii. A set for DC control relay for monitoring engine shut down, engine starting and failure to start lockout etc.
- xxiii. Any other relay if necessary to make the control panel complete and functional and to meet the site requirement as specified in the scope of work under additional condition.
- xxiv. Alternatively compact Electronic DG Set automatic operation & control relay may be provided in place of individual relays. Electronic Multiple Metering unit in place of individual units for measuring electrical & engine parameters shall be acceptable.

#### **D) SYSTEM OPERATION:**

##### **MANUAL MODE:**

- i) It shall be possible to start up the generator set only by the operator by pressing the start push button is kept pressed.
- ii) Alternator close and trip operation shall also be operated by pressing appropriate button on the panel. However, closure of the contractor shall be feasible only after alternator has build up full voltage.
- iii) Engine shut down otherwise due to faults, shall also be manual by pressing "Stop" button.

**TEST MODE:**

During test mode engine shall get the start signal even though the main supply is healthy and the alternator start building up voltage but the set shall not take load by closing of contactor for alternator. If the main failure taken place during testing mode the load shall be transferred to DG set.

**AUTO MODE:**

During failure of power, the DG set will start automatically within 30 seconds (in three attempts) and power contractor of DG set will automatically close. As soon as the power resumes the same will automatically trip and close the power contactor of supply mains. The engine should stop automatically.

**E) ACOUSTIC ENCLOSURE:** OEM recommendation in respect of ACOUSTIC ENCLOSURE is also acceptable.

**CONSTRUCTION:**

- It should have weather proof corrosion resistant modular construction fabricated with 2mm / 1.6 mm thick CRCA Sheet outer and should adhere to mandatory gazette noise regulation norms.
- All the sheet steel components should be pretreated with zinc phosphate prior to polyester powder coating with zinc plated or stainless steel fasteners.
- The container should be designed for easy access to serviceable parts. It should have glass control panel viewing window. It should have provision for illumination inside enclosure.
- The doors should be fitted with high quality EPDM gaskets to avoid leakage of sound.
- For security and safety, it should have special lockable door handles with single key and emergency stop button.
- Detachable cable glands shall be provided.

**PAINTING:**

- The sheet metal component should be powder coated after seven tanks pre-paint treatment.
- To have longer life of container it should be P.P. based powder coated (inside as well as outside).
- Base frame should be epoxy coated when fabricated.

**ACOUSTIC INSULATION:**

- Sound proofing of enclosure should be done with quality rock wool / glass wool / mineral wool conforming to IS: 8183 of 96 Kg. /m<sup>3</sup> density. Alternatively insulated with fire retardant foam as per standard manufacturing practice of the manufacturer shall also be acceptable.
- The rock wool / glass wool / mineral wool shall further be covered with fiberglass cloth / fiber tissue paper fire resistive and perforated powder coated sheet of 0.6 mm thickness.
- The Acoustic Enclosure shall be as per type tested design approved by laboratory for compliance of sound level of 75 dBA at 1 meter specified by Ministry of Environment & forest / CPCB.
- Drawing of the type tested enclosure & copy of test certificate shall be provided at the time of submission of technical bid.

**VENTILATION AND AIR CIRCULATION:**

- The ventilation system shall be designed to provide air inlet / exhaust acoustic louvers for efficient air circulation and shall have following special features.
  - a. Adequate ventilation is to be provided to meet air requirement for combustion and heat removal.
  - b. The temperature inside the enclosure shall not exceed 5-7°C more than the ambient temperature near air suction point.

**EXHAUST SYSTEM:**

A high efficiency residential silencer along with its associated piping and flexible bellow is to be mounted inside the acoustic enclosure.

**F) EARTHING:**

Earthing for DG Set body earthing & Neutral earthing shall be provided as per CPWD General Specifications for Electrical Work Part-I (Internal) 2013, Part-II (External) 1994 & part-VII (DG set) 2013.

### ADDITIONAL SPECIFICATION FOR E&M WORK

- i) The work shall be carried out in conformity with CPWD General specification Part – I (Internal) 2013 and CPWD General specification Part – II (External) 1994 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- ii) Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E), & decision of the Engineer in Charge shall be final & binding.
- iii) The contractor will ensure that all the skilled persons managed/deployed for executing the electrical work possess the wireman license issued by approved authorities. Consequences arising due to the default of the contractor to comply with this condition would be contractor's responsibility only.
- iv) The contractor will make his own arrangement for storage of material arranged by him, and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, fittings, cables etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- v) All hardware, fastening material viz. nuts, bolts, washers and screws etc. to be used on work shall be of Zinc / cadmium plated iron.
- vi) All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.
- vii) The contractor shall have to furnish the insulation test report, earth report, along with all required details of electrical load on the prescribed Performa for the electric connection from Supply Company.
- viii) The contractor shall submit the completion certificate and completion plan as per Clause 1.26 of General specifications for Electrical Works Part-I, Internal 2013 after completion of work.
- ix) All earthing material (GI plate, strip, wire) should be hot dip galvanized. All concealed works and earthing shall have to be done in the presence of Engineer-in-Charge or his authorized representative.
- x) MCCBs shall have  $I_{cs} = 100\%I_{cu}$ .
- xi) The department reserves the right to inspect the Panel Boards at the manufacturer's premises for which the contractor should give 15 days advance notice.
- xii) The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- xiii) The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No.DG/MISC.(ELECT.)/1 dated 30.03.2017**.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- xiv) Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge.

**ACCEPTABLE MAKES OF MATERIAL FOR DG SET WORK**

| Sl. No. | Materials                                                   |   | Acceptable makes                                                                               |
|---------|-------------------------------------------------------------|---|------------------------------------------------------------------------------------------------|
| 1.      | Engine                                                      | : | Cummins / MTU / Perkins / Escorts Kubota/ Mitsubishi / Caterpillar / Kirloskar / Ashok Leyland |
| 2.      | Alternator                                                  | : | Cummins / Kirloskar / Crompton / Stamford / Leroy Somer / NGET / Jyoti                         |
| 3.      | Relays                                                      | : | As per standard practice of manufacturer                                                       |
| 4.      | Contactors                                                  | : | As per standard practice of manufacturer                                                       |
| 5.      | M.S Pipes                                                   | : | As per Part C-1                                                                                |
| 6.      | Anti Vibrations Mountings                                   | : | Dunlop, Polybond                                                                               |
| 7.      | Batteries                                                   | : | Exide, Standard, Amco, Panasonic, Luminous                                                     |
| 8.      | Ammeter / Voltmeter (Digital)                               | : | Conserve, L&T, AE or as per standard practice of manufacturer                                  |
| 9.      | Current transformer                                         | : | As per Manufacturer design.                                                                    |
| 10.     | AMF PANEL                                                   | : | Manufactured by OEM only.                                                                      |
| 11.     | Acoustic Enclosure                                          | : | Manufactured by OEM only.                                                                      |
| 12.     | LT Cable / FRLS PVC insulated copper conductor (ISI Marked) | : | As per Part C-1                                                                                |
| 13.     | Air Circuit Breaker, MCCB, MCB, Contactor etc.              | : | ABB / Siemens / Schneider / Legrand / L&T                                                      |
| 14.     | Push Buttons                                                | : | ABB / Siemens / Schneider / Legrand / L&T                                                      |
| 15.     | CT / PT                                                     | : | As per manufacturer's practice.                                                                |

# PART C-6

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.(SH :- SITC of Fire Fighting System Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of Fire Fighting System Work”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                                          |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works                   | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| I                                                                                                     | <b>SITC of Fire Fighting System Work</b> | 77,86,840/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means <b>“SITC of Fire Fighting System Work”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.

**OR**

- ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## **ADDITIONAL CONDITIONS FOR FIRE FIGHTING SYSTEM**

### **1. Specification:-**

The work shall be executed as per CPWD's general specification for Electrical Works Part – I (Internal) – 2023, Part – II (External) – 2023, Part – V (Wet Riser and Sprinkler System for Fire Fighting Installations) – 2020, I.E. Rules, Indian Standards amended up to date and as per direction of Engineer-in charge. The additional specifications are to be read with above and in case of any variations; specifications given along with the tender shall apply.

### **2. Terms of Payments:-**

Following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein on pro – rata basis.

- (i) No advance payment shall be made.
- (ii) 70% after initial inspection and delivery at site in good condition on pro-rata basis.
- (iii) 20% after completion of installation in all respect.
- (iv) Balance 10% will be paid after Testing, Commissioning & Handing Over to the department for beneficial use.

**3. Approval from CFO:-** The Contractor shall be liable to obtain NOC from Chief Fire Officer, and work shall be deemed to be completed only after receiving NOC from CFO & rectification thereafter if any. However, required statutory fee if any shall be paid by department. However all liasoning work / arranging inspection of CFO shall be the responsibility of contractor. It is the responsibility of the contractor to apply for fire advisory from local fire safety department and get the preliminary inspection done before any work of Fire Fighting and Fire Alarm System. After completion of the work, the system shall be offered to local fire safety department for obtaining NOC.

**4. Storage:-** Responsibility for storage of material for execution of work shall be of main contractor.

**5. Power & Water Supply:-** Responsibility for supply of power & water for execution of work shall be of main contractor.

6. The material in required quantity to be used in the work shall be got approved from the Engineer-in-charge before its use at site. The Engineer-in-charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.

7. Contractor shall preserve the copies of invoices, test certificates, gate passes etc. to prove the genuineness of material/purchases. The responsibility of procurement of genuine material of specialized works shall rest with the contractor.

8. No inspection out side the country is permissible if required so the same will be deemed to be waived off and necessary test reports shall be submitted before the dispatch of equipment.

## **TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING SYSTEM**

### **1.0 SITE CONDITION:**

The work is to be carried out for Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand..

- 1.1 The Tenderers are advised to visit the site for any site particular to be well acquaintance about the site requirement by him, before tendering.

### **SCOPE OF WORK AND EXCLUSIONS:**

- 1.2 General features and major components of the work are as underConstruction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

1.3 The work shall comprise entire labour including supervision and all materials necessary to make a complete installation to the entire satisfaction of the department. The term complete installation shall mean, not only major items of equipment covered by these specifications, but also incidental sundry components necessary for complete execution and satisfactory performance of the installation, with all labour charges, whether or not these have been mentioned in detail in the tender documents. The work shall include data entry, programming, start up test and demonstration, training of personnel for maintenance and operation, submission of construction and installation drawings and writing diagrams, as built documents and system guarantee etc. as required.

### **COMPLIANCE WITH REGULATIONS AND INDIAN STANDARDS.**

All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

- (i) CPWD Specification for Internal (2023) and External Specification (2023) as amended up to date.
- (ii) Prevailing factories Act. as amended up to date.
- (iii) Indian Electricity Rules as amended up to date.
- (iv) B.I.S. & other standards as applicable as amended up to date.
- (v) Workmen's compensation Act. as amended up to date.
- (vi) Water works manual as amended up to date.

### **Interpreting Specifications:**

In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:

- (a) Schedule of quantities
- (b) Technical specifications
- (c) Drawing (if any)
- (d) General specifications
- (e) Relevant BIS or other international code in case BIS code is not available.

## **TECHNICAL DETAILS OF FIRE FIGHTING SYSTEM**

**Internal Hydrant:-** Every riser will be provided with the following at every floor including terrace

- |       |                                                                                                                                                                      |   |       |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------|
| (i)   | Single headed out let                                                                                                                                                | - | 1 No  |
| (ii)  | First Aid Hose Reel                                                                                                                                                  | - | 1 No. |
|       | (length of pipe shall be such that nozzle of the hose can be Taken into every room and within 6 Mtr. Of any part of The room keeping in view layout and obstruction) |   |       |
| (iii) | Hose pipe 63 mm dia 15 me long with male and female Coupling at both ends                                                                                            | - | 1 No  |
| (iv)  | Branch pipe 63 mm dia with 20 mm (nominal internal diameter)                                                                                                         |   |       |
|       | Nozzle and suitable for instantaneous connection                                                                                                                     | - | 1 No. |

### **Yard Hydrant (External Hydrant)**

For fighting fire from outside the building, yard hydrants are provided around the building and in the closed court yard. For connecting yard hydrants a ring of pipe shall be laid underground around the building at a minimum distance of 2 m from the face of the building. All internal risers shall be connected with this ring. Yard hydrants shall be located at a minimum distance of 2 m but not more than 15 m from the building face. The yard hydrants shall be easily accessible and should normally be provided near boundary wall/along road. While locating yard hydrants it should be ensured that same do not become hindrance in vehicular movement or entrance to the building. Yard hydrants, should be located around the building in such a way that it should be possible to fight fire on any face of the building from the nearest

hydrant. At least one hydrant post shall be provided for every 45 m. Fire Hydrants shall be of stand post type conforming to IS 908. All Yard hydrant outlets shall be situated 1 m above ground level. The stand posts shall be 80 mm in diameter for single headed hydrants. The stand posts shall be painted 'fire red'. Mild steel stand post may be accepted even in cases where underground mains are of cast iron, using flanged joints. Only Oblique hydrants conforming to IS 5290 with outlets angled towards ground shall be used. The hydrant couplings shall be of the instantaneous spring-lock (female) type of 63 mm diameter and valves shall be of the screw down type. Suitable pressure reducing devices shall be provided for yard as well as internal hydrants where the pressure exceeds 7 kgf/cm<sup>2</sup>, considering the safety of operators.

All hydrants should be serially numbered.

**Yard hydrant will include the following accessories**

- |                                                                                                              |          |
|--------------------------------------------------------------------------------------------------------------|----------|
| (i) Connection from ring main with 80 mm dia MS pipe                                                         |          |
| (ii) 63 mm dia single head landing valve                                                                     | - 1 No.  |
| (iii) Butterfly/sluiice valve 80 mm dia                                                                      | - 1 No.  |
| (iv) Hose pipe 63 mm dia 15 m long with male and female coupling at ends                                     | - 2 Nos. |
| (v) Branch pipe 63 mm dia with 20 mm nominal internal diameter nozzle, suitable for instantaneous connection | - 1 No.  |

All above components shall be housed in a suitable size MS cabinet made from 2 mm thick sheet with glass panel on front. The cabinet shall be painted red.

(Note:- In case hose pipes and branch pipes are likely to be stolen from yard hydrants, the same may be kept in a central place i.e. fire control room/ fire pump room.)

**Fire Service inlet :-** In order to facilitate feeding of water in the system by fire service, a 2/3 way 63 mm diameter collecting head shall be provided and connected with each riser/down comer and the ring main with non-return valve and butterfly/sluiice valve. This should be located at a place where fire brigade tender can reach.

**Fire Service connection:** It is for feeding water to underground storage tank by fire tenders. The static water storage tank shall be provided with a fire brigade collecting head with 4 number 63 mm diameter instantaneous male inlets arranged in a valve box at a suitable point at street level. If tank is not approachable for the fire engines, the fire brigade collecting head shall be connected to the static tank by a suitable fixed galvanized iron pipe not less than 150 mm in diameter to discharge water into the tank when required.

**Fire Brigade draw out collecting head:** Each of the static water storage tanks shall also be provided with a fire brigade draw out collecting head with 63 mm diameter instantaneous male draw out arranged in a valve box at a suitable point at street level. This draw out shall be connected to galvanized iron pipe of 100 mm diameter with foot valve arrangement in the tank.

**Air Vessel:** - To counteract the water hammer effect, air vessel shall be provided at the top of each riser.

**Orifice Plate:** - Suitable pressure reducing devices shall be provided for yard as well as internal hydrants to control pressure to desired limit especially at lower level hydrants.

**Alarm for Wet Riser System:** - To indicate the flow of water in the system, turbine type alarm shall be provided at a prominent place outside the pump house in the main line before any connection is taken. The alarm will indicate the healthiness of the system and shall not be silenced till the main fire pump is in operation.

**Control system-**

The system shall be designed for operation automatically so that as and when water is drawn from the system through any hydrant, the pumps will operate automatically and feed water in to the system. However once a fire pump starts working, it will be stopped only manually (except jockey pump) or on account of any fault or non-availability of power supply to electrical pumps or low water level in UG/Terrace tank.

Facility shall also be provided for manual operation. A selector switch for auto/manual selection shall be provided for each pump.

**The control system shall be designed to provide the following sequence of operation:**

- i) The Pressurization Pump shall maintain pressure in the system and shall operate only on account of slow pressure loss. In case of sudden pressure loss the Pressurization Pump shall not operate. The pump shall start when the water pressure in the system falls to a pre-set value (about 0.35 kgf/cm<sup>2</sup> below normal system pressure) and shut down when the system pressure reaches the set value. Both limits shall be adjustable.
- ii) Main Electric Fire Pump shall operate on account of sudden pressure loss. So long as Main Electric Fire Pump is working, other Fire Pumps will not operate. The pump shall start when the water pressure falls to a pre-set value in the system (about 1 kgf/cm<sup>2</sup>). In case, Normal Electric Supply fails while the Main Electric Fire Pump is running, the DG Set for essential supply will start within 5 seconds.

- iii) The Diesel Fire Pump will start on sudden pressure loss, only in case supply to Main Electric Fire Pump is not available or within a pre-set time the Main Electric Fire Pump fails to start or fails during operation. No other pump will be working when Diesel Engine Fire Pump is in operation. Audio-Visual Alarm shall be available to indicate failure of Main Electric Fire Pump.
- iv) A three attempts starting facility will be provided for diesel pump.
- v) If within a pre-set time, the standby pump also fails to start or fails to develop pressure, the standby pump shall also be shut down and locked out. An audio visual alarm indication shall be given at the control panel.
- vi) The Terrace Pumps will start on sudden loss of pressure only when both the Fire Pumps have either failed to start or exhausted water.
- vii) Only one pump will be working at a time. In manual mode more than one pump can be started.
- viii) Water level in UG and terrace tanks shall be monitored and in case of low water level, pumps connected with the tank shall not operate (even on manual mode) or stop operation as the case may be. An audio-visual alarm shall be given at the control panel.

**Wet Riser:** Wet Riser shall be interconnected at terrace level to form a ring and cut-off shall be provided for each connection to enable repair/maintenance without affecting rest of the system.

**Down Comer:** In down comer, underground tank, fire pumps at ground level, ring main and yard hydrant will not be provided. A minimum of two terrace pumps (electrical) shall be provided. One pump shall act as standby. All down comer pipes shall be inter connected at the terrace level. In case terraces are not interconnected, all building will be treated as individual buildings.

Fire service inlet shall be provided with each Riser/down comer for facilitating pumping of water from fire service tenders.

**Control system:** - The starting of terrace pump shall be automatic i.e. with the opening of any hydrant valve or hose reel on any floor, the pump will start automatically with fall in line pressure. In addition start/stop push buttons shall be provided at ground floor near internal hydrant for starting the pump manually. Where fire control room has been provided, remote operation of terrace pump may be done from fire control room in place of near internal hydrant. The control panel for terrace pumps shall be provided near the pumps in a suitable enclosure to avoid unauthorized operation.

## **FIRE PUMPS**

### **TYPE**

Pumps conforming to IS 12469 shall be exclusively used for Firefighting purposes. The pumps shall be centrifugal type direct driven with a 3 phase, 415 V + 10%, 50 Hz, A.C. motor. The standby fire pump shall be driven by diesel engine. The pumps may be either of horizontal split casing (HSC) type with operating speed not exceeding 1500 rpm, or solid casing with operating speed not exceeding 3000 rpm as specified in the tender documents.

### **RATING**

The terrace pump shall be suitable for continuous operation in the system. The head and discharge requirements shall be as specified in the tender documents. The head shall be suitable for the system and shall take into consideration the pressure drops across the various components in the water circuit as well as the frictional losses.

Pump shall be capable of discharging not less than 150 percent of the rated discharge at a head of not less than 65 percent of the rated head. The shut off head shall not exceed 120 percent of the rated head in the case of horizontal Pumps.

### **MATERIAL AND CONSTRUCTION**

- i) The centrifugal pumps shall conform to IS 1520.
- ii) The pump casing shall be of heavy section close grained cast iron and designed to withstand 1.5 times the working pressure. The casing shall be provided with shaft seal arrangement as well as flanges for suction and delivery pipe connections as required.
- iii) The impeller shall be of bronze, brass or stainless steel. This shall be shrouded type with machined collars. Wear rings, where fitted to the impeller, shall be of the same material as the impeller. The impeller surface shall be smooth finished for minimum frictional loss. The impeller shall be secured to the shaft by a key.
- iv) The shaft shall be of stainless steel and shall be accurately machined. The shaft shall be balanced to avoid vibrations at any speed within the operating range of the pump.
- v) The shaft sleeve and wearing ring etc. shall be of bronze, brass or stainless steel.
- vi) The bearings shall be ball or roller type suitable for the duty involved. These shall be grease lubricated and shall be provided with grease nipples/cups. The bearings shall be effectively sealed against leakage of lubricant or entry of dust or water.

- vii) The shaft seal shall be mechanical type, so as to allow minimum leakage. A drip well shall be provided beneath the seal.
- viii) The pumps shall be directly coupled to the motor/diesel engine shaft through a flexible coupling protected by a coupling guard.
- ix) The pump and motor/diesel engine shall be mounted on a common robust bed plate fabricated from mild steel section. The bed plate shall have rigid, flat and true surfaces to receive the pump and motor/diesel engine mounting feet. The pump will be perfectly aligned with the motor/engine so as to avoid any vibration during operation at all variations of load.

### **ACCESSORIES**

Each pump shall be provided with the following accessories:-

- (a) Butterfly / sluice valves on suction and discharge.
- (b) Reducers, as may be required to match the sizes of the connected pipe work.
- (c) Non-return valve at the discharge.
- (d) Pressure gauge at discharge side between pump and the non-return valve.

### **INSTALLATION**

- a) The pump and motor /engine assembly shall be mounted and arranged for ease of maintenance and to prevent transmission of vibration and noise to the building structure or to the pipe work.
- b) The pump and motor /engine assembly shall be installed on suitable RCC foundation. The length and width of the foundation shall be such that 100 mm space is left all around the base frame. The height of foundation shall be so decided that the total weight of foundation block is 1.5 times the operating weight of the pump assembly.
- c) The foundation shall be isolated from the floor by vibration isolating pads.
- d) More than one pump and motor assembly shall not be installed on a single base or Cement concrete block.
- e) The suction/discharge pipe shall be independently supported and their weight shall not be transferred to the pump. It should be possible to disconnect any pump for repairs without disturbing the connecting pipe line.
- f) A minimum clearance of 1 meter around the main pumps shall be provided.

### **PIPE WORK**

#### **PLUMBING DESIGN**

Pipe sizes shown in tender documents are purely for contractor's guidance. The contractor shall be responsible for selection of sizes as per detailed engineering to be done by him. Plumbing design to be done by the contractor shall incorporate the following:-

- (a) Butterfly/sluice valves shall be provided at suction and delivery sides of pumps
- (b) Fire service connection/inlet
- (d) Test valve.
- (e) Drain connections.
- (i) For testing the system healthiness and automatic operation on daily basis, one test pipe with Butterfly/sluice valve shall be provided in common discharge header. For avoiding wastage of water, this pipe shall discharge water in the tank.
- (ii) Non return valve shall be provided at the delivery of each pump and fire service inlet. This Shall be of swing type.
- (iii) Air release valves with ball valve shall be provided in the piping system for venting trapped air With a size of 25 mm for pipes up to 100 mm and 40 mm for larger pipes.
- (iv) Plumbing drawings showing the sizes of pipe, valves, layout and other details shall be prepared and shall be got approved from the Engineer-in-Charge before the execution of the plumbing work.

#### **PIPE MATERIALS**

Pipes shall be of the following materials

- (a) Mild steel heavy class(c-class) conforming to IS:1239 upto 150 mm.
- (b) Welded black steel pipe, class 2, conforming to IS: 3589, for sizes greater than 150 mm. These pipes shall be factory rolled and fabricated from minimum 6 mm thick M.S sheet for pipes up to 350 mm dia and from minimum 7 mm thick M.S. sheet for pipes for 400 mm dia and above.
- (c) Cast iron double flanged class-"A" conforming to IS: 1536 or IS: 1537(to be provided only in under ground application)
- (d) GI pipe medium class (B-class) conforming to IS: 1239(For Drain)
- (e) Cadmium plated steel nuts/bolts/washers shall be used.

#### **PIPE SIZES**

The pipe sizes shall be selected as under:-

- (i) Suction and delivery pipes of pumps shall be not be less than following

**Pump Discharge****Suction dia (mm)****Delivery dia (mm)**

(a) 900 lpm

75

50

(b) 2280 lpm

150

150

- (ii) Pipe connecting pump house to ring main shall be not less than 150 mm diameter. Higher size pipe shall be selected depending upon length of pipe and friction loss.
- (iii) Down comer pipe size shall be of 100 mm dia.
- (iv) Where wet riser/down comers are not to be provided but hose reel and terrace tanks are to be provided, pipe of size 65 mm diameter shall be provided in between the pump and hose reel.
- (v) Fire service inlet and fire service connection shall be with pipe size not less than 150 mm diameter.
- (vi) All tee off connection for landing valve from vertical risers or from ring main for external hydrants shall be with pipe size not less than 80 mm dia.

**Selection of Material:-** Components like landing valve, hose coupling branch pipes etc. are available in three material i.e. Aluminum Alloy, Gun metal and Stainless steel. Aluminum Alloy is prone to wear and tear and weather conditions faster than other two materials. However being cheaper, Aluminum Alloy may be used in location where chances of pilferage are more. Stainless steel may be considered at location not very safe from theft. Gunmetal may be used in installations which are well protected.

**Hose Pipes/ Branch pipes:-** A minimum of two number of 63 mm diameter, 15 m long hose pipe with instantaneous coupling at both ends and one number branch pipe with nozzle shall be kept with every internal and external hydrant.

**Orifice Plate:-** The pressure in a firefighting system varies from point to point. The pressure will be maximum in the pump house and minimum at the farthest hydrant at terrace level. To reduce pressure to safe operating pressure at every internal/external hydrant, orifice plates are provided before connection of landing valve between the flanges of landing valve and pipe flange. The size of orifice shall be calculated as per details given in

**PIPE MATERIALS**

Pipes shall be of the following materials:

- a) Mild steel heavy class (C-class) conforming to IS:1239 for sizes up to 150 mm.
- b) Welded black steel pipe, Class 2, conforming to IS: 3589, for sizes greater than 150 mm. These pipes shall be factory rolled and fabricated from minimum 6mm thick M.S. Sheet for pipes upto 350 mm diameter and from minimum 7 mm thick M.S. sheet for pipes of 400 mm diameter and above.  
MS pipes may be allowed for extension of existing systems which are laid with CI pipes.
- c) Cast iron double flanged pipe, Class-A conforming to IS 1536 or IS: 1537 (to be provided only in underground application).
- d)
  - (i) GI Pipe medium Class (B-class) conforming to IS:1239 (For Drain)
  - (ii) Cadmium plated steel nuts/bolts/washers shall be used.
  - (iii) Flex drop of stainless steel metallic pipe with mounting accessories, frame for installation on false ceiling.

**PIPE JOINTS**

- (i) Electric welding joints shall be provided in the M.S. pipe work. Flanged joints shall be provided for connections to valves, pumps, air vessels etc and also on straight lengths at suitable points to facilitate erection and subsequent maintenance.
- (ii) For connection of C.I. pipe, fittings shall also be of C.I heavy grade conforming to IS:1538. The flanges shall be smooth faced and neoprene gasket shall be provided. Where un-avoidable and to connect under ground pipe with risers, M.S. pipe may be used in the form of distant pieces. The joint between C.I and M.S. pipe shall be flanged type. M.S. pipe laid at such locations shall be provided anti-corrosive treatment.
- (iii) Mild steel flanges shall be of IS:6392 i.e. "Plate Flanges for Welding" and flange thickness shall be as under. Gasket thickness shall not be less than 3 mm.

**Pipe dia**

200 mm  
150 mm and 125 mm  
100 mm and 80 mm  
65 mm  
40 mm and below

**Flange Thickness**

24 mm.  
22 mm  
20 mm  
18 mm  
16 mm

- (iv) Fittings installed underground shall be of cast iron 'heavy' grade conforming to IS 1538 whereas those installed above ground shall normally be of medium grade wrought steel or mild steel conforming to IS 1239 (Part 2) or malleable iron fittings conforming to IS 1879.

- (v) All hardware items such as Nuts, bolts, washers shall be of appropriate size. Washers shall be used on both sides of the bolt.

### VALVES

Sluice valve conforming to IS: 780 or butterfly valve conforming to IS: 13095 shall be provided. All valves shall be suitable to with-stand the pressure in the system and rating shall be PN. 1.6. All valves shall be right handed (i.e. handle or key shall be rotated clock wise to close the valve), the direction of opening and closing shall be marked and an open/shut indicator fitted.

- (i) The materials of valves shall be as under:-  
Body – Cast Iron  
Disc – Cast Bronze or Stainless Steel  
Seat – Either integral or Nit rile rubber  
o-ring- Nit rile/Silicon.
- (ii) Non return valves shall be swing check type in horizontal run and lift check type in vertical run of pipes.
- (iii) Air release valves shall be gun metal body.

**STRAINERS:** Stainless steel strainers shall have minimum 1 mm thick screen with 3 mm perforations. Strainers shall be provided with flanges.

### ORIFICE PLATE

Orifice plate shall be made of 6 mm thick stainless steel and shall have an identification tag projecting beyond any flange between which it is clamped. The orifice shall be plain central hole without burs and diameter not less than one half of the internal diameter of the pipe to which it is fitted.

### INSTRUMENTS

- (i) Pressure gauge of appropriate range and 150 mm dia size shall be provided.
- (ii) The pressure gauge shall be duly calibrated before installation and shall be complete with shut off valve.

### AIR VESSEL

Air vessel shall be provided on top of each riser and shall be fabricated out of 8 mm thick M.S. Sheet. The ends shall be dished. This shall be of 250 mm diameter, 1.2 m high and installed vertically on suitable legs. The legs shall be provided with M.S. Plate of size 75 mm x 75 mm x 5 mm at the bottom so that the legs do not puncture the roof. The legs shall be grouted in CC foundation. Flange connection shall be provided for connection with wet riser pipe. Air release valve and pressure gauge with shut off valve shall be provided. The air vessel shall be tested at 25 kgf/cm<sup>2</sup> pressure before installation.

### INSTALLATION

- (i) The installation work shall be carried out in accordance with the detailed drawings prepared by The contractor and approved by the Engineer-in-Charge.
- (ii) In pipe above ground level, expansion loops or joints shall be provided to take care of expansion or contraction of pipes due to temperature changes.
- (iii) Tee-off connections shall be through equal or reducing tees, otherwise ferrules welded to the Main pipe shall not be resorted to.
- (iv) Open ends of piping shall be blocked as soon as the pipe is installed to avoid entrance of foreign Matter.
- (v) Piping installation shall be supported on or suspended from structure adequately .  
The contractor shall provide, clamps, hangers etc.
- (vi) Proper lines and levels shall be maintained while installing exposed pipes.
- (vii) Pipe supports in pump house shall be floor mounted and of mild steel/G.I spacing of pipe Supports shall not be more than that specified below:-

| Nominal Pipe Size (mm) | Spacing (m) |
|------------------------|-------------|
| 20 and 25              | 2.00        |
| 32 and 125             | 2.50        |
| 150 and above          | 3.00        |

Extra supports shall be provided at the bends and at heavy fittings like valves to avoid undue stress on the pipes.

- (viii) Anti vibration pads, springs or liners of resilient and non-deteriorating material shall be provided at each support, so as to prevent transmission of vibration through the supports.
- (ix) Pipe sleeves of diameter larger than the pipe by least 50 mm shall be provided wherever pipes pass through walls and the annular spaces shall be filled with felt and finished with retaining rings.
- (x)
  - (a) Vertical risers shall be parallel to walls and column lines and shall be straight and in Plumb. Risers passing from floor to floor shall be supported at each floor by clamps.
  - (b) The space in the floor cut outs around the pipe work shall be closed using cement Concrete (1:2:4 mix) or steel sheet, from the fire safety considerations, taking care to see that a small annular space is left around the pipes to prevent transmission of vibration to the structure.
  - (c) Riser shall have suitable supports at the lowest point.
- (xi) Where mild steel pipes are to be buried under ground the top of the pipes shall be not less than 100 cms below the ground level. Where this not practicable, permission of the Engineer-in-Charge shall be obtained for burying the pipes at interval in Masonry or C.C. blocks shall be provided for supporting the pipes. After the pipes have been laid, the trench shall be refilled with the excavated soil in layers of 20 cm and rammed and any extra soil shall be removed from the site of work by the contractor.
- (xii) Underground pipe shall be laid at least 2 m. away from the face of the building preferably along the roads and foot paths. As far as possible laying of pipes under road, pavement and large open Spaces shall be avoided. Pipes shall not be laid under building and where unavoidable, these shall be laid in masonry trenches with removable covers.
- (xiii) To facilitate detection of leak and isolation of defective portion of pipe, valves shall be provided in underground pipe at suitable locations. As far as possible such valves shall be provided over ground. If the valves are to be provided below ground, suitable masonry chamber with cover plate shall be provided. Locations where vehicles can pass shall be avoided for provision of valve below ground.
- (xiv) Pipe over ground shall be painted in red colour. Suitable identification shall be Provided to indicate the run of under ground pipe wherever the route of underground pipe cannot be ascertained from the location of yard hydrant/isolating valves.
- (xv) It shall be made sure that proper noiseless circulation is achieved in the system. If proper Circulation is not achieved due to air-bound connections, the contractor shall rectify the defective connections. He shall bear all the expenses for carrying out the above rectification including the tearing up and refinishing of floors, walls, etc. as required.

## **PRESSURE TESTING**

- (a) All piping shall be tested to hydrostatic test pressure of at least one and a half times the Maximum operating pressure, but not less than 10 Kg/Sq.cm for a period not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer-in-Charge.
- (b) Piping repaired subsequent to the above pressure test shall be re-tested in the same manner.
- (c) System may be tested in sections and such sections shall be securely capped.
- (d) Pressure gauges may be capped off during pressure testing of the installation.

## **PIPE SUPPORTS**

For installing pipes vertically or horizontally inside the building standard pipe supports of reputed make shall be used. Following supports shall be used.

- (i) Split pipe support clamps with rubber lining for vertical, horizontal and roof hanging.
- (ii) Clevis Hangers for horizontal supports to adjust varying heights.

For pipes of size 100 mm and above, with the prior approval of Engineer-in-Charge, "U" clamp with dash fastener may be used for supporting horizontal pipe from ceiling.

## **MEASUREMENT**

Measurement of plumbing work shall be on following basis:-

- (a) Piping shall be measured along the centre line of installed pipes including all pipe fittings and Accessories but excluding valves and other items for which quantities are specifically indicated in the schedule of work. No separate payment shall be made for fittings and accessories.
- (b) The rates for piping work shall include all wastage allowances, flanges, pipe supports, hangers, Excavation, refilling, testing , nuts and check nuts, vibration isolators, suspension where Specified or required and any other item required to complete the piping installation. None of These items will be separately measured and paid.

## **FIRE FIGHTING ACCESSORIES**

### **1. LANDING VALVE**

Landing valves are provided in the system for connection of hose pipes for discharging water for fighting fire by fire brigade b or trained personnel.

- The landing valves shall be as per IS: 5290
- 1.1 The landing valves are of single and double head outlet types.
  - 1.2 Material of construction:
    - (i) Body, outlet and cap etc : Bronze or Aluminum alloy or stainless steel
    - (ii) Spindle : Brass for Bronze body, stainless steel for Aluminum alloy and Stainless steel body.
    - (iii) Hand wheel : Mild steel or cast iron.

## 2. INSTALLATION

- (i) The landing valve shall be fitted to a T connection of the riser at the landing in such a way that the Valve is in the centre of the internal hydrant opening and at height of 900 mm. from floor level.
- (ii) The valve base shall be vertical and the valve facing outside. There should be no hindrance in Operation of the handle.

## 3. FIRST AID HOSE REEL

First aid hose reel is meant for delivering small quantity of water in early stage of fire and can be operated even by untrained personnel, and thus provides a most effective fire fighting facility. It consists of a length of 20 mm (nominal internal) diameter hose tubing warped around a reel with water. Inlet pipe, stop valve and shut off nozzle. The entire assembly is mounted on a wall bracket and can swing 180 degree. The water inlet is connected to the riser pipe by means of 37 mm socket and valve. The hose tube can be pulled out easily for the purpose of discharge of water on fire.

First aid hose reel shall be as per IS-884. The coupling branch pipe and nozzle shall be as per IS: 8090

### Material of Construction:-

- (i) Hub and sides : Aluminum Alloy/Mild steel/Aluminum sheets.
- (ii) Wall Bracket : Cast iron/Mild steel.
- (iii) Hose tube (20 mm) Thermoplastic (Textile Reinforced) Type-2 as per IS-12585 (Nominal internal dia)
- (iv) Nozzle with branch pipe : Brass
- (v) Stop Valve(Ball Valve) : Gun metal

Normally M.S. construction is used. Other materials may be used in areas having corrosive atmosphere. The water flow rate shall be not less than 24 lpm and the range of jet shall be not less than 6 m.

## 4. Installation

- (i) First aid hose reels are installed with internal hydrant space for which is provided as per where space is not provided, first aid hose reel shall be installed in suitable size MS cabinet made from 2 mm thick sheet with glass door. The cabinet shall be painted red. The size of the cabinet shall be such that there is no obstruction in swinging the hose reel. The location of cabinet shall be such that it does not form an obstruction in passage/escape route.
- (ii) The length of hose tube shall be such that the nozzle of the hose can be taken into every room and within a range of 6 m. from any part of the room.
- (iii) There shall be no obstruction in swinging the hose reel and should be installed above landing valve Where provided.
- (iv) The inlet valve shall be at 900 mm above floor level.
- (v) Hose reel bracket should be firmly grouted on the wall with the help of rawl bolts.

## FIRE HOSE DELIVERY COUPLING BRANCH PIPE AND NOZZLES

These are important accessories used for firefighting operations.

### i. Material of Construction

1. Copper Alloy
2. Aluminum alloy
3. Stainless Steel

### ii. Delivery Hose Coupling's

- a) The delivery hose couplings consist of male half coupling and female half coupling. Grooves are Provided on outer side on both coupling for binding hose pipes with wires. In female coupling spring Loaded cam tooth is provided for holding male half coupling in position. Male half coupling and female half coupling are provided on both sides (i.e. on one side male and on other side female) of hose pipes. Two or more pipes can be joined together with the help of these couplings instantaneously.
- b) Sizes: - These are available in two sizes i.e. 63 mm and 70 mm. Normally size 63 mm is used.

- iii. **Branch Pipe and Nozzle:** - Branch pipes with nozzle are mounted at the end of hose pipe. Branch pipe is properly finished and free from sharp edges. During operation, a fireman has to hold the branch pipe. One end of branch pipe is fixed with hose coupling and the other end is threaded to fit the nozzle. Nozzle is tapered pipe with one end threaded internally which is fixed on branch pipe. The size of other End i.e. nozzle shall be 20 mm.(nominal internal diameter)

#### **FIRE SERVICE INLET AND FIRE SERVICE CONNECTION**

- (i) These are provided for connection of fire service hose pipes for either directly pressurizing the system their pumps or filling water in the tank from a distance. In the first case non return valve with butterfly valve shall be provided for holding water pressure. Fire service inlet shall be provided with each wet riser/down comer and the ring main.
- (ii) **Material of Construction**
- a) Copper Alloy.
  - b) Aluminum Alloy.

#### **HOSE PIPES**

Hose pipe shall be rubber lined woven jacketed and 63 mm in diameter. They shall conform to Type A (Re-inforced rubber lined) of IS: 636. They shall be flexible and capable of being rolled. Length of hose pipe will be 15 m.

- i. The hose pipe shall be complete with male and female coupling at the ends.

#### **ELECTRICAL WORK**

##### **GENERAL**

- Unless otherwise specified in the tender specifications, all equipments and materials for Electrical works shall be suitable for operations on 415 V/240 V  $\pm$  10%(3 phase/single phase) 50 Hz AC system.
- All electrical works shall be carried out complying Central Electricity Authority (Measures Relating To Safety and Electric Supply) Regulations, 2010 and NEC 2011, as amended up to date.
- All parts of electrical works shall be carried out as per appropriate CPWD General Specifications For Electrical works, namely Part 1 (internal) 2013, Part II (external) 1994 work all as amended to date.
- All materials and components used shall conform to the relevant IS specifications amended to Date.

##### **POWER SUPPLY**

Following 3 phases, 415 Volts, 50 Hz, supplies is to be arranged by agency free of cost for fire fighting installations.

- Normal supply for fire pumps near under ground tank.

##### **MOTORS**

The motors shall be squirrel cage AC induction type. The motors shall be suitable for continuous duty and rating necessary to drive the pump at 150 percent of its rated discharge with at least 65 percent rated head. The motor shall be totally enclosed fan cooled type conforming to protection clause IP 21 of IS: 4691. The class of insulation shall be "F". The synchronous speed shall be 1500/3000 rpm as per requirement of the pump. The motor shall conform to IS: 325.

##### **MOTOR STARTER**

- (i) The motor starter shall conform to IS: 1822 "Motor starters of voltage not exceeding 1000 volts" and shall be air insulated and suitable for 415 V  $\pm$  10%, 50 Hz, 3 phase AC supply and shall be Integrated in the panel.
- (ii) Starter for the motor shall be direct on line (D.O.L) for motors up to and including 7.5 H.P rating and automatic star-delta type for motors of higher ratings unless otherwise specified in the tender specifications.
- (iii) Each starter shall be provided with the following protections:-
  - (i) Thermal overload on all the three phases with adjustable settings.
  - (ii) Independent single phase preventor (current sensing type)
- (iv) Adequate number of extra NO/NC contacts for interlocks, indicating lamps, remote operation Etc. shall be provided on the starter/contractor.
- (V) Under voltage/ No volt trip shall not be provided.

##### **CONTROL PANEL**

- (i) The control panel shall be floor mounted cubical type compartmentalized panel board fabricated from 2 mm. thick CRCA sheet, phosphatised and powder coat painted, totally enclosed, dust and vermin proof, free standing, floor mounting type with suitable size cable alley and loose wire box, having suitable size Aluminium bus bar. The board shall be fabricated from 2.0 mm thick CRCA sheet and powder coated after 7 tank treatment process. The board shall be fabricated with IP 42 degree of

- protection for indoor and IP 54 degree of protection for outdoor. It shall be suitable for termination of the incoming / outgoing cable(s) from bottom / top.
- (ii) The capacity of switch gear shall be suitable for the requirements of motor fed / controlled. Starting currents shall be duly considered.
  - (iii) Switchgears & accessories shall be provided as specified for automatic operation of terrace fire pumps sensing the pressure drop in the down comer. Besides automatic operation of pumps, provisions for manual operation shall be incorporated.
  - (iv) Control panel shall house starters for motor with independent current sensing type Single phase preventor for each starter.
  - (v) Digital type measuring instruments like ammeter & voltmeter, Volt meter with selector switch, a set of indicating lamps and fuses for voltmeter and lamps shall be provided. Ammeter with CTs, and selector switch shall be provided with each motor starter. Instruments shall be flush mounted with the panel and have a class index not higher than 1.0. The instruments and accessories shall be provided whether or not specifically indicated in the tender specifications.
  - (vi) Care shall be taken to provide adequate clearances between phase bus bars as well as between Phase bus bars, neutral and earth.
  - (vii) Where terminations are done on the bus bars by drilling holes therein, extra cross section shall be provided for the bus bars. Alternatively, terminations may be made by clamping.
  - (viii) Provision shall be made for proper termination of cables at the switchboards such that there is no strain either on the cables, or on the terminators. Cables connected to the upper ties shall be duly clamped within the switchboard.
  - (ix) Identification labels shall be provided against each switchgear and starter compartment, using plastic / aluminum engraved labels.
  - (x) Metallic danger board conforming to relevant IS shall be fixed on each electrical panel.

#### **POWER CABLING**

- (i) Unless otherwise specified, the power cables shall be XLPE insulated, PVC outer sheathed Aluminum conductor, armoured cables 1100 V grade. The power cables shall be of 2 core for Single phase, 4 core for sizes up to and including 25 sq. mm, 3-1/2 core for sizes higher than 25 sq.mm for 3 phase. Alternatively, XLPE/PVC insulated copper cable (single core/multicore unarmoured) of grade 1100 V shall be used.
- (ii) Power cables shall be of sizes to meet the starting and running current of motors fed and shall be as approved by the Engineer-in-Charge, after taking into consideration the load, the length of cabling.
- (iii) Cables shall be laid in suitable metallic trays suspended from ceiling, or mounted on walls. Cable ducts shall not be provided in pump rooms. Cable trays shall be of perforated steel sheet with adequate structural strength and rigidity. Necessary supports and suspenders for cable trays shall be provided by the contractor as required.

#### **CONTROL WIRING**

- (i) Control wiring shall be done using ISI marked PVC insulated and PVC sheathed, 2.5 Sq.mm 250 V grade, armoured multi-core copper conductor cable. The control cable shall also be laid in the same manner as power cable.
- (ii) The number and size of the control cables shall be such as to suit the control system design adopted by the contractor as per OEM recommendation.
- (iii) Runs of control wires within the switchboard shall be neatly bunched and suitably supported/Clamped. Means shall be provided for easy identification of the control wires.
- (iv) Control wiring shall correspond to the circuitry/sequence of operations and interlocks approved By Engineer-in-Charge.

#### **EARTHING**

- i. Provision of earth electrodes and the type of earthing shall be as specified in the NIT.
- ii. The earth work shall be carried out in conformity with CPWD Specifications for Electrical Works (Part-I), Internal 2013.
- iii. The size of earth conductors for body earthing of equipments shall be 2 Nos 6 mm dia copper Wire/2 Nos 25 x 3 mm G.I strip.
- iv. Compression type glands shall be used for all terminations in the case of PVC/XLPE cables.

#### **PAINTING**

All panels shall be supplied with the manufacturer's standard finish painting or as indicated in the Schedule of Work.

## **TECHNICAL SPECIFICATIONS FOR AUTOMATIC SPRINKLER SYSTEM**

### **1.0 SCOPE**

The general requirement of selection, design, installation, testing, commissioning and maintenance of automatic sprinkler system for firefighting in buildings used for other than industrial and storage purpose.

1.1 Reference: For additional information regarding definitions, planning, design, hydraulic calculations, Tables etc. following documents are to be referred to:-

- (ii) IS:15105:- Design and installation of fixed automatic sprinkler, Fire Extinguisher Systems- Code of Practice.
- (iii) IS: 9972:- Specification for Automatic Sprinkler Heads for Fire Protection Service.

### **1.2 CLASSIFICATION OF OCCUPANCIES**

Sprinklers are provided in industrial and non industrial buildings. The design of sprinkler installation depends upon type of occupancy. Buildings are categorized under the following classes for the purpose of designing the installations in IS 15105

- a) Light hazard class
- b) Moderate hazard class
- c) High hazard class
- d) Storage hazards.

For details of classifications, IS: 15105 is to be referred. Light Hazard Occupancies shall be understood as those with low fire loads and with materials within having low rates of heat release. Light Hazard Occupancies are of non-industrial type subject to the condition that "No single compartment greater than 210 m<sup>2</sup> are allowable within light hazard occupancies and such compartments shall be fire separated by walls having 30 min rating and doors. Otherwise the sprinkler system shall be designed as per Ordinary Hazard Occupancy."

Office buildings (excluding store rooms), education institutions, hospitals (excluding kitchens, stores, utilities), libraries, museums, nursing homes, prisons and residential apartments are classified under light hazard occupancies.

Airport terminal buildings, car parking areas within building or basement, departmental stores/retail shops are classified under ordinary hazard class.

In order to satisfy above conditions, all buildings classified under Light Hazard shall be designed under Ordinary Hazard class. Accordingly these specifications cover Ordinary Hazard class only.

### **COORDINATION**

**Award of Work:** - Depending upon progress of building work, the work of firefighting should be awarded well in time.

- i. **All make and model / technical specification with arrangement drawings as per site locality.**
- ii. Before handing over, the building is to be got inspected by the representative of Chief Fire Officer and local bodies. The building will be issued N.O.C. for occupation / possession only when all safety provisions including firefighting work are complete to the satisfaction of Chief Fire Officer. As such, firefighting work will be considered completed in all respect only when NOC is Issued by CFO or competent officer of local bodies.

## **INSTALLATION, TESTING AND COMMISSIONING**

### **PREPARATION AND APPROVAL OF DRAWING:-**

After award of the work, the contractor has to prepare working drawings and submit To the Engineer-in-charge for approval. The work is to be executed as per approved drawings.

- 1) Site survey should be carried out in detail.
- 2) In addition to building plans, layout plan along with landscape plan/horticulture plan and other services plans should be consulted.
- 3) Pipe sizes are to be decided in accordance with provision as per CPWD specification.

### **INSTALLATION:-**

- 1) All valves shall be installed at a height and in a position that their operation by right hand is conveniently possible.
- 2) All pressure gauges should be installed so that the dial is vertical and is visible while entering the pump House.
- 3) Risers shall be parallel to the wall and in plumb. Adequate supports shall be provided from the wall. Opening around the pipe in slab shall be filled with CC and finished with plaster.
- 4) Internal hydrant shall be provided in the centre and facing out side for ease of operation. Sufficient Space shall be provided around the handle for operation. There shall be no hindrance in moving the first aid hose reel.
- 5) Terrace pipes shall be supported on CC pedestals of adequate height. The pipe route shall be such as no Hindrance is created in movement at the terrace. Pipes shall be sufficiently raised above terrace. It is to be ensured that water proofing is not damaged during laying of pipes.

**TESTING:-****Initial Testing**

- 1) During laying of pipes, the same shall be subjected to 10 Kg/cm<sup>2</sup> hydraulic pressure for a period of 24 Hours, in sections.
- 2) After completion of the work, all valves/fittings shall be installed in position and entire system shall be tested for 24 hours at a pressure of 10 Kg/cm<sup>2</sup>. The drop of pressure up to 0.5 Kg/cm<sup>2</sup> shall be accepted.

**Final Testing**

- 1) After completion, all operation checks shall be carried out for automatic operation of the systems. For this purpose, landing valves may be opened at different locations. The exercise shall be repeated couple of times to ensure trouble free operation of the system.
- 2) **Flow Test:** - The design flow of pumps shall be checked. The pump shall be operated after opening a number of landing valves at different locations. Design pressure is to be maintained in the pump House. Water discharge is to be measured by drop in level in UG tank for a certain period. All pumps shall be tested one by one. The flow rate shall be not less than as specified while maintaining the design pressure in pump house.

**COMMISSIONING:-**

Flushing the System: Before commissioning, the entire system shall be flushed to ensure that any earth/foreign matters which might have entered during installation are taken out. For this, pump may be operated and valves opened at different locations.

- 1) As soon as the work is complete, the system shall be commissioned and made available for use. Requirement of fire fighting installations is equally important during occupation of the building. If the building is to be occupied in part, fire fighting system of building completed shall be commissioned by isolating the system of under construction portion of the building.
- 2) The fire fighting system shall be maintained and manned from the very first day of its commissioning.
- 3) Any defects noticed during the warranty period shall be promptly attended by the contractor and availability of the system at all time is to be ensured.

**TECHNICAL SPECIFICATION FOR FIRE EXTINGUISHERS**

| ITEM NO.  | PARAMETER                         | SPECIFICATIONS AS PER NIT      |
|-----------|-----------------------------------|--------------------------------|
| <b>I</b>  | <b>CO2 Type Fire Extinguisher</b> |                                |
| 1         | Conforming IS                     | IS: 15683                      |
| 2         | Capacity                          | 4.5 Kg                         |
| 3         | Filling Ratio                     | 0.66                           |
| 4         | Type                              | Portable                       |
| 5         | Expellant                         | Self                           |
| 6         | Efficiency Discharge              | Minimum 95%                    |
| 7         | Discharge Time                    | More Than 8 Sec & 15 Sec       |
| 8         | Throw                             | Minimum 2 Mtrs. for 4.5 Kg     |
| 9         | Operating Position                | Upright                        |
| 10        | Operating Valve                   | Wheel / Squeeze Grip type      |
| 11        | Operating Temperature Range       | -30 Deg C To +55 Deg C         |
| 12        | Fire Rating                       | 21B, C                         |
| <b>II</b> | <b>ABC Type Fire Extinguisher</b> |                                |
| 1         | Conforming IS                     | IS: 15683                      |
| 2         | Capacity                          | 6 Kg                           |
| 3         | Anti Corrosive Inhibitor          | Epoxy Polyester Powder Coating |
| 4         | Type of Extinguisher              | Constant Pressure              |
| 5         | Type of Extinguishing Media       | Dry Powder As per IS 14609     |
| 6         | Expellant                         | Pressurized with N2 Gas        |
| 7         | Efficiency Discharge              | Minimum 85%                    |
| 8         | Jet Length                        | More than 2 Mtrs.              |
| 9         | Discharge Time                    | More Than 13 Sec               |
| 10        | Hydraulic test Pressure           | 35 Kg/cm <sup>2</sup>          |
| 11        | Operating Position                | Upright                        |
| 12        | Charged Pressure                  | 15 Kg/cm <sup>2</sup>          |
| 13        | Operating Temperature Range       | -10 Deg C To +55 Deg C         |
| 14        | Operating Valve                   | Squeeze Grip type with hose    |
| 15        | Fire Rating                       | 3A, 34B, C                     |

|            |                                           |                                |
|------------|-------------------------------------------|--------------------------------|
| <b>III</b> | <b>Clean Agent Type Fire Extinguisher</b> |                                |
| 1          | Conforming IS                             | IS: 15683                      |
| 2          | Capacity                                  | 6 Kg                           |
| 3          | Type of Extinguisher                      | Constant Pressure              |
| 4          | Valve Type                                | Squeeze Grip Type with Nozzle  |
| 5          | Efficiency Discharge                      | Minimum 95%                    |
| 6          | Operating Position                        | Upright                        |
| 7          | Expellant                                 | Pressurized with N2 Gas        |
| 8          | Extinguisher Media                        | HFC 236 fa                     |
| 9          | Operating Temperature Range               | -0 Deg C To +55 Deg C          |
| <b>IV</b>  | <b>Electrical Matting</b>                 |                                |
| 1          | Conforming IEC                            | IEC 61111                      |
| 2          | Class                                     | Class - 1 PV tested upto 10 KV |

#### **TECHNICAL SPECIFICATION OF E&M WORK**

- i) The work shall be carried out in conformity with CPWD General specification Part – I (Internal) 2013 and CPWD General specification Part – II (External) 2023 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- ii) Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E), & decision of the Engineer in Charge shall be final & binding.
- iii) The contractor will make his own arrangement for storage of material arranged by him, and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- iv) All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.
- v) The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- vi) The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No. DG/MISC.(ELECT.)/1 dated 30.03.2017**.
  - a) Authorization certificate.
  - b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- vii) Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge

**ACCEPTABLE MAKES OF MATERIAL FOR FIRE FIGHTING SYSTEM WORK**

| S. N. | Item                                                                                    | Acceptable makes                                                                       |
|-------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1     | Pump                                                                                    | Kirloskar / Crompton / Wilo Mather & Platt / KSB                                       |
| 2     | Motor                                                                                   | Kirloskar / Siemens / Crompton / ABB                                                   |
| 3     | GI / MS Pipe                                                                            | As per part C-1                                                                        |
| 4     | Sluice /Butterfly /Non Return / Ball Valves                                             | SANT / Honeywell / Kirloskar / Kartar/ Advance - ISI Marked                            |
| 5     | Pressure Switch / Pressure Gauge                                                        | Danfoss / Indofoss / Feibig / H. Guru / Marsh / Japson / Rapid Control / System Sensor |
| 6     | Internal / External Hydrant / First Aid Hose Reel / Hose Pipe / Fire Brigade Inlet etc. | Life Guard / Newage / Getech/ Kalpex/ Kartar/ Omex/ Atasee (ISI Marked)                |
| 7     | Sprinkler                                                                               | Life Guard / Safe Guard / Omex / Duntop / Tyco / HD/ Atasee                            |
| 8     | Fire Extinguisher and Accessories                                                       | As per part C-1                                                                        |
| 9     | Fire Control Panel (Outdoor / Indoor)                                                   | As per part C-1                                                                        |
| 10    | Selector Switch                                                                         | As per part C-1                                                                        |
| 11    | Digital type Ammeter / Voltmeter / Multifunction meter                                  | As per part C-1                                                                        |
| 12    | LED Type Indicating Lamps                                                               | As per part C-1                                                                        |
| 13    | Push Buttons                                                                            | As per part C-1                                                                        |
| 14    | Control fuses with base                                                                 | Siemens / BCH / L&T / GE                                                               |
| 15    | CT/PT                                                                                   | As per manufacturer's practice.                                                        |
| 16    | FRLS PVC insulated copper conductor (ISI Marked)                                        | As per part C-1                                                                        |
| 17    | LT Cable (ISI Marked)                                                                   | As per part C-1                                                                        |

# PART C-7

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand (SH : SITC of Automatic Fire alarm System & PA System).**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of Automatic Fire alarm System & PA System”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                                                            |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works                                     | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| I                                                                                                     | <b>SITC of Automatic Fire alarm System &amp; PA System</b> | 26,84,617/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means <b>“SITC of Automatic Fire alarm System &amp; PA System”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.

**OR**

- ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## **COMMERCIAL AND ADDITIONAL CONDITIONS FOR FIRE ALARM SYSTEM**

### **1.0 General**

- 1.1 This specification covers manufacturing, testing as may be necessary before dispatch, delivery at site, all preparatory work assembly and installation, commissioning putting into operation of FAS/AFAS including intelligent addressable fire alarm system & final testing & commissioning.
- 1.2 Location: The equipments will be installed at Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. The work shall be executed as per CPWD General Specifications for Electrical Works Part-I (Int.) 2013, Part-II (Ext.) 1994, Part-IV (Sub St.) 2013, Part-VI (FAS)-2018, as amended upto date, relevant I.E. Rules, BIS/IEC and as per directions of Engineer-in-Charge. These additional specifications/conditions are to be read in conjunction with above and in case of variations; specifications given in these additional conditions shall apply. However, nothing extra shall be paid on account of these additional specification and conditions, as the same are to be read along with schedule of quantities for the work.
- 1.3 The tenderer should in his own interest visit the site and get familiarize with the site conditions before tendering.
- 1.5 No T&P shall be issued by the Department and nothing extra shall be paid on account of this.

### **2.0 Commercial Conditions:**

- 2.1 Type of contract: The work to be awarded by this tender shall be treated as indivisible works contract.
- 2.2 Submission and opening of Tenders:
  - 2.2.1 The tender shall be submitted online, duly completed as per NIT conditions within period of bid submission:
  - 2.2.2 The tenderers are advised not to deviate from the technical specifications/item, commercial terms and conditions of NIT like terms of payment, guarantee, arbitration clause, escalation etc.
  - 2.2.3 Tender only shall be opened on the due date and time in the presence of tenderers or their authorized representative who wish to remain present.
  - 2.2.4 Scrutiny/evaluation of the tender shall be done by the department. In case, it is found that the technical specification of a tenderer is not in line with NIT specifications/requirements and/or contains too many deviations, the department reserves the right to reject the tender of such firms(s) without making any reference to the tenderer(s).
  - 2.2.5 Necessary clarifications required by the department shall have to be furnished by the tenderer within the time given by the department for the same. The tenderer will have to depute his representative to discuss with the officer(s) of the department as and when so desired. In case, in the opinion of the department a tenderer is taking undue long time in furnishing the desired clarifications, his bid will be rejected without making any reference.
  - 2.2.6 After obtaining clarification from all the tenders, the tenders shall be opened.
  - 2.2.7 The department reserves the right to reject any or all the price bids and call for fresh prices/tenders as the case may be without assigning any reason.

### **3.0 Terms of Payments**

- The following percentage of contact rates for the various items included in the contract shall be payable against the stage of work shown herein.
- 3.1 80% after initial inspection and delivery at site in good condition on pro-rata basis.
  - 3.2 10% after completion of installation in all respects.
  - 3.3 Balance 10% will be paid after testing, commissioning and handing over to the department for beneficial use.
- ### **3.4 Security Deposit**
- Security Deposit shall be deducted from each running bill and final bill to the extent of 2.5% of the gross amount payable. The security deposit shall be released on the expiry of guarantee period stipulated in the contract.
- ### **3.5**
- Income tax, GST, labour cess & other statutory deduction etc. shall be deducted at source as per the prevalent laws. The deduction of Security Deposit, Income Tax, etc., shall be done after calculation for the above due payment as per clauses 3.1 to 3.3 and net payment shall reduce accordingly.

### **4.0 Rates**

- 4.1 The rates quoted by the tenderer, shall be firm and inclusive of all taxes (including works GST & labour cess), duties, levies, etc. and all charges for packing forwarding, insurance, freight and delivery, installation, testing and commissioning etc. at site including temporary construction of storage, risks over head charges, general liabilities./ obligations and clearance from CFO. However, the fee if any, for the CFO/Local body inspections shall be borne by the Department.
- 4.2 The contractor has to carry out maintenance as per manufacturer's standards for a period of 12 months from the date of handing over. Nothing extra shall be paid on this account.

**5.0 Completeness of tender**

All sundry equipments, fitting, unit assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections and all other items which are useful and necessary for efficient assembly and installation of equipment and components of the work shall be deemed to have been included in the tender irrespective of the fact whether such items are specially mentioned in the tender documents or not.

**6.0 Storage and Custody of Material**

The agency has to make his own arrangement for storage. No separate storage accommodation shall be provided by the department. Watch and ward of the storage and their safe custody shall be responsibility till the final taking over of the installation by the department.

**7.0 Care of the Building**

Care shall be taken by the contractor while handling and installing the various equipment and components of the work to avoid damage to the building. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste material arising out of the installation from the site of work.

**8.0 Completeness Period**

The completion period indicated in the tender documents is for the entire work of planning, designing, approval of drawings etc, arrangement of materials & equipments, delivery at site including transportation, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge.

**9.0 Guarantee**

**9.1** All equipments shall be guaranteed for a period of 12 months from the date of taking over the installation by the department against unsatisfactory performance and/ or breakdown due to defective design, workmanship or material. The equipment or component, or any part thereof, so found defective during guarantee period shall be forthwith repaired or replaced free of cost to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of Engineer-in-Charge in this regard shall be final & binding on the contractor.

**9.2** The tenderer shall guarantee among other things, the following:

- (a) Quality, strength and performance of the material used as per manufacturer's standards.
- (b) Safe mechanical and electrical stress on all part under all specified conditions of operation.
- (c) Satisfactory operation during the maintenance period.

**10.0 Water supply / Power Supply**

Arrangement of Water / power supply shall be responsibility of contractor within its quoted rate.

**11.0 Acceptable makes of various equipments**

The acceptable makes of various equipments / components / accessories have been indicated in "Acceptable Makes" indicated in the list attached. The tenderer shall work out the cost of the offer on this basis. Alternate makes are not acceptable.

**12.0 Data Manual and Drawing to be furnished by the tenderer:**

**12.1** With tender : The tenderer shall furnish alongwith the tender, detailed technical literature, pamphlets and performance data for appraisal and evaluation of the offer.

**12.2** After award of work: The successful tenderer be required to submit the following drawings within 15 days of award of work of approval before commencement of installation.

- (a) General arrangement drawing of the equipments like Detectors, R.I., C&I Panel etc. in the building with complete dimensions.
- (b) Any other drawing necessary for the job.

**13.0** The successful tender should furnish well in advance three copies of detailed instruction and manuals of manufacturer's for all items of equipments regarding installation, adjustment operation and maintenance including preventative maintenance and troubleshooting together with all the relevant data sheets, spare parts catalogue etc. all in triplicate.

**14.0 Extent of Work**

**14.1** The work shall comprises of entire labour including supervision and all material necessary to make a complete installation and such tests and adjustment and commissioning as may be required by the department. The term

- complete installation shall not only mean major items of the plant and equipments covered by the specification but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in details in the tender documents in connection with this contract as this is a turnkey job.
- 14.2** In addition to supply, installation, testing and commissioning of FAS/ AFAS including intelligent addressable FAS equipments, following works shall be deemed to be included with the scope of work to be executed by the tenderer as this is a turnkey job-
- (a) Minor building works necessary for installation of equipments, foundation making of opening in walls or in floors and restoring them to their original condition / finish and necessary grouting etc. as required.
  - (b) All supports for cable and MS Channel for erection as are necessary.
  - (c) Getting CFO inspection done and obtaining clearance. However, necessary fees for inspection shall be borne by the Department.
- 15.0 Exclusion and work to be done by other agencies:**  
The following shall be excluded from the scope of work:
- (a) Major dismantling of any existing building work.
- 16.0 Inspection and Testing**
- 16.1** The material and equipments shall be offered for initial inspection at manufacturer's works. The contractor will intimate the date of testing of equipments at the manufacturer's work before dispatch. The successful tenderer shall give advance notice of minimum two weeks regarding the dates proposed for such test to the department representative to facilitate his presence during testing. The Engineer-in-charge may witness such testing. The cost of the Engineer visit to the factory will be borne by the Department. Equipments will be inspected at the manufacturer/ Authorized Dealers premises before dispatch to the site by the contractor. Nothing extra shall be paid for initial inspection/testing at Manufacture Works.
- 16.2** Copies of all documents of routine and type test certificates of the equipment carried out at the manufactures premises shall be furnished to the Engineer-in-charge and consignee.
- 17.0 VALIDITY**  
Tenders shall be valid for acceptance for a period as defined in part A of NIT.
- 18.0 COMPLIANCE WITH REGULATIONS AND INDIAN STANDARDS:**
- 18.1** All works shall be carried out in accordance with relevant regulation both statutory and those specified by the Indian Standards related to the works covered by this specification in particular, the equipment and installation will comply with the following:
- (i) Factories Act.
  - (ii) Indian Electricity Rules
  - (iii) B.I.S. & other standards as applicable
  - (iv) Workmen's compensation Act.
  - (v) Statutory norms prescribed by local bodies like fire department, CEA, Power Supply Co. etc.
- 18.2** After completion of the installation the same shall be offered for inspection by the representatives of the C.F.O. The contractor will extend all help including test facilities to the representatives of CFO. The observation of CFO will be attended by the contractor.
- 18.3** Nothing in this specification shall be constructed to relieve the successful tender of his responsibility for the design, manufacture and installation of the equipment with all accessories in accordance with currently applicable statutory regulations and safety codes.
- 18.4** Successful tenderer shall arrange for compliance with statutory provisions of safety regulations and departmental requirements of safety codes in respect of labour employed on the work by the tenderer. Failure to provide such safety requirements would make the tenderer liable for penalty for each default. In addition, the department will be at liberty to make arrangement for safety requirements at the cost of tenderer and recover the cost thereof from him.
- 19.0 INDEMNITY**  
The successful tenderer shall at all times indemnify the department, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the contractor shall be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer on account of the above.

- 20.0 Erection Tools:**  
No tools and tackles either for unloading or for shifting the equipments for erection purposes would be made available by the department. The successful tendere shall make his arrangement for all these facilities
- 21.0 Cooperation with Other Agencies:**  
The successful tenderer shall co-ordinate with other contactors and agencies engages in the construction of building if any, and exchange freely all technical information so as to make the execution of this work / contract smooth. No remuneration should be claimed from the department for such technical cooperation. If any unreasonable hindrance is caused to other agencies and any completed portion of the work has to be dismantles and re-done for want or cooperation and coordination by the tenderer during the course of work, such expenditure incurred will be recovered from the successful tenderer if the restoration work to the original condition or specification of the dismantled portion of work was not under taken by the tenderer himself.
- 22.0 Mobilization Advance:**  
No mobilization advance shall be paid for this work
- 23.0 Insurance and Storage:**  
All consignments are to be duly insured upto the destination from warehouse at the cost of the contractor. The insurance covers shall be valid till the equipment is handed over duly installed, tested and commissioned.
- 24.0 Verification of Correctness of equipments at destination:**  
The contractor shall have to produce all the relevant records to certify that the genuine equipments from the manufacturers has been supplied and erected.
- 25.0 Painting**  
This shall include cost of painting of the entire installation. The major equipments like C&I Panel, cable trays etc. shall be factory final finish painted. The agency shall be required to do only touching to the damages caused to the painting during transportation, handling & installation at site, if there is no major damage to the painting. However hangers, supports etc. of cable tray etc. shall be painted with required shade including painting with two coats of anti corrosive primer paint at site.
- 26.0 Training :**  
The scope of work includes the on job technical training of two persons of department at site. Nothing extra shall be payable on this account.
- 27.0 Maintenance:**  
**27.1** Sufficient trained and experienced staff shall be made available to meet any exigency of work during the guarantee period of one year from the handing over of the installation.  
**27.2** The maintenance, routine as well as preventative for one year from the date of taking over the installation as per manufactures recommendation shall be carried out.
- 28.0 Interpreting Specification:**  
In interpreting the specification, the following order of decreasing importance shall be followed in case of contradictions:  
(a) Schedule of quantities  
(b) Technical Specification  
(c) Drawing (if any)  
(d) General Specification  
(e) Relevant BIS or other international code in case BIS code is not available.

## **TECHNICAL SPECIFICATION OF INTELLIGENT ADDRESABLE FIRE ALARM SYSTEM**

### **1.0 General & System Engineering**

The latest development in fire alarm system, Detectors Technology is Intelligent Addressable Fire Alarm System over conventional system. It is now become almost necessary to install this system in every functional and important building because the system has many advantages over conventional automatic fire alarm system such as:

- (i) Accurate quick response to emergencies.
  - a) Early fire warning
  - b) Individual Device identification / location
  - c) Analog Signal feed back
  - d) Pre-alarm notification
- (ii) Eliminates nuisance alarms
- (iii) Powerful operator interface
- (iv) Reliable
- (v) Advance on line diagnostics i.e.
  - a) Continuous circuit supervision
  - b) Detection and isolation of faults
  - c) Continuous processing of analog value sensor data
  - d) Maintenance diagnostics
  - e) Panel test
  - f) Control Board self test
- (vi) Reduction in maintenance costs by:
  - a) Remote testing and sensitivity adjustment.
  - b) Panel testing of smoke sensor to meet International Standard.
  - c) Individual sensor cleaning on need based only.
- (vii) Flexible application

An intelligent addressable fire alarm system is provided to effect total control over the life safety services required in the building. The system is provided with addressable and analog fire alarm initiating, annunciating and control devices. The system is such that smoke sensors/detectors, thermal sensors/detectors and manual call points etc. can be identified with point address. The system is capable of:

- a. Setting smoke sensor sensitivity remotely on a pre-programmed sequence. The system is able to recognize normal and alarm values that reveal trouble condition, pre alarm or need of maintenance.
- b. Provide a maintenance / pre-alert capability at smoke sensors to prevent the detectors from indications a false alarm due to dust, dirt, etc.
- c. Provide alarm verification of individual smoke sensors. Alarm verification printed on the in-built printer of the main fire alarm panel on the external printer attached.
- d. Provide outputs that are addressable i.e. output have a point address to be set from the main control station.
- e. The operator is able to assign such points to logical point groups (software zones) for pre-programmed operation.
- f. In the event of fire alarm but not in a fault condition, the exact location is shown on the main fire alarm panel, local sounder automatically sounded; the complete information is printed along with time and date of occurrence. Air handling units on the effected zones is automatically switched OFF and simultaneously respective fire dampers are closed. Pressurization fans on the evacuation shafts i.e. stairwells, etc. are automatically switched ON. All system output program assigned via control-by event programs that are activated by a particular point in the alarm are executed, and the associated system output (alarm notification appliance and/ or relays) are activated. The audio portion integrated to the system directs the proper signal (tone or Voice) to the appropriate speaker circuits. Pre-recorded alarm messages are played on the public address system.
- g. All the loop elements are able to isolate the short circuits on the loop wiring and thus no element is isolated in the event of single short circuit and the exact location of the short circuit is indicated on the respective fire alarm panel.
- h. The fire alarm panels have necessary interface units for intelligent addressable detectors alarm output modules for external actuations through fail safe programmable relays and communication interface.  
Fire alarm management system in an intelligent addressable Fire Alarm and Detection System comprises of Graphical Management System which is multi-user, with a lot of facilities. It has two screen display the left screen dedicated to display the graphic ( building floor plans, Alarm panels etc.) and the right screen lists all events (alarm reports, Fault messages, information about disable detectors etc.)
- i. Building management system provides bidirectional monitoring and operation of the attach devices of the Fire Alarm and Detection Systems. Besides, other components/ devices in the building like AHU's Pressurization Doors, lifts etc. can also be monitored and operated from the graphical fire alarm management software.

### **2.0 Manual Call Points**

#### **2.1 Scope**

This section covers the requirements of manual call points (MCP) used in addressable intelligent fire alarm systems.

#### **2.2 Constructional requirements of:-**

- i. It is used to trigger a fire alarm manually, and should be suitable for connection to the system loop technology. The alarm is raised by breaking the glass with the alarm carrying on until a replacement glass panel is fitted or alarm to be made silent from control panel. Suitable arrangement like scratching by a diamond bit shall be incorporated in the frangible element.
- ii. A micro switch within the units is held "off" by the edge of the glass when glass is broken the switch is released and a signal is transmitted to control panel where the alarm is raised. The glass is preferably plastic coated to eliminate the damage of splinters causing injury.
- iii. For testing without breaking the glass a test key, should be available so as to lower or remove the glass to release the micro switch. Full functional test is achieved accordingly.
- iv. Facility for reset/adjustment of manual call point alarm triggering.
- v. The unit shall be made out of polycarbonate ABS blend with flame retardant & self extinguishing properties or cast aluminum or ASA plastic or as per manufacturer design and applicable standards.
- vi. It shall preferably contain an integrated short circuit isolator which should ensure that a fault is localized and that the loop continues to function fully in the event of a wire break or a short circuit.
- vii. The call box shall have suitable provision to knock out of termination of a 20mm conduit. This shall also have suitable provision for being fixed on surface or semi recessed in wall.
- viii. The word 'FIRE' shall appear embossed in red color on the front.
- ix. Acknowledgement LED displays –red for triggered alarm indication (flashing) and / or maintenance evacuation.
- x. Protective category shall be IP54 for indoors & IP65 for outdoors applications.

### **2.2.1 Installation Requirements**

- i. Manual call boxes shall be installed at a height of 1400mm above the floor level.
- ii. They shall be installed at easily accessible, well illuminated and conspicuous position, preferably in a contrasting background so that they are easily noticed from either direction. They should be semi-recessed so as to project minimum 10mm from wall surface.
- iii. They shall be installed free from obstructions and shall not themselves obstruct exit way.
- iv. It shall be located on escape routes at (inside or outside) each floor to escape stairs preferably near entry to staircases at various level.
- v. It shall be located such a way that, no person in the premises needs to travel more than 30 meters to reach a manual call point to give an alarm.
- vi. Where necessary, the travel distance may be reduced to less than 30 meters e.g. where there is difficulty in access or in potentially dangerous risk areas.

## **3.0 Intelligent Addressable Fire Detectors**

### **3.1 Scope**

The section covers the requirement of automatic intelligent addressable fire detectors.

### **3.2 Type of Detectors**

The detectors shall be one or more of following types:

#### **(A) Heat Detectors:**

- a. Fixed Temperature
- b. Rate of Rise-Cum-fixed temperature Detectors
- c. Probe type high temperature Bi-Metal Heat Detector
- d. Linear Heat Sensing Cables

#### **(B) Smoke Detectors:**

- a. Ionization type
- b. Optical type
- c. Air Sampling type (Laser type Detector or high sensitivity detector)
- d. Multi-criteria Type
- e. Photo-thermal Type
- f. Beam Detector
- g. Carbon Monoxide

#### **(C) Spark / Ember Detector**

#### **(D) Ultra Violet (UV) Flame Detector**

#### **(E) Infra Red (IR) Flame Detector**

#### **(F) Thermal Multi-Criteria Detector**

### 3.2.1 Governing Specifications:

- a. Heat Detectors shall conform to IS-2175 - 1988 or BS-5445 ( EN 54) Part 5 –1977(VdS/LPCB approved) or NFPA72 (UL/ULC/FM approved) amended upto date.
- b. Smoke Detectors shall conform to IS-11360-1985 or BS 5446 Part I-1977 & Part VII –1985 (VdS/LPCB approved) or NFPA72 ( UL/ULC/FM approved) amended upto date.
- c. For other detectors/devices relevant IS or BS (EN 54) (VdS/LPCB approved) or NFPA 72 (UL/ULC/FM approved) amended upto date

### 3.2.2 Detectors & Applications:

#### (a) Fixed Temperature Heat Detector:

The fixed temperature heat detectors are designed to operate when the temperature of detectors exceeds a predetermined value.

**Application :** Used where the ambient temperature is likely to fluctuate rapidly over short period e.g. in kitchen, boiler room, D.G. Set room, Non AC. area in building.

#### (b) Rate of rise-cum-fixed temperature detectors:

These detectors are designed to operate within a given time.

- When the rate of temperature rise at the detector exceeds a predetermined value regardless of the actual temperature.
- When temperature at detector exceeds a predetermined value

#### **Application -**

In areas subject to smoke, dust and dirt during normal use, where smoke detectors cannot used.

#### © Probe type High Temperature Bi-Metal Heat Detector:

The detector are reset type and highly suitable to use above 80°C where electronic components cannot be used.

**Application:** Generator Enclosure, turbine enclosures, oven and furnace area etc.

#### (d) Linear Heat Sensing Cables:

These can be broadly divided into two categories; digital and analogue, depending upon the principle by which the sensing cable registers a change in temperature.

Digital sensor consists of two core cable in which the conductors are separated by a heat sensitive insulator. When a specified temperature is reached, the cable insulation breaks down and an alarm is activated.

In analogue sensor, cores are separated by a negative temperature co-efficient polymer whose resistance reduces in proportion to temperature increase.

**Applications:** These cables are used for detecting fire and overheating in following areas:

- a. Cable tunnels, trays and vaults
- b. Material conveyors
- c. Bulk storage mull - racked areas
- d. Rim seals of floating roof tanks storing hazardous chemicals.

#### (e) Ionization smoke Detector

Good for invisible smoke detection. Due to use of radioactive element present in it, the disposal is a great problem and can cause serious health hazard, hence now slowly becoming obsolete, use of this detector may be avoided.

#### (f) Optical Smoke Detectors

The optical smoke detector is based on Light Scattering principle. The LED (Light Emitting Diode) transmits light to the measuring chamber where it is absorbed. In case of fire, smoke enters the measuring chamber and the smoke particle scatter the light. The amount of light reaching to photo diode is converted into a proportional electrical signal. On operation of detector when the electrical signal reaches a predetermined threshold value it triggers the alarm on control panel.

**Use:** More suitable for smoldering fire which produces mainly larger particle of smoke e.g. burning of PVC, in A.C. area in a building.

#### (g) Air sampling type detector (High sensitivity smoke detector)

Laser type smoke detectors are used in this type of system. Detector consists of a piping or tubing distribution network that runs from the detector to the areas to be protected. An aspiration fan in the detector housing draws air from the protected area back to the detector through air sampling ports, piping or tubing. At the detector, the air is analyzed for the products by the laser based smoke detector.

**Use:** Typical application of the system is in places where trace of smoke needs to be detected and high airflow can make traditional smoke detector inadequate.

#### (h) Spark / Ember Detector

This detector uses a solid state photodiode or photo transistor to sense the radiant energy emitted by embers typically between 0.5 microns and 2.0 microns in normally dark environments.

These detectors can be made extremely sensitive (microwatts) and their response times can be made very short (microseconds).

**Applications:**

The detectors are primarily installed to detect sparks and embers that could, if allowed to continue to burn, can cause a much larger fire or explosion.

The detector is mounted on some form of duct or conveyor, monitoring the fuel as it passes by. It is necessary to enclose the portion of the conveyor where the detectors are located, as these devices generally require a dark environment.

**(i) Ultra-Violet (UV) Flame Detector:**

It makes use of ultra violet sensitive photocathode for detecting flame. It has very high sensitivity and low false alarm rate and is suitable for indoor application.

The detector is not suitable for high ceiling as the radiation from fire is attenuated by smoke. The random UV radiation from sources such as lighting, the Arc welding etc. can cause false alarms hence usage in such areas to be avoided.

**(j) Infra-red flame detector:**

Almost all the materials that participate in the flaming combustion emit ultraviolet radiation to some degree during flaming combustion whereas only carbon containing fuels emit significant radiation at 4.35 micron (Carbon dioxide) band used by many detectors to detect a flame. This detector senses wave length in the infrared spectrum.

**Application:**

- a. High-ceiling, open-spaced buildings such as ware-houses and aircraft hangers
- b. Outdoor or semi outdoor areas where winds or draughts can prevent smoke from reaching a heat or smoke detector.
- c. Where rapidly developing flaming fire can occur such as in petrochemical production areas, storage areas, natural gas installations, paint shops or solvent areas.

Some of the extraneous sources of radiant emissions that have been identified as interfering with the stability of flame detectors include the following:

- a) Sun Light
- b) Lightning
- c) X-rays
- d) Gamma Rays
- e) Cosmic Rays
- f) Ultraviolet radiation from welding
- g) Electromagnetic interference
- h) Hot objects
- i) Artificial lighting

**(k) Photo - Thermal Multi-criteria detector**

This detector combines optical smoke and heat detection and is capable of being used as a smoke and heat detector both. The multi criteria detector shall be able to discriminate between non-threatening deceptive phenomenon such as cigarette smoke and actual fire hazards. This avoids nuisance alarm.

**Application:** This is good for smoldering and fast flaming fires, optically dense smoke and can be used in buildings for AC and Non-AC area.

**3.3 General Features common to all Detectors:**

- i. Built-in-response Indicator:  
Each detector shall incorporate indicator "LED" at the detector which shall blink on actuation of the detector to locate the detector which is operated while on fire. The detector shall not be affected by the failure of the response indicator lamp.
- ii. The detector shall have preferably 360 visible view of the alarm LED or twin LEDs blink whenever detector is addressed.
- iii. The detector shall have preferably with integrated built in short circuit isolator or as per manufacturer design so that in case of any short circuit in the detector, the detector can be isolated so that loop should be able to retain the full functionality or in case built in short circuit isolator not available/ provided by the manufacturer a fault isolator unit shall be provided after every 20 detectors/ devices in a loop. But in later case isolator unit shall ensure that the loop is functional except the faulty detector.
- iv. The detector shall be with IP 54 protection category with base.
- v. The detector shall be with built in microprocessor capable of making alarm on control panel based on the information stored in detector.
- vi. The detector shall confirm to international standard i.e. NFPA/EN or equivalent.
- vii. The detector shall provide electronic address setting by means of configuration software.

- viii. The detector shall be plug-in-type and shall have common base to facilitate exchange for cleaning & maintenance. The base of the detector shall be interchangeable with other smoke detectors.
- ix. The detector shall be supplied fully tested and each detector should bear the SI. No. and seal of the approving laboratory/body.
- x. The detectors, device including response indicator and control panel shall be of same make.
- xi. Reversed polarity or faulty zone wiring shall not damage the detector.
- xii. The detector shall be suitable for column/ceiling mounting.
- xiii. The detector should have static voltage over load protection.
- xiv. The detector shall be individually identifiable from the control unit by geographical location in the system.
- xv. The detector shall connect to the local control unit via a fully supervised two wire circuit.
- xvi. The detector shall be inserted into or remove from the base by a simple push twist mechanism with an appropriate tool.

### **3.4 Addressable Beam Detector (Infra-red light detector)**

- i. The Beam Detectors shall be long range, projected beam type smoke detectors which consist of a separate transmitter and receiver and evaluating unit integrated into a compact housing.
- ii. The transmitter shall emit an invisible pulsed infra red beam to receiver when beam is obscured beyond selected threshold (20%, 30%,.....70% obscuration) by smoke, the receiver shall signal an alarm. If the beam is completely blocked, receiver shall signal a trouble.
- iii. It shall provide selectable sensitivity and alarm response time for flexibility of installations.
- iv. It shall have a range coverage from 9 mtrs. to 100 mtrs. with upto 16-17 mtrs. spacing between adjacent detectors on smooth , flat ceilings.
- v. It shall have automatic environment compensation.

### **3.5 Addressable Heat Detector:**

- i. The detector and transmission electronics in the detector head for easy exchange in the event of malfunction. Therefore no electronics are permitted in base.
- ii. It has maximum triggering temperature programmable from 58 °C to 81 °C.
- iii. It has high level of immunity to electromagnetic influences.
- iv. The alarm signal when limit temperature is reached is given in Para (ii) above.
- v. Automatic addressing during initial set up or exchange of the detector, without making adjustment of detector.
- vi. Adjustment of the maximum temperature value in combination with or without the temperature differential value.
- vii. Theft protection to protect against unauthorized removal of the detector from base can be available.

### **3.6 Addressable optical- Thermal ( Multi Criteria Detector):**

- i. The intelligent multi criteria detector shall have photo electric and thermal technologies in a signal sensing device.
- ii. The device shall include to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react in the event of a fire condition.
- iii. It shall have an ability to distinguish between a fire condition and a fire alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to database of actual fire and deceptive phenomena.

#### **Use:**

- i. These detector shall be utilized for slow smoldering fire.
- ii. The microprocessor shall be capable of selecting the appropriate sensitivity levels based on the environmental conditions, it can be in office, manufacturing unit, kitchen etc. and have the ability to automatically change the setting as the environment changes.

### **3.7 Intelligent Duct Smoke Detectors**

- i. The smoke detectors housing shall accommodate either an intelligent ionization detector or an intelligent photo electric detector of that provides continuous analog monitoring and alarm verification from the panel through a control module in the loop system.
- ii. When sufficient smoke is sensed in the return air coming to AHU (Detector unit has to be installed in return air path) an alarm signal is initiated at FACP to close the fire damper and prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by duct system.

### **3.8 Detector Base:**

- i. The detectors of all types shall fit into a common type of standard base.
- ii. Once a base has been installed, it shall be possible to insert, remove and exchange different types of detectors by a simple push & twist movement.
- iii. The standard base shall be equipped with screw less wiring terminals suitable for securing wire size upto 1.5 sqmm and with built in strain limits to prevent permanent terminals deformation and weakening of contact pressure.

- iv. It shall have a sealing plate, prevent dirt, dust condensation or water from the conduit reaching the wire terminals of the detector contact points.
- v. All standard base shall be supplied with a removable dust cover to protect the contact area during installation and construction phase of the building. It must allow the inspection and verification of the zone wiring before insertion of any detectors.
- vi. The standard base shall have a built in mechanism, which allows mechanical locking of any installed detector head, thus preventing unauthorized removal or tempering while maintaining.
- vii. Reversed polarity or faulty zone wiring shall not damage the detector.

### **3.9 Intelligent Addressable Monitor Module**

- i. The module shall be suitable to monitor the polling of up to minimum four potential free contacts by using a single or multiple housing and designed for surface or flush mounting.
- ii. The operating mode can be selected and is assigned separately for each input the addressing of the module and the setting of parameters should be carried out using PC software, via the fire alarm control panel.
- iii. The module should contain an integrated short circuit isolator which ensures that the fault is localized and the loop continues to function fully in the event of a wire break or a short circuit.
- iv. The module should be minimum IP 40 protection category when housed in a case or as per manufacturer design.
- v. The module should be with soft addressing to be set with a PC via fire alarm panel at the time of programming.
- vi. The module should have integrated buzzer force signaling maintenance alarms.
- vii. An LED shall be provided that shall flash under normal condition indicate that module is operational.

### **3.10 Intelligent Addressable Relay / Control Module**

- i. Relay module may contain upto four relays each with a potential free changeover contact.
- ii. Each relay contact should be FAIL/ SAFE programmable, means it should be possible to program each contact to operate in three conditions viz. NO FIRE CONDITION, FIRE CONDITION AND LOOP POWER FAILURE CONDITION.
- iii. Both the addressing of the module and setting of parameters to be carried out using PC software via the fire alarm control panel.
- iv. The module contains a short circuit isolator, which ensures that the fault is localized and that the loop continues to function fully in the event of a wire break or a shot circuit.
- v. The module should be minimum with IP 40 protection category when housed in a case or as per manufacture design.
- vi. It should have integrated buzzer for signaling maintenance alarms.
- vii. Its housing have is designed for surface or flush mounting.

### **3.11 Isolator Module:**

- i. The module shall limit the number of module of detectors that may be rendered inoperative by a short circuit on the loop segment.
- ii. At least one isolator module shall be provided for each floor or protected zone of the building.
- iii. If a wire short circuit occurs, the isolator module shall automatically open circuit (disconnect) the loop. When the short circuit condition is corrected, the module shall automatically reconnect the isolated section.
- iv. The module shall not require any address setting and its operation shall be automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
- v. It shall give information on the control panel in the form of audio- visual alarm enunciations along with list of detectors which have become non-functional.

## **4.0 Addressable Fire Alarm Control panel**

**4.0.1 Scope:** This section covers the requirements of main fire alarm, control panel, repeater panel, graphical management system, response indicator etc. used in addressable fire alarm system.

### **4.1 Functional Requirement.**

#### **4.2 General**

- i. In the event of fire alarm but not in a fault condition, the exact location shall be shown on the Main Fire Alarm Panel (MFAP).
- ii. Local sounder should sound automatically.
- iii. Complete information shall be printed with time and date of occurrence.
- iv. Air handling units on the effected zones shall be automatically switched OFF and respective fire dampers shall also be closed.
- v. Pressurization fans of staircase shall automatically be switched ON.
- vi. The audio portion integrated to the system shall direct the proper signal (tone or voice) to the appropriate speaker circuits.
- vii. Pre-recorded alarm messages shall be played on the Public Address System.

- viii. The panel shall have the facility to process the input signals and control the output functions either directly or through interface modules as per the requirements.
- ix. The panels shall have necessary interface units for addressable detectors alarm output modules for external actuations through fail safe programmable relays.
- x. The processor shall interact with the other modules through a common bus.
- xi. The system shall store all basic information and job specific data in memory.
- xii. Different password shall protect any change to system operations.
- xiii. The design of the panel hardware and software shall incorporate the capability to accept additional input from fire protection system such as sprinkler and water flow switch, operation of fire dampers, pressurization fans etc.
- xiv. The panel shall have an extra loop card to serve as standby in case of burn out or malfunctioning of any operating loop cards.
- xv. The panel shall be totally enclosed, dust and vermin proof.

#### **4.3 Type of control and indicating panels:**

Following are the types of control and indication panels in Addressable Fire Alarm Control Panel:

- 1) Intelligent Addressable Main Fire Alarm Control and Indicating Panel.
- 2) Graphical Fire Alarm Management System.
- 3) Intelligent Repeater Panel.
- 4) Intelligent Response Indicator
- 5) Talk Back System / Fire Fighter Telephone Systems.

#### **4.4 Addressable Fire Alarm Control Panel (FACP)**

- 1) The addressable Fire Alarm Control Panel (FACP) shall function as a network panel & also as a fully stand alone panel. FACP shall have its own microprocessor, software and memory. In the event of failure of panel or communication breakdown between the networked panels the FACP shall automatically operate on stand-alone mode without sacrificing any functions (The networking should be peer to peer). Information of all panel in the network should be available on all individual panels.
- 2) The panel should be modular microprocessor based in nature and should be expandable from single loop up to 10 loops.
- 3) FACP shall supervise detection circuits and shall generate an alarm in case of abnormal conditions.
- 4) FACP shall provide general purpose inputs for monitoring such functions as low battery on AC power failure. FACP shall provide tamper protection and commendable outputs, which can operate relays or logic level devices.
- 5) Smoke detectors shall be powered using the FACP based smoke detection circuits FACP shall provide control for resetting smoke detectors, fault isolation and sensor loop operations. It shall be possible to mix different fire devices within same FACP to optimize field wiring.
- 6) It shall be possible for the panel to have a loop length with different modules offering 1.5 km length of devices from the panel.
- 7) FACP shall provide monitoring and control of one floor or area or for multiple floors or areas. FACP shall meet the following requirements to assure the integrity and reliability of the system:
  - (a) The FACP shall have proper listing and / or approval from the following recognized agencies:
    - (i) National Fire Protection Association (NFPA) -USA. This will cover the following approval:
      - a) UL (Under writers Laboratories Inc.)
      - b) ULC (Under writers Laboratories Canada)
      - c) FM (Factory Mutual)
      - d) CSM (California State Fire Marshal)
    - (ii) EN (European)
 

This will cover the following approval:

      - a) LPCB (Loss Prevention Council Board)
      - b) VDS (Vertauen Durch Sicherheit)
      - c) BRE

- FACP shall be NFPA/EN listed independently and as per relevant IS Code as a Fire Alarm Control Panel.
- (b) The FACP should have integrated power distribution module and fixed cabling done internally to guarantee a clear and tidy cable feed.
  - (c) The panel should have an LCD display with minimum 300 characters and keypad. The Display should enable a flexible design of the operating menu with variable keys and message windows fixed keys should be used for standard operating steps e.g. for fire alarm securities supervisory trouble and other events. The current status of the system should be displayed by LED's interfaces (RS232) enable the connection to a PC.
  - (d) The panel should have a 230V AC power supply unit in plug in design with rack and panel connector and 24VDC /6Amp. single output power supply. The module should be protected against over voltage and reverse polarity. The output voltage is monitored and regulated externally.
  - (e) LCD display at the FACP shall be provided to indicate point of alarm or trouble. In Such systems means for manually scanning the points in trouble shall be provided and a trouble and alarm LED shall be used to indicate that there are points in alarm / trouble. The alarm /trouble LED shall only get switched off when all alarm / trouble are cleared from the loop.
  - (f) It shall be possible to command test, reset and alarm silence from the FACP.
- 8) FACP switches shall allow authorized personnel to accomplish the following, independent of the central console.
- (a) Acknowledge a general alarm condition.
  - (b) Silence the local audible alarm.
  - (c) It shall be possible to silence the alarm indicating devices (hooters).
  - (d) Reset all zones (logical Point Group) / points, after all initiating devices have returned to normal.
  - (e) Perform a complete operational test of the memory with a visual indication.
  - (f) Test all panel LED's for proper operation without causing a change in the condition of any zone (Logical Point Group).
  - (g) Walk test –The system shall provide both a basic and advanced walk test for testing the entire fire alarm system including testing of all devices, detectors module etc. in the complete system.
- 9) Software zones/loops shall be circuited and protected by fault isolators such that in the event of a zone/ loop short –circuit, smoke and thermal sensors shall be located and shall report alarm and fault isolator unit after every 20 detector or devices in a loop isolates the part.
- 10) Monitoring modules shall be provided to monitor and address contact-type input devices. The monitor module shall be housed in the FACP supervised by FACP.
- 11) The FACP shall have drift compensation facility to compensate for environment. When a detector accumulates dust in the chamber and reaches an unacceptable level but still below the allowed limit, the control panel shall indicate a maintenance alert warning. When the detector accumulates dust in the chamber above the allowed limit, the control panel shall indicate a maintenance urgent warning.
- 12) The FACP should be NFPA/EN listed approved to provide the sensitivity measurement and documentation required.
- 13) FACP shall be backed up with its built in UPS power or can be powered separately.
- 14) The display on FACP shall provide indication for AC power, system alarm, system trouble/security alarm, display trouble and signal silence to this would mean that in the event of change of any detector/zone sequence alterations, the operator can initiate these by use of the LCD & alpha –numeric keys on the FACP panel to reconfigure the above parameters.
- 15) Power supply unit of FACP shall have following characters:
- (a) The main power supply shall be 230V AC  $\pm 10\%$  50Hz  $\pm 3\%$  and shall in turn provide all necessary power of FACP.
  - (b) It shall provide a separate battery control module with charger. The battery should last for 24 hours minimum in normal operation upon power failure & 30 minutes in alarm condition.
  - (c) For ease of service, all wiring terminal blocks shall be plug-in type.
  - (d) The fire alarm panels shall have a possibility of being interlinked by direct connectivity or an optical cable link between the various locations and should further have connectivity to the main control center.
- 16) Each loop shall have minimum 99 detectors/devices.
- 17) There shall be minimum 20% spare capacity in the looping system for future expansions. The firm has to intimate the maximum number of devices/ detectors can be connected in one loop based on the manufacturer design. Some devices need external supply and some devices supported by loop power.
- 18) The length of loop shall not exceed more than 3000 meter for wire size 1.5sq mm. as per manufacturer recommendations.
- 19) Each loop should not be divided into more than 8 fire zones.

#### **4.5 Response indicator:**

- 1) The response indicator shall be used to locate a fire alarm if the detector's LED cannot be seen (i.e. it is hidden by false floors, false ceilings etc.). When a detector is set off, as well as the alarm message being sent, unit response indicator is also activated and flashes red.
- 2) The response indicator shall loop powered and separate power supply shall not be required.
- 3) Remote response indicator shall be installed outside the areas normally kept closed to identify the detector response even if the room is locked. These indicators shall be able to indicate the status of the corresponding detectors in these areas.

#### **4.5.1 Installation of Response Indicator:-**

- 1) Response indicator shall be installed on wall such that its top is at door level and by the side of the entrance to the respective premises.
- 2) Response indicators for detectors installed over a false ceiling in a corridor shall be installed directly under the false ceiling.
- 3) Response indicators for detectors under a false floor shall be installed at a height of 1 mtr. above false floor level. Additionally, a marking of an arrow pointing downwards shall be made by the side of the response indicator.
- 4) The installation shall be such that visual indications from the response indicators are conspicuous and the affected area is spotted without difficulty.

#### **4.6 Talk Back System/Fire Fighters Telephone Systems:-**

##### **(i) Fire Fighters Telephone System Panel:-**

Fire Fighters Telephone System Panel shall be microprocessor based with its own microcontroller, memory, communication modules, intelligent initiating and indicating devices and suitable SMPS. The panel shall be suitable for required number talk back unit connections. The fire fighters telephone system will have integral talk back system to provide a 2 way voice communication between the fire fighters telephone. The talk back system shall include fire fighter master control console with a backlit LCD display for status display and a fire fighters telephone handset, standby battery for 24 hours in operation and half an hour alarm condition.

The Fire Fighter Telephone System shall also include the following:

A red colored master telephone handset with flexible coiled self-winding five feet cord placed within the fire fighters telephone system panel housing:-

The Fire Fighters Telephone Systems Panel shall include:-

- Indicating High power LEDs
- Input power supply: 230 volts AC 50Hz single phase supply 17-28V DC through rectifier, sealed maintenance free battery including trickle/Booster battery charger. Fire fighters telephone system panel housing shall be Dust and vermin proof cold rolled steel sheet 16 gauge powder coated with see through glass front Fire fighters Telephone system shall be able to withstand 10 °C to 490 °C and upto 93 % RH non condensing type. Fire fighter Telephone system shall be able to be integrated with building and control system and Public Address System.

##### **(ii) Talk back Units/Fire Fighters Telephone:-**

Red Colored fire fighters telephone of rugged ABS plastic construction with 1500 mm coiled cord, a hook switch and the telephone jack placed in a surface mounted cabinet of 18 gauge CRC sheet steel construction with a hinged lockable door and a break glass full front panel labeled. Fire Fighters Telephone including painting with two coats of red synthetic enamel paint over one coat of primer.

#### **5.0 Addressable Intelligent Sounders and Silencing Switches**

##### **5.1 Scope:**

This section covers the requirements of sounders and silencing switches used in fire alarm systems:

##### **5.2 Type of Sounders:**

- 1) Panel Sounders
- 2) Addressable Loop Fire Alarm Sounders.

##### **5.3 Functional requirements:**

- 1) Panel Sounder shall be provided in specified fire alarm panel, repeater panel if any so as to draw attention of the caretaking personnel in a building to a fault in the FAS wiring and a fire condition in the protected premises.
- 2) Fire alarm sounder of low intensity type shall be installed to signal to the occupants of the building to evacuate in the event of a fire.

- 3) Fire alarm sounders cum strobe of high intensity types shall be installed to draw the attention of the fire fighting personnel towards the main location of fire in the premises where a fire has erupted. The strobe should have a light intensity of 15cd. To 100cd.
- 4) Fire alarm sounders shall not be used for any purpose other than for fire operations.
- 5) Silencing facility shall be provided only for panel sounders and not for fire alarm sounders.
- 6) It shall be designed Suitable for ceiling mounted or wall mounted.

#### **5.4 Operation of sounders and silencing:**

- 1) Panel sounders shall be actuated automatically from the control panel.
- 2) Panel sounders shall be actuated automatically as soon as fire alarm signal is initiated from any trigger device connected to them. These shall also be sounded when there is a fault alarm signal within their areas of control.
- 3) A silencing switch shall be provided in the panel. Operation of this switch shall mute the audio output from the panel sounder in this panel and in its repeater panel, if any. Silencing switch shall also be provided in repeater panel which when actuated shall mute the audio output in the panel only.
- 4) Fire alarm sounders in a zone affected by a fire shall be actuated automatically as soon as fire alarm signal is initiated from any trigger device in that zone. All other fire alarm sounders shall be actuated only automatically from the fire alarm panel.

#### **5.5 Specification Requirements:**

##### **5.5.1 Sounders**

- a. The frequency of sound from sounders shall lie in the 500-1000 Hz band. The sound level shall be at least 65dB (A) or 5dB (a) above or any other noise likely persists for a period longer than 30 second at any part of the building sounders with a level greater than 120 dB (A) shall not be provided.
- b. The sound shall be continuous although the frequencies and amplitude may vary and of the same characteristics from the fire alarm sounders in a building. Coded fire alarm signaling from sounders shall not be provided which may cause hearing damage.
- c. 'Fault alarm' and 'Fire alarm' in a panel sounder shall be distinctly different.
- d. The sounder shall be with IP 54 protection category.
- e. It shall conform to EN/NFPA/Indian standards.
- f. The volume of sounders can be adjusted from the fire detectors control panel. Minimum three volume setting from fire alarm control panel shall be available.
- g. The strobe cum hooter are two wire devices that offer tone choices of either continuous horn or temporal tone when constant voltage from fire alarm control panel is applied. Each tone has minimum three volume levels that can be selected for installation.
- h. The strobe cum hooter installed at entrance of building should have three tones programmable from the fire detector control panel so that at least one of these tones can be selected to comply with at least 110dB (A) frequency range of 440Hz to 2850 Hz. The Volume should be adjustable from control panel.
- i. The strobe should have a light intensity from 15 cd to 110 cd.

##### **5.6 Installation Requirements:**

- a. Low intensity fire alarm sounders may be installed on surface of ceilings, suspended from ceiling or recessed in flush with the ceiling, depending on the construction of the sounder and ceiling height.
- b. These shall be installed at a height not lower than 2.4 mtrs. except when recessed in a false ceiling of lower height. In such cases the sounders shall be recessed at false ceiling level.
- c. When installed flush with a false ceiling these shall match the ceiling surface. Necessary provisions such as wooden boxing or frame work to accommodate the sounders shall be made in the ceiling in advance.
- d. High intensity sounders shall be mounted on substantial supports. Provisions for terminating the electrical wiring cables shall be such as not to permit entry of rain water through the wiring conduits or cable runs.

**6.0 Zoned Audio Amplifier** – Digital Audio Amplifiers delivers highly intelligible voice for evacuation and mass notification / emergency communication purposes. Digital messages generated by the audio source unit and paging messages are multiplexed into 6 separate channels transmitted over fiber optic cable or a single twisted pair of wire. Each zone amplifier contains integrated de multiplexing circuitry that allows any one of the 6 digital audio channels to place messages or signals on the amplifier's built – in speaker circuit.

Listing - UL, ULC, CE, EN

Operating Environment – 0°C - 49°C, 93% RH, Non – Condensing

Frequency Response – 400 Hz to 4KHz @ +/-3dB

Output Voltage – 25 Vrms

TDH (distortion) - <7%

Line resistance – 50 Ohms Max.

Internal Tone Generator – 1KHz Temporal (3-3-3) Tone evac

#### **7.0 Speaker -**

Housing – Engineering Plastic  
Wire Connection – 0.75 Sq. mm to 2.5 Sq. mm wire size  
Operating Environment – Indoor only 0°C - 49°C ambient temperature, 93% RH  
Listing – UL, ULC, CE, EN  
Operating Voltage – 25 Vrms or 70 Vrms  
Speaker Response – 400 To 4000 Hz

## **8.0 Power Supply Equipment and Wiring**

### **8.0.1 Scope :**

This section covers the requirements of power supply equipment for the addressable Fire Alarm System (AFAS) and the wiring for the system.

### **9.1 Main Supply**

Power supply at 230 + 10% V, 50Hz, AC single phase shall be provided by the department, terminating directly into the incoming switches of the C&I panel. Earth wire shall also be provided with the power supply. Rectification of the input AC supply into DC and further stabilization of the voltage as may be necessary shall form part of the FAS equipment.

### **9.2 Stand by battery supply**

- 1) Standby battery shall be provided with Fire Alarm Control Panel.
- 2) Battery supply shall be arranged to automatically feed the FAS in the event of variation of input A.C. voltage beyond preset values on high and low sides.
- 3) The battery shall be sealed completely maintenance free. The battery shall be conforming to relevant Indian/International Standard. The normal voltage shall be suitable for the AFAS. The Capacity of the battery shall be suitable to feed the fire alarm panel and other addressable loop elements for a period of 24 hours upon a normal power failure and after which sufficient battery shall remain to provide full load operation for at least 30 minutes in line with IS 2189.
- 4) Installation:  
Battery shall be located in the main fire alarm panel.

### **9.3 Battery Charger**

- 1) The power supply in the fire alarm panel shall be in-built automatic battery charger suitable to charge the batteries as per the requirements of relevant standard.
- 2) The charger shall be complete with necessary voltmeter, ammeter, indicating lamps, fuses etc.
- 3) It shall have protection from overloads and short circuits on both AC & DC sides.
- 4) It shall have protection to prevent discharge through the charger.

## **9.4 Wiring for FAS/AFAS**

### **9.4.1 Circuit Design:**

- (i) The loop element (Smoke Detectors Heat Detectors, Manual Call Points, Monitor Modules Control Modules, Loop Sounders) wiring in AFAS shall be closed circuit loop type (Class A type) , so that if the communication fails from one side, it is restored automatically from the other side. The wiring shall be independent of the detector zoning. The Zones shall be software based.
- (ii) The design of the system wiring shall match the control and indicating equipment in the system.

### **9.4.2 Wiring Materials:**

- (i) The wiring shall be PVC insulated 2 core 1.5 Sq mm FRLS shielded copper Conductor stranded cables in red/black color and generally conforming to IS-694-2010 and meet the signal cabling requirements.
- (ii) The strand of cables shall not be cut to accommodate & connect to the terminals. The terminals shall have sufficient cross sectional area to take all the strands.

### **9.4.3 Installation requirements:**

- (i) The electrical work connected with a FAS shall be carried out in conformity with CPWD general specification for electrical works Part-I (Internal) 2013, and part-II (external) 1994, both amended up to date.
- (ii) In no case the FAS equipment or connections be mounted in or on boxes, cover plates or blanks carrying the accessories or connections of any other service.
- (iii) FAS wiring shall be exclusive to the FAS and be physically separated from wiring for any other service in the building.
- (iv) Wiring for different circuit voltages in a FAS shall be in separate conduits.
- (v) To minimize possible disruption due to fire or other causes, fire alarm circuits should be separated as much as possible from each other. Where practicable, the different fire alarm circuit shall be run through different routes.
- (vi) The metal body of all control and indicating panels shall be loop earthed using 2.5 sqmm copper wire and bonded to the earthing system in the building.

## **TECHNICAL SPECIFICATION OF CONVENTIONAL FIRE ALARM SYSTEM**

### **1.0 Manual Call Boxes**

#### **1.1 Scope**

This section covers the requirements of manual call boxes used in fire alarm system.

#### **1.2 Constructional requirements:-**

- i) The call box shall be of 1.5 mm thick welded sheet steel or 3 mm thick cast aluminium. The front face shall have a glass area designed to break by a steady application of pressure or by impact. Suitable arrangement like scratching by a diamond bit shall be incorporated in the frangible element so that when it breaks upon application of pressure by a finger, it does not hurt the finger.
- ii) The frangible element shall keep a push button pressed inside such that in the event of breaking of the frangible element, the push button is released to actuate an alarm in the control panel. The push button shall be partly depressed so as not to hinder breaking of the frangible element.
- iii) The call box shall have suitable knock out for termination of a 20 mm conduit. This shall also have suitable provision for being fixed on surface or semi recessed in wall.
- iv) Where sheet steel is used for call box, this shall be thoroughly cleaned off dust, dirt, grease and rust if any and two coats of anti rust primer shall be given both inside and outside followed by two coat of synthetic enamel paint in signal red colour or epoxy or powder coated after seven tank process.
- v) In the case cast aluminium body for a call box, the surface shall be neatly finished with red colour paint.
- vi) The word 'FIRE' shall be printed on the call box in face of window.
- vii) The glass surface shall be minimum 30 Sqcm in area and glass thickness shall not exceed 2 mm.

#### **1.3 Installation Requirement:-**

- i) Manual call boxes shall be installed at a height of 1400mm above the floor level.
- ii) They shall be installed at easily accessible, well illuminated and conspicuous position, preferably in a contrasting background so that they are easily noticed from either direction. They should be semi-recessed so as to project minimum 10mm from wall surface.
- iii) They shall be installed free from obstructions and shall not themselves obstruct exit way.
- iv) It shall be located on escape routes at (inside or outside) each floor to escape stairs preferably near entry to staircases at various level.
- v) It shall be located such a way that, no person in the premises needs to travel more than 30 meters to reach a manual call point to give an alarm.
- vi) Where necessary, the travel distance may be reduced to less than 30 meters e.g. where there is difficulty in access or in potentially dangerous risk areas.

#### **1.4 Functional Requirement:-**

One the glass is broken the alarm shall sound on the floor as well as on control panel.

### **2.0 Control and Indicating Panels**

#### **2.1 Scope:**

This section covers the requirements of the various Control and indicating panels used in Fire Alarm System 2.2

#### **Type of control and indicating panels:**

Following are the types of control indicating panels in a FAS / AFAS. These shall be provided as specified in the schedule of work.

- a) Main control and indicating panel (C & I Panel) including Public Addressable System
- b) Sector Panel
- c) Zonal Panel
- d) Repeater Panel

### **3.0 Functional Requirement.**

#### **3.1 General**

The trigger devices shall be connected to the respective zonal panels. Where the zoning design in any work provides of area as sector and further sub division as zones, the trigger devices shall be connected to the sector panels, since no zonal panel is required in such a case. The sector / zonal panels shall in turn be connected to the C & I Panel. The C & I panel shall provide necessary audio – visual alarm and actuate the sounders. This shall also initiate signals for any other operation specified in tender specification. Electric power supply to the entire FAS / AFAS shall be fed through this panel.

#### **3.2 Constructional requirements:**

#### **3.3 General design & fabrication:**

- (i) The various control and indicating panels shall be totally enclosed, dust and vermin proof and shall be suitable for the environmental conditions at the site of their installation.
- (ii) These shall be fabricated out of sheet steel of 1.6 mm thickness and designed for wall or floor mounting. They shall be front openable type with hinged cover and lock.
- (iii) The C & I panel shall be designed such that the equipment for power supply, battery charging and PA system for FAS / AFAS are housed in independent compartments. Maintenance free batteries shall however not be accommodated inside the panel to avoid problems due to corrosion.

- (iv) Suitable knock outs shall be provided for the entry of cables and wiring into the panels.
- (v) The panels after fabrication shall be cleaned to remove any dust / dirt / grease / rust and phosphated. After two coats of anti – rust primer, the panels shall be finished with powder coating of fire red colour.
- (vi) All components and their wiring shall be arranged so as to be conveniently attended to from the front of the panels.
- (vii) All indicating lamps, control switches and buttons and fuses shall be located in the front of the panels. These shall be suitable and unambiguously labeled.
- (viii) The indicating lamps should consist of LED conforming to relevant Indian standards, connected in parallel, of following colours:
  - a) Red to indicate FIRE condition – Two LED
  - b) Amber to indicate FAULT condition – only one LED i.e. for open & short circuits separately
  - c) Green to indicate HEALTHY condition.
- (ix) Test buttons to test the indicating lamps shall be provided.
- (x) All control and indicating panels can be of either electro – mechanical type or of electronic type.
- (xi) Any printed circuit boards (PCBs) used in the panels shall be plug in type. The PCBs shall be suitably protected against atmospheric corrosion.
- (xii) If required, the panel should have additional capacity to operate auxiliary equipment like fire dampers, fire closers, ventilation and / or pressurizing fans, smoke exhaust fans etc.

#### **4.0 Sounders and Silencing Switches**

##### **4.1 Scope:**

This section covers the requirements of sounders and silencing switches used in fire alarm system / Automatic Fire Alarm System:

##### **4.2 Type of Sounders:**

**Sounders in a FAS / AFAS shall be of the following types:**

- (a) Panel Sounders
- (b) Fire Alarm Sounders. These in turn comprise of low intensity and high intensity sounders. The sounders for fire alarm should be electronic hooters / horns / electric bell.

##### **4.3 Functional requirements:**

- (a) Panel Sounder shall be provided in C & I panels, sector / zonal panel specified and repeater panel if any so as to draw attention of the care taking personnel in a building to a fault in the FAS / AFAS wiring and a fire condition in the protected premises.
- (b) Fire alarm sounder of low intensity type shall be installed to signal to the occupants of the building to evacuate in the event of a fire.
- (c) Fire alarm sounders cum strobe of high intensity types shall be installed to draw the attention of the fire fighting personnel towards the main entrance of the premises where a fire has erupted.
- (d) Fire alarm sounders shall not be used for any purpose other than for fire operations.
- (e) Silencing facility shall be provided only for panel sounders and not for fire alarm sounders.

##### **4.4 Specification Requirements:**

###### **4.4.1 Sounders**

- (a) Hooter shall be provided for both sounders and fire alarm sounders. Bell may be provided as low intensity fire alarm sounders, only where so specified.
- (b) The frequency of sound from sounders shall lie in the 500-1000 Hz band. The sound level shall be at least 65dB (A) or 5dB (a) above or any other noise likely persists for a period longer than 30 second at any part of the building sounders with a level greater than 120 dB (A) shall not be provided.
- (c) The sound shall be continuous although the frequencies and amplitude may vary and of the same characteristics from the fire alarm sounders in a building. Coded fire alarm signaling from sounders shall not be provided which may cause hearing damage.
- (d) 'Fault alarm' and 'Fire alarm' in a panel sounder shall be distinctly different.

##### **4.5 Installation Requirements:**

- (a) Low intensity fire alarm sounders may be installed on surface of ceilings, suspended from ceiling or recessed in flush with the ceiling, depending on the construction of the sounder and ceiling height.
- (b) These shall be installed at a height not lower than 2.4 mtrs. except when recessed in a false ceiling of lower height. In such cases the sounders shall be recessed at false ceiling level.
- (c) When installed flush with a false ceiling these shall match the ceiling surface. Necessary provisions for frame work to accommodate the sounders shall be made in the ceiling in advance.
- (d) High intensity sounders shall be mounted on substantial supports. Provisions for terminating the electrical wiring cables shall be such as not to permit entry of rain water through the wiring conduits or cable runs.

## **5.0 Power Supply Equipment and Wiring**

### **5.0.1 Scope :**

This section covers the requirements of power supply equipment for the Fire Alarm System / Automatic Fire Alarm System and the wiring for the system.

### **5.1 Main Supply**

Power supply at 230 V, 50Hz, AC single phase shall be provided terminating directly into the incoming switches of the C&I panel. Earth wire shall also be provided with the power supply. Rectification of the input AC supply into DC and further stabilization of the voltage as may be necessary shall form part of the FAS equipment.

### **5.2 Stand by battery supply**

- (a) Standby battery shall be provided with C & I Panel.
- (b) Battery supply shall be arranged to automatically feed the FAS / AFAS in the event of variation of input A.C. voltage beyond preset values on high and low sides.
- (c) The battery shall be sealed completely maintenance free lead acid type or any other rechargeable type. The normal voltage shall be suitable for the FAS / AFAS. The Capacity of the battery shall be such that it should capable of maintaining the system in normal operation for a period of not less than 24 hours after failure of normal supply.
- (d) **Installation:**  
Battery shall be located in a well ventilated space close to the C & I panel, so as to be conveniently maintained. This shall be installed in a non corrosive enclosure, such as wood, PVC or steel coated with epoxy paint.

### **5.3 Battery Charger**

- (a) The battery shall be provided with a matching battery charger which shall form part of the C & I panel. The battery shall be in continuous trickle / boost charge.
- (b) The charging rate shall be such that after re – charging for a period of 8 hours.
- (c) The charger shall be complete with necessary voltmeter, ammeter, indicating lamps, fuses, etc.

### **5.4 Wiring for FAS/AFAS**

#### **5.4.1 Circuit Design:**

The design of the system wiring shall match the manufacturer system design.

#### **5.4.2 Wiring Materials:**

- (a) The PVC insulated FRLS copper conductor cable having a minimum 1.5 Sq mm cross sectional area conforming to IS-694 to be used.
- (b) Armoured XLPE cables conforming to IS 7098 Part – 1, 1988 with upto date amendments shall be used for connection with control panels & other areas wherever required.
- (c) Wiring shall be laid in metallic / rigid conduit.
- (d) Cables connected to detectors should be given 'S' loops on both sides of the detectors which should be properly clamped to the ceiling. Loop should also be left, where wire / cables connect to sounders & all other accessories in the system. Appropriate glands should be provided where the cables enters the junction box.
- (e) Only 'red colour' wire should be used for laying in conduit.
- (f) No over head lines should be used to connect different building.
- (g) All the wires should be tagged for proper identification, should be identified by ferrules at junction & cable by colour bands at every 3 meters distance.
- (h) Multi core cables and flexible cords shall not be used.

#### **5.4.3 Installation requirements:**

- (a) The electrical work connected with a FAS shall be carried out in conformity with CPWD general specification for electrical works Part-I (Internal) 2013, and part-II (external) 1994, both amended up to date.
- (b) In no case the FAS equipment or connections be mounted in or on boxes, cover plates or blanks carrying the accessories or connections of any other service.
- (c) FAS wiring shall be exclusive to the FAS and be physically separated from wiring for any other service in the building.
- (d) Wiring for different circuit voltages in a FAS shall be in separate conduits.
- (e) To minimize possible disruption due to fire or other causes, fire alarm circuits should be separated as much as possible from each other . Where practicable, the different fire alarm circuit shall be run through different routes.
- (f) The metal body of all control and indicating panels shall be loop earthed using 2.5 sq mm copper wire and bonded to the earthing system in the building.

**ACCEPTABLE MAKES FOR FIRE ALARM SYSTEM & PA SYSTEM**

| <b>Sl. No.</b> | <b>Item</b>                                                                                                                                                      | <b>Acceptable makes</b>                                 |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 1              | Automatic Fire Alarm Control Panel, Addressable Detectors, Addressable Manual Call Points, Low Intensity Strobe cum Hooter / Sounder, Fault Isolator Module etc. | Honeywell (Notifier) / Bosch / Edward / Ravel / Siemens |
| 2              | PA System                                                                                                                                                        | Honeywell / Bosch / Edward / Ravel / Siemens            |
| 3              | Conventional Fire Alarm Panel, Manual Call Points, Hooter / Sounder, etc.                                                                                        | Honeywell / Agni / Apollo / Ravel / Siemens             |
| 4              | Wires / Cables                                                                                                                                                   | Polycab / RR Kable / Havells / Finolex / KEI            |

# **PART C-8**

**Name of Work : Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH :- SITC of Lift work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of Lift work”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                        |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------|------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| I                                                                                                     | SITC of Lift work      | 70,44,749/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/OEM, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head<br/>OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head<br/>OR</p> <p>iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>b) Bot Specialized firms as well as CPWD (B&amp;R) contractor shall associate OEM for execution of this work.</p> <p>Similar work shall means <b>“SITC of Lift work”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor and the associated specialized agencies & OEM is required to give affidavit to confirm their association.
4. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
5. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
6. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
7. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
8. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
9. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
10. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

11. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
12. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
13. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
14. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

# **TERMS, CONDITIONS AND SPECIFICATIONS FOR LIFT WORK**

## **1.0 LOCATION**

The lift shall be installed in Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

## **2.0 Interpreting specifications**

In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:

- a) Schedule of quantities
- b) Technical specifications
- c) Drawing (if any)
- d) General specifications
- e) Relevant IS or other international code in case IS code is not available.

## **3.0 SITE CONDITION:**

3.1 The work is to be carried out for Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

The Tenderers are advised to visit the site for any particulars to be well acquaintance about the siterequirement by him, before tendering.

3.2 General features and major components of the work are as under.

Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand is being carried out by CPWD. Dimension of lift shaft shall normally be governed by CPWD specification for Lift and approved architectural drawing. The type of lifts shall Passenger Lift.

3.3 The Department shall not issue any T&P for carrying out the work. Nothing extra shall be paid on account of engagement of T&P by the supplier/Contractor to carryout the work at site.

## **4.0 SPECIFICATIONS FOR LIFTS: -**

These specifications are intended to cover the complete installation of Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand in a first class workmanlike manner and to include all work and materials in accordance with the drawings and specifications as specified. The work shall be carried out in accordance with the CPWD General Specifications for Electrical Work 2013 &Part-III lift & escalators 2003 as amended upto date, relevant I.S. Specifications, National electric code, Indian Electricity Act & Rules which govern the requirements of the lift installation and as per direction of Engineer-in-Charge including amendments up to date of the specifications, standards and regulations. These specifications are to be read in conjunction with above and in case of variations; specifications given in these additional conditions shall apply. However nothing extra shall be paid on account of the additional specifications and conditions as the same are to be read along with schedule of quantities for the work.

## **5.0 GENERAL CONDITIONS: -**

5.1 These specifications cover manufacture, testing as may be necessary before dispatch, delivery at site, all preparatory work, assembly and installation, testing, commissioning, trial run, seeking approval / license from the local authorities, putting into operation of Lifts for beneficial use of client as per satisfaction of the Engineer-in-Charge.

## **6.0 COMMERCIAL CONDITIONS**

6.1 **TYPE OF CONTRACT:** The work to be awarded by this tender shall be treated as individual work contract.

### **7.0 Terms of payment**

7.1 The following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein.

- (i) 80% after initial inspection and delivery at site in good condition on pro-rata basis.
- (ii) 10% after completion of installation in all respect.
- (iii) Balance 10% will be paid after testing, commissioning trial run and handing over to the department for beneficial use.

**8.0 Rates**

- 8.1 The rates quoted by the tenderer, shall be firm and inclusive of all taxes, duties and levies and all charges for packing forwarding, insurance, freight and delivery, installation, testing commissioning etc. at site including temporary constructional storage, risk, overhead charges general liabilities / obligations and clearance from local authority.  
The contractor has to carryout routine and preventive maintenance for 12 Months from the date of handing over. Nothing extra shall be paid on this account.

**9.0 Completeness of tender**

- 9.1 All sundry equipment, fittings, unit assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections and all other items which are useful and necessary for efficient assembly and installation of equipment and components of the work shall be deemed to have been included in the tender irrespectively of the fact whether such items are specifically mentioned in the tender documents or not.

**10.0 Inspection and Testing**

- 10.1 For item / equipment requiring initial inspection manufacturer's works the contractor will intimate the date of testing of equipments at the manufacturer works before dispatch. The department also reserves the right to inspect the fabrication job at factory and the successful tenderer has to make the arrangement for the same. The successful tenderer shall give sufficient advance notice regarding the dates proposed for such test / inspection to the department's representatives to facilities his presence during testing / fabrication. The Engineer-in-charge at his discretion may witness such testing / fabrication. The cost of Engineer's visit to the factory will be borne by the department. Also equipment may be inspected at the manufacturer's premises, before dispatch to the site by the contractor.  
Copies of all documents of routine and type test certificates of the equipments, carried out at the manufacturer premises shall be furnished to the Engineer-in-charge and consignee.

**11.0 Storage and custody of materials**

- 11.1 No separate storage accommodation shall be provided by the department. Watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the final taking over of the installation by the department.

**12.0 Care of the building**

- 12.1 Care shall be taken by the contractor while handling and installing the various equipments and components of the work to avoid damage to the building. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of the installation from the site of works.

**13.0 Completion of period**

- 13.1 The completion period of **as per civil work** indicated in the tender documents is for the entire work of planning, designing, supplying, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge.

**14.0 Guarantee**

- 14.1 All equipments shall be guaranteed for a period of 12 months from the date of taking over the installation by the department against on satisfactory performance and / or breakdown due to defective design, workmanship of material. The equipments or components, or any part thereof, so found defective during guarantee period shall be forthwith repaired or replaced free of cost, to the satisfaction of Engineer-in-charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of the Engineer-in-charge in this regard shall be final.

**15.0 POWER SUPPLY**

Electric service connection of 230 Volts single phase/415 V, 3 phases, 4 wires, 50 Hz, AC supply is to be arranged by the agency free of cost in the existing building for installation purposes.

**16.0 WATER SUPPLY: Water supply is to be made available by the agency free of cost.****17.0 Data manual and drawings to be furnished by the tenderers**

- 17.1 The tenderer shall furnish along with the tender, detailed technical literature, pamphlets and performance data for appraisal and evaluation of the offer.

**18.0 After award of work**

18.1

- (i) The successful tenderer would be required to submit the following drawings within a month of award of work for approval before commencement of installation.
  - a) All general arrangement drawings.
  - b) Details of foundations for the equipment, load data, location etc. of various assembled equipment as may be needed generally by other agencies for the purpose of their work. The data will include breaking load on guides, reaction of buffers on lift pits reaction on support points in machine room, lift well etc.
  - c) Complete layout dimensions for every unit / group of units with dimensions required for erection purposes.
  - d) Any other drawing / information not specifically mentioned above but deemed to be necessary for the job by the contractor.

18.2 The successful tenderer should furnish well in advance three copies of detailed instructions and manuals of manufacturers for all items of equipments regarding installation, adjustments operation and maintenance including preventive maintenance and troubleshooting together with all the relevant data sheets, spare parts catalogue and workshop procedure for repairs, assembly and adjustment etc. all in triplicate.

**19.0 Maintenance (Routine and Preventive) -** For one year from date of completion and handing over.

**20.0 Minor building work** –Minor building work necessary for installation of equipment, foundation, making of opening in walls or in floors and restoring to their original condition, finish and necessary grouting as required.

**21.0 CIVIL WORK TO BE DONE BY LIFT CONTRACTOR (INCLUDED IN CONTRACT)**

- a) To provide scaffolding (iron) in the hoist way required for erection of lift.
- b) To carry out minor civil work, such as modification and making good the pockets / cutouts in wall / ceiling for car, counter weight, rail bracket, hall buttons, indicators and laying of sills in positions or any other work required for smooth operation commissioning of lifts.
- c) To provide and fix the steel item such as machine beams, arch beam, bearing plate in the machine room, separators wherever required and buffer support channels and vertical iron ladder in lift.
- d) Department will provide required electric panel with cable feed at one place or in the lift supplier panel within the machine room. Lift supplier will do all electrical works from departmental panel to the lift controller and machine etc.
- e) Providing of hoisting beam in the machine room for hoisting of equipment during erection and to facilitate maintenance in future including their fixing etc.
- f) Providing and fixing of necessary sill supporting projection sheet fascia plates on all landings as per requirements.

**22.0 CONTROL PANEL:** As per manufacturer practice and relevant code

**23.0 REVERSE PHASE RELAY**

A reverse phase relay shall be provided on the controller which is designed to protect the lift equipment against phase reversal and protection against phase failure.

**24.0 TESTS AT SITE:** As per CPWD specification for lifts and elevators and as per B.I.S code.

**25.0 PERMISSION TO INSTALL THE LIFTS AND LICENSE TO RUN THE LIFTS FROM RELEVANT AUTHORITIES**

25.1 It shall be the responsibility of the successful tenderer to obtain the necessary permission, if required, to install the lifts from the relevant local authorities and subsequently to have the installation inspected by the relevant local authorities and arrange to obtain the license to run the lifts. All relevant papers connected to obtaining the permission and final inspection will be submitted to the Department. The requisite fees for this purpose shall be included in the quoted rate and no extra will be paid on this account.

**26.0 ERECTION**

26.1 The lift Contractor shall commence the erection of the lift equipment immediately after receipt of the complete equipment from makers and complete the work to the satisfaction of the Engineer-in-Charge within the stipulated time. The lift installation shall be handed over in perfect working order on completion of the work.

## 27.0 Compliance with regulations and Indian standards

All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by the specifications. In particular, the equipment and installation will comply with the following:

- (i) Factories Act.
  - (ii) Indian electricity rules
  - (iii) IS and BS standards as applicable.
  - (iv) Workmen's compensation Act
  - (v) Statutory norms prescribed by local bodies like CEA, NDMC etc.
- (All as amended upto date)

## 28.0 Eligibility Criteria for Lift Works

- 1) The lift manufacturer shall comply with latest BIS standards, duly certified by the manufacturer itself.
- 2) The manufacturer shall be compliant to the Public Procurement (Preference to Make In India), Order 2017 (as amended from time to time) issued by the department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry.
- 3) The experience of successful completion of similar works shall be as per CPWD Works Manual / SoP.
- 4) The manufacturer shall furnish an undertaking regarding availability of spares for the entire life i.e. 15 to 20 Years.
- 5) The complete lift installation including its components, safety devices, various types of controls etc., testing, inspection, operation & maintenance shall conform to relevant codes, Standards, code of practices, guidelines, safety rules, inspection manual(s), rules issued by Bureau of India Standards, as amended up to the last date of receipt of tenders.
- 6) Quality Standards shall conform to IS/ISO-9001:2015.
- 7) The down time of installed lifts, which are being maintained by the manufacturer, shall not be more than 8 hours (average) in case of minor faults and 7 days (average) in case of major faults in last one year. The data to be considered shall be for last financial year.

### **TECHNICAL SPECIFICATIONS OF PASSENGER / GOODS LIFT**

#### **Specification for Passenger Lift (13 passenger 884 Kg.)**

| SI No. | Parameters               | Details                                                                                                                            |
|--------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Type of Lift             | Passenger lift MRL (Without machine Room)                                                                                          |
| 2      | Number of lifts required | 1                                                                                                                                  |
| 3      | Speed                    | 1.5 MPS                                                                                                                            |
| 4      | Floors                   | 7 (B+G+5)                                                                                                                          |
| 5      | Travel                   | 29 Meters (approx.)                                                                                                                |
| 6      | Stops & opening          | 7 stops and 7 openings                                                                                                             |
| 7      | Controller               | A.C. variable voltage & variable frequency                                                                                         |
| 8      | ARD                      | Automatic rescue device (ARD) complete with dry maintenance free batteries as required.                                            |
| 9      | Operation                | Microprocessor based single automatic push button/simplex selective collective/ duplex collective selective with/without attendant |
| 10     | Power                    | 415 Volts+10%, 3 phase, 50 Hz, 4 wires system                                                                                      |

| Sl No. | Parameters                                      | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11     | Car Enclosure                                   | Stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish) on all sides and stainless steel decorative ceiling with fans (indirect throw) and LED fitting.                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 12     | Flooring                                        | The car flooring should be smooth and antiskid as approved by engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 13     | Type of doors                                   | a) Car: Power operated, centre opening horizontal sliding stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish).<br>(b) Landing doors: stainless steel scratch proof.                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 14     | Hand Rail                                       | A hand rail not less than 600mm long at 900mm above floor level to be fixed adjacent to control panel in the lift car.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 15     | Voice announcement system                       | Voice announcement system in the car to announce the position of the elevator in the hoist way as the car passes or stops at floor served by the elevator.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 16     | Mandatory Features                              | Closed loop Control System, protection against power fluctuation, self diagnostic control, Landing doors 2 hours Fire rated, Overload detection and protection, Over speed Governor, Dot Matrix LED D & P Indicators In Car & Landings, BMS Compatibility, tamper proof infrared curtain covering almost the entire height of the lift car door, Alarm horn, Anti Nuisance Operation, CCTV camera system with 4 MP IP camera, suitable NVR and HDD for 30 days storage backup, Firemen switch, 2/3 way intercom, Emergency Stop Switch with battery backup for fan and light fitting for 1 hour, pit ladder. |
| 17     | Lift doors                                      | The lift doors shall have a vision panel to enable persons with hearing impairment to signal for help or assistance in the event of an emergency.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 18     | (xvi) Emergency Situation                       | An appropriate technological support be provided (Through emergency messaging   services or alarms etc.) to respond to the emergency requirements of person with hearing impairment or deafness.                                                                                                                                                                                                                                                                                                                                                                                                             |
| 19     | Failure of ARD                                  | In case of failure of ARD or other electronic devices, a provision of manual rescue be provided                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 20     | Type of Doors                                   | Horizontal sliding-center opening fabricated from stainless steel in Moon Rock Finish / Hairline Finish of not less than 1.5 mm thick.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 21     | Construction design and finish of car body work | <b>Car Frame:</b> The car frame shall be in accordance with clause - 4 of IS 14665 (Part 4-Sec3):2001 made of sheet steel of rigid construction to withstand without permanent deformation the operation of safety gear. The car shall be so mounted on the frame that vibration and noise transmitted to the passengers inside is minimized.                                                                                                                                                                                                                                                                |
|        |                                                 | <b>Car platform:</b> The car platform shall be of framed construction and designed on the basis of rated load evenly distributed. The dimensions shall conform IS: 14665 (PART 1)2000. The flooring shall be smooth and anti skid surface. A load plate along with overload alarm, giving the rated load and permissible maximum number of passengers should be fitted in each lift car in a conspicuous position.                                                                                                                                                                                           |

| SI No. | Parameters | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |            | <b>Car body:</b> The car shall be enclosed on all sides by metallic enclosure (fabricated with stainless steel sheet in Moon Rock Finish / Hairline Finish not less than 1.5 mm thick). The enclosure including the door shall withstand without deformation a thrust of 36 kg applied normally at any point and as per IS 14665 (part 4 / Sec3) – 2001 (SS sheet steel shall not be less than 1.5 mm thick). Ventilation openings shall be as per IS 14665 (Part 4 / Sec 3) - 2001. Grounding switches at ground floor level shall be provided on the lifts to enable the fire service to ground the lifts (fireman's switch). |
|        |            | <b>Car Roof:</b> The roof of car shall be solid type capable of supporting a weight of at least 140 kg and as per IS 14665 (Part-4-Sec3):2001.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|        |            | <b>Car Thresholds:</b> Car entrance shall be provided with metal thresholds having a grooved surface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|        |            | <b>Toe Guard Aprons:</b> The toe guard apron of gauge not less than 1.6 mm sheet steel shall be provided extending at least 15mm beyond entrance jambs at each side. The guards shall have a straight vertical face extending below the level of the finished car.                                                                                                                                                                                                                                                                                                                                                              |
|        |            | <b>Clearance:</b> The clearance between the top of the car and the soffit of the lift shaft roof, bottom of the car and the pit floor, the buffers etc., and the clearance between the car and the lift well, between the car and the landing sill, between two lift cars in the same shaft etc., shall be provided as per IS 14665 (Part 1, 2&4).                                                                                                                                                                                                                                                                              |
|        |            | <b>Car apron, landing thresholds and sills:</b> A apron shall be fitted to the car platform such that no dangerous gap exist at any time when the landing door is opening. Thresholds and sill plates shall be provided at the landings also.                                                                                                                                                                                                                                                                                                                                                                                   |
|        |            | <b>Intercom System:</b> Telephone with minimum two connections-one at the operator's room and other at security guard room and the emergency signal with rechargeable batteries as source of supply shall be made in the each lift car. The emergency signal device should incorporate a feature that gives immediate feedback to the car passengers that the signal has been passed on to desired security / maintenance staff. This shall be achieved by pressing of button from these control stations which shall give audio signal to the passengers in the car.                                                           |
|        |            | <b>Emergency Power Supply for lift car:</b> This shall include suitable secondary battery with charging arrangement and inverter with necessary contactors for supplying the light fixture in the lift car. The same battery shall also feed the alarm bell and communication equipment.                                                                                                                                                                                                                                                                                                                                        |
|        |            | <b>Ratings and instructions:</b> Inside the lift car, a stainless steel metallic plate indicating the rated load and detailed instructions for the passengers shall be provided.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|        |            | <b>Lift car interior finish:</b> The side rear and facial panel shall be of scratch free stainless steel sheet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|        |            | <b>Operating panel inside the car:</b> The car operating shall be of full length stainless steel metal flush mounted and duly finished to match the car interior décor. A separate illuminated panel for indicating the floor and direction shall be provided on the door way. All switches shall be fade proof. Each device and its operating position shall be legible fade proof and marked. <b>Braille Language</b> shall also be provided to make the lift user friendly to blinds.                                                                                                                                        |

| SI No. | Parameters            | Details                                                                                                                                          |
|--------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 22     | Type of signal system | Digital floor position indicator in the car and at all landings (to be provided above the car / landing doors / along the landing door buttons.) |
|        |                       | Travel direction indicator in the car and at all landings (to be provided above the car / landing doors / along the landing door buttons.)       |
|        |                       | Gongs & visual indication on all landings for pre arrival of the car for both cars.                                                              |
|        |                       | <b>Overload warning audio &amp; visual indicator inside the car. (lift should not start on overload)</b>                                         |
|        |                       | Battery operated alarm bell and emergency light                                                                                                  |
|        |                       | Car operating panel with fade proof luminous buttons in car and with landings                                                                    |
|        |                       | Luminous hall buttons at all landings with Braille language engraved.                                                                            |
|        |                       | Firemen's switch at ground floor                                                                                                                 |

**Specification for 2000kg Machine room less (MRL) goods lift**

| SI No. | Parameters               | Details                                                                                                                                                                              |
|--------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Type of Lift             | 2000kg Machine room less (MRL) goods lift (Without machine Room)                                                                                                                     |
| 2      | Number of lifts required | 1                                                                                                                                                                                    |
| 3      | Speed                    | 0.5 MPS                                                                                                                                                                              |
| 4      | Floors                   | 7 (B+G+5)                                                                                                                                                                            |
| 5      | Travel                   | 29 Meters (approx.)                                                                                                                                                                  |
| 6      | Stops & opening          | 7 stops and 7 openings                                                                                                                                                               |
| 7      | Controller               | A.C. variable voltage & variable frequency                                                                                                                                           |
| 8      | ARD                      | Automatic rescue device (ARD) complete with dry maintenance free batteries as required.                                                                                              |
| 9      | Operation                | Microprocessor based single automatic push button/simplex selective collective/ duplex collective selective with/without attendant                                                   |
| 10     | Power                    | 415 Volts+10%, 3 phase, 50 Hz, 4 wires system                                                                                                                                        |
| 11     | Car Enclosure            | Stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish) on all sides and stainless steel decorative ceiling with fans (indirect throw) and LED fitting.                 |
| 12     | Flooring                 | The car flooring should be smooth and antiskid as approved by engineer-in-charge.                                                                                                    |
| 13     | Type of doors            | a) Car: Power operated, centre opening horizontal sliding stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish).<br>(b) Landing doors: stainless steel scratch proof. |
| 14     | Hand Rail                | A hand rail not less than 600mm long at 900mm above floor level to be fixed adjacent to control panel in the lift car.                                                               |

| SI No. | Parameters                                      | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15     | Voice announcement system                       | Voice announcement system in the car to announce the position of the elevator in the hoist way as the car passes or stops at floor served by the elevator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 16     | Mandatory Features                              | Closed loop Control System, protection against power fluctuation, self diagnostic control, Landing doors 2 hours Fire rated, Overload detection and protection, Over speed Governor, Dot Matrix LED D & P Indicators In Car & Landings, BMS Compatibility, tamper proof infrared curtain covering almost the entire height of the lift car door, Alarm horn, Anti Nuisance Operation, CCTV camera system with 4 MP IP camera, suitable NVR and HDD for 30 days storage backup, Firemen switch, 2/3 way intercom, Emergency Stop Switch with battery backup for fan and light fitting for 1 hour, pit ladder.                    |
| 17     | Lift doors                                      | The lift doors shall have a vision panel to enable persons with hearing impairment to signal for help or assistance in the event of an emergency.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 18     | (xvi) Emergency Situation                       | An appropriate technological support be provided (Through emergency messaging   services or alarms etc.) to respond to the emergency requirements of person with hearing impairment or deafness.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 19     | Failure of ARD                                  | In case of failure of ARD or other electronic devices, a provision of manual rescue be provided                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 20     | Type of Doors                                   | Horizontal sliding-center opening fabricated from stainless steel in Moon Rock Finish / Hairline Finish of not less than 1.5 mm thick.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 21     | Construction design and finish of car body work | <b>Car Frame:</b> The car frame shall be in accordance with clause - 4 of IS 14665 (Part 4-Sec3):2001 made of sheet steel of rigid construction to withstand without permanent deformation the operation of safety gear. The car shall be so mounted on the frame that vibration and noise transmitted to the passengers inside is minimized.                                                                                                                                                                                                                                                                                   |
|        |                                                 | <b>Car platform:</b> The car platform shall be of framed construction and designed on the basis of rated load evenly distributed. The dimensions shall confirm IS: 14665 (PART 1)2000. The flooring shall be smooth and anti skid surface. A load plate along with overload alarm, giving the rated load and permissible maximum number of passengers should be fitted in each lift car in a conspicuous position.                                                                                                                                                                                                              |
|        |                                                 | <b>Car body:</b> The car shall be enclosed on all sides by metallic enclosure (fabricated with stainless steel sheet in Moon Rock Finish / Hairline Finish not less than 1.5 mm thick). The enclosure including the door shall withstand without deformation a thrust of 36 kg applied normally at any point and as per IS 14665 (part 4 / Sec3) – 2001 (SS sheet steel shall not be less than 1.5 mm thick). Ventilation openings shall be as per IS 14665 (Part 4 / Sec 3) - 2001. Grounding switches at ground floor level shall be provided on the lifts to enable the fire service to ground the lifts (fireman's switch). |
|        |                                                 | <b>Car Roof:</b> The roof of car shall be solid type capable of supporting a weight of at least 140 kg and as per IS 14665 (Part-4-Sec3):2001.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|        |                                                 | <b>Car Thresholds:</b> Car entrance shall be provided with metal thresholds having a grooved surface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| SI No. | Parameters            | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                       | <b>Toe Guard Aprons:</b> The toe guard apron of gauge not less than 1.6 mm sheet steel shall be provided extending at least 15mm beyond entrance jambs at each side. The guards shall have a straight vertical face extending below the level of the finished car.                                                                                                                                                                                                                                                                                                    |
|        |                       | <b>Clearance:</b> The clearance between the top of the car and the soffit of the lift shaft roof, bottom of the car and the pit floor, the buffers etc., and the clearance between the car and the lift well, between the car and the landing sill, between two lift cars in the same shaft etc., shall be provided as per IS 14665 (Part 1, 2&4).                                                                                                                                                                                                                    |
|        |                       | <b>Car apron, landing thresholds and sills:</b> A apron shall be fitted to the car platform such that no dangerous gap exist at any time when the landing door is opening. Thresholds and sill plates shall be provided at the landings also.                                                                                                                                                                                                                                                                                                                         |
|        |                       | <b>Intercom System:</b> Telephone with minimum two connections-one at the operator's room and other at security guard room and the emergency signal with rechargeable batteries as source of supply shall be made in the each lift car. The emergency signal device should incorporate a feature that gives immediate feedback to the car passengers that the signal has been passed on to desired security / maintenance staff. This shall be achieved by pressing of button from these control stations which shall give audio signal to the passengers in the car. |
|        |                       | <b>Emergency Power Supply for lift car:</b> This shall include suitable secondary battery with charging arrangement and inverter with necessary contactors for supplying the light fixture in the lift car. The same battery shall also feed the alarm bell and communication equipment.                                                                                                                                                                                                                                                                              |
|        |                       | <b>Ratings and instructions:</b> Inside the lift car, a stainless steel metallic plate indicating the rated load and detailed instructions for the passengers shall be provided.                                                                                                                                                                                                                                                                                                                                                                                      |
|        |                       | <b>Lift car interior finish:</b> The side rear and facial panel shall be of scratch free stainless steel sheet.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|        |                       | <b>Operating panel inside the car:</b> The car operating shall be of full length stainless steel metal flush mounted and duly finished to match the car interior décor. A separate illuminated panel for indicating the floor and direction shall be provided on the door way. All switches shall be fade proof. Each device and its operating position shall be legible fade proof and marked. <b>Braille Language</b> shall also be provided to make the lift user friendly to blinds.                                                                              |
| 22     | Type of signal system | Digital floor position indicator in the car and at all landings (to be provided above the car / landing doors / along the landing door buttons.)                                                                                                                                                                                                                                                                                                                                                                                                                      |
|        |                       | Travel direction indicator in the car and at all landings (to be provided above the car / landing doors / along the landing door buttons.)                                                                                                                                                                                                                                                                                                                                                                                                                            |
|        |                       | Gongs & visual indication on all landings for pre arrival of the car for both cars.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|        |                       | <b>Overload warning audio &amp; visual indicator inside the car. (lift should not start on overload)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                       | Battery operated alarm bell and emergency light                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|        |                       | Car operating panel with fade proof luminous buttons in car and with landings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|        |                       | Luminous hall buttons at all landings with Braille language engraved.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|        |                       | Firemen's switch at ground floor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## ACCEPTABLE MAKES FOR LIFT & OTHER ACCESSORIES

| Sl. No. | Item            | Acceptable makes                                                                                                                                               |
|---------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.      | Passenger lifts | OTIS Elevator Company (India) Limited. / Johnson Lifts Pvt. Ltd. / Kone Elevator India Ltd. / Schindler India Private Ltd. / Mitsubishi Electric Asia Pvt. Ltd |

### **Preference to PPP-M – II Policy (Make in India):**

- (i) The Government has issued public procurement policy (Preference to Make in India) vide Ministry of Commerce and Industry Development of industrial policy and promotion (PPS) vide order No.P-45021/2/2017-PP BE-II dated 28.05.2018, to—Encourage Make in India and to promote manufacturing and production of Goods and services in India with a view to enhancing income and employment. CPWD has decided to implement this policy.
- (ii) The agency shall submit list of makes of materials proposed to be used on the work from local suppliers (as defined in the above order dated 28.05.2018) along with minimum local content as specified below for approval of the department out of the approved makes kept in the tender.
- (iii) The department will be approving only makes of the materials having a minimum local content of 50% for use on this work, out of the preferred makes list.
- (iv) The minimum local content of 50% is considered for the complete item including labour component. The agency shall obtain the certificate for all items except for sundry items.

# **PART C-9**

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH :- SITC of VRV/VRF AC System Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of VRV/VRF AC System Work”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                                                |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works                         | Estimated Cost Rs.   | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| I                                                                                                     | <b>SITC of VRV/VRF AC System Work (200 HP)</b> | <b>1,40,81,254/-</b> | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head<br/>OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head<br/>OR</p> <p>iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means <b>“SITC of VRV/VRF AC System Work with minimum individual capacity of 160 HP”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.
  - OR**
  - ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.

11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## **ADDITIONAL CONDITIONS FOR VRF/VRV AC WORK**

### **1. Specification:-**

The work shall be executed as per CPWD's general specification for Electrical Works Part – I (Internal) – 2023, Part – II (External) – 2023, HVAC work – 2024, I.E. Rules, Indian Standards amended up to date and as per direction of Engineer-in charge.

### **2. Terms of Payments:-**

Following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein on pro – rata basis.

- (v) No advance payment shall be made.
- (vi) 70% after initial inspection and delivery at site in good condition on pro-rata basis.
- (vii) 20% after completion of installation in all respect.
- (viii) Balance 10% will be paid after Testing, Commissioning & Handing Over to the department for beneficial use.

### **3. Storage:-** Responsibility for storage of material for execution of work shall be of main contractor.

4. The material in required quantity to be used in the work shall be got approved from the Engineer-in-charge before its use at site. The Engineer-in-charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.

## **TECHNICAL SPECIFICATION OF E & M WORK**

- i) The work shall be carried out in conformity with CPWD General specification Part – I (Internal) 2013 and CPWD General specification Part – II (External) 1994 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- ii) Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E), & decision of the Engineer in Charge shall be final & binding.
- iii) The contractor will make his own arrangement for storage of material arranged by him, and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- iv) All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.
- v) The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- vi) The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No.DG/MISC.(ELECT.)/1 dated 30.03.2017**.
  - a) Authorization certificate.
  - b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- vii) Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge.

## **TECHNICAL SPECIFICATIONS FOR VRF/VRV AC SYSTEM**

### **1.0 SITE CONDITION:**

The work is to be carried out for Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

- 1.1 The Tenderers are advised to visit the site for any site particular to be well acquaintance about the site requirement by him, before tendering.

### **SCOPE OF WORK AND EXCLUSIONS:**

- 1.2 General features and major components of the work are as under Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

### **COMPLIANCE WITH REGULATIONS AND INDIAN STANDARDS**

All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

- (i) CPWD Specification for Internal (2023) and External Specification (2023) as amended up to date.
- (ii) Prevailing factories Act. as amended up to date.
- (iii) Indian Electricity Rules as amended up to date.
- (iv) B.I.S. & other standards as applicable as amended up to date.
- (v) Workmen's compensation Act. as amended up to date.
- (vi) Water works manual as amended up to date.

### **Interpreting Specifications:**

In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:

- (a) Schedule of quantities
- (b) Technical specifications
- (c) Drawing (if any)
- (d) General specifications
- (e) Relevant BIS or other international code in case BIS code is not available.

1. The scope of this section comprises the design, supply erection, testing and commissioning of 100% inverter technology based VRV/VRF type system of air conditioning conforming to these specification/ Explanatory Note and in accordance with the requirements of Drawing and Schedule of Quantities. The prices quoted shall include all the equipment ancillary material as specified and all such items whatsoever and which may be required to fulfill the intent and purpose as laid down in the specification and the approved drawings. The contractor shall calculate equipment capacity based upon design parameters specified for the system design & verify all the quantities and sizes of refrigerant pipe, fitting, cables, control cable, pipes, insulation, indoor units, and outdoor units etc. before installation to avoid any shortfall or surplus. The tenderer shall also include all necessary civil work MS frame work for installation of outdoor and indoor units in VRV/VRF based air condition system. The cost quoted by tenderer shall also include the refrigerant gas R-410A & its charging for proper & specified functioning of air conditioning system.

Civil work/ MS frame work for indoor and outdoor units related to VRV/VRF equipment, all cuttings should be properly finished as existing surrounding. The installation of outdoor unit on the terrace of building should be checked up structurally & their mounting should be structurally safe for the outdoor unit to ensure in such a way that after installation.

- a) Cutting of walls and floors/ ceiling.
  - b) Making holes.
  - c) Sleeves.
  - d) Foundation
2. The scope in the tender schedule also covers detailed designing of complete air-conditioning system based on 100% inverter technology based Air-cooled VRV/VRF air conditioner, capable of cooling and heating as per individual or season requirement suitable for operation on 415 V, 3 Phase, 50 Hz AC electric supply.

The outdoor units shall have both cooling & heat pump mode, consisting of one/ multiple outdoor unit with single circuit of refrigerant piping and multiple indoor units of various types. Each indoor unit should have

capability to cool or heat as per seasonal weather changes. This shall also include complete capacity calculation for indoor and outdoor units complete with CAD drawing, designing & layout of following.

- I. Outdoor units.
- II. Indoor units.
- III. Refrigerant piping
- IV. Condensate water piping & disposal.
- V. Power & Control Cables between Outdoor units & Indoor units. (as applicable)
- VI. Vertical / Horizontal TPN DB / Panel

While designing the system care should be taken to select outdoor units of suitable capacity based on design data & to economize on available floor area for installation of outdoor units as well as optimum utilization of outdoor units and type of indoor unit taken into considerations. The indoor units should be designed based upon the heat load calculations for individual rooms/ areas to be air-conditioned and over capacities should be avoided. The design should also specifically take care of disposal of condensate drain water so that there is no leakage of condensate water inside the room as well in the route of condensate water pipe line. The layout of refrigerant piping is to be designed in such a way so that it should not disturb the aesthetic of the building/ room, inadvertent damage in the route of pipe should not occur in future & optimum length of pipe line for efficient air conditioning. After completion of the work four sets of 'as erected/ commissioned drawing' of activities listed above shall be submitted.

#### **Design Data**

The work of air-conditioning outdoor and indoor units as specified in schedule of work is required to be carried out for Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

There may be certain parameter like inadequate heat insulation of the building, air leakage from doors, windows or other outlets such as staircases, corridor, ventilators, shaft & including no under deck insulation of top floor of the building. Therefore, the specified design parameters are only tentative in nature, however, all efforts shall be made to achieve the following specified design parameters and if at any design stage need for higher capacity outdoor HP is required, necessary approval shall be accorded based on design analysis and discussions on the subject. In case of any deviation from the parameters specified below, the technical issues involved shall be brought to the notice of Engineer-in-charge for seeking necessary approvals to achieve these parameters. Engineer-in-charge, however, reserves the right to permit any deviations from the parameters as specified.

3. The project of air-conditioning of office of NABARD, Ranchi is required to be executed in time bound and professional manner. The equipments involved in air-conditioning are complex in nature comprising of instrumentation, control and central management system. The job, therefore calls for highest order of technical expertise and also requirement of experience of air-conditioning installation with proven performance. The tenderer, shall, therefore obtain, before quoting/ the consent of OEM and furnish the same along with the bid document. This consent shall also cover aspects of desired assistance in the field of design, development, testing, execution, completion & maintenance/ maintenance spares of the air-conditioning system.
4. Notwithstanding the technical details as specified in the tender, the manufacturers may offer/ indicate systems and necessary design & features applicable for the offered products at the tendering stage.
5. **Specifications of Outdoor Unit**
  - i) Outdoors units of the VRV system shall be compact air cooled type.
  - ii) The outdoor unit should comprise of Inverter controlled Twin Rotary Compressor / Scroll Compressor
  - iii) Each module of outdoor unit must have at least 50 % of Variable compressor which can work on Part load Suitable to operate at heat load proportional to indoor requirement.
  - iv) The ODU must deliver COP of minimum 4.7 at 50 % load.
  - v) The outdoor units must be suitable for up to 225 m refrigerant piping between outdoor unit & the farthest indoor units. Allowable level difference between outdoor unit & indoor units shall be 50 m in case of outdoor unit on top & 40 m in case of outdoor unit at bottom.
  - vi) Allowable level difference between various indoor units connected to one out door unit shall be up to 15 m.
  - vii) The outdoor units shall be suitable to operate within an ambient temperature range of 5 Deg C to 43 Deg C in cooling mode; & -20 Deg C to 15 Deg C in heating mode.
  - viii) The entire operation of outdoor units shall be through independent remotes of indoor units. No separate Start/ Stop function shall be required.
  - ix) Starter for the Outdoor Unit compressor shall be —Direct on Line type. Inverter compressor of the unit shall start first & at the minimum frequency, to reduce the inrush current during starting.

- x) Complete refrigerant circuit, oil balancing/ equalizing circuit shall be factory assembled & tested

**6. Specifications of Indoor units :**

The units include pre-filter, fan section and DX coil section. The housing of units shall be light weight powder coated galvanized steel. Units shall have external casing of ABS Plastic for supply and return air.

- i) All indoor units as specified shall have, in general, noise levels less than 46 db.
- ii) Each unit shall have electronic control valve to control refrigerant flow rate respond to load variation of the room.
- iii) The address of the indoor unit shall be set automatically or through central controller in case of individual and group control.
- iv) The fan shall be dual suction, aerodynamically designed, Turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on motor shaft having support from housing.
- v) The cooling coil shall be made out of seamless copper tubes and having continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested at 21 kg/sqm air pressure under water.
- vi) Indoor unit shall have cleanable type filter fixed to an integrally moulded/ moulded plastic frame. The filter shall be slide in and neatly insertable type. It shall be possible to clean the filters either with compressed air or water.
- vii) Each unit shall have Electronic control expansion valve for variable refrigerant Flow Effect.
- viii) Each indoor high wall, unit shall be with cordless remote controller as standard features. The controller shall be able to change fan speed and angle of swing flap (for high wall) temperature etc. individually as per manufacturer.

**7. Installation:**

- i) The units shall be mounted on ribbed rubber pads for vibration isolation. The contractor shall supply the required charge of refrigerant, lubricant and other consumables, for commissioning and testing of the equipment.
- ii) All the equipment shall be thoroughly tested and checked for leaks. All safety controls shall be suitably set and a record of all setting shall be furnished to the project supervisor.
- iii) Providing and fixing M.S. structural support for condensing unit with vibration isolator pad in-between support and structure and vibration isolation suspender and pads for evaporating units shall be in scope of contractor.

**8. Painting:**

Shop coats of paint that have become marred during transportation or erection shall be cleaned off with mineral spirits, wire brushed and spot primed over the affected areas, then coated with enamel paint to match the finish over the adjoining shop- painted surfaces.

**9. Condensate Drain Piping:**

All pipes to be used for condensate drain shall be PVC pipe conforming to IS: 4985 - Class I & all joints should be Gluing or solvent cementing as per manufacturer recommendation.

**1. Y- Joints / Header Joints**

Y-Joint/ Ref-net separation refrigeration pipe joints and headers shall be in the appropriate orientation to enable correct distribution of refrigerant. The Distribution Joints should be factory insulated with pre-formed sections of Expanded Polystyrene/Equivalent.

**2. Refrigerant Piping:**

- i. Refrigerant piping for the air-conditioning system shall be upto 19.1 mm dia of soft seamless copper tubes & for above 19.1 mm dia the pipe material shall be of hard seamless copper tubes with pipes material being hard drawn copper pipe. Forged copper fittings shall be used for the refrigerant piping. The refrigerant piping arrangements shall be in accordance with good engineering practices as applicable to the air-conditioning industry, and shall include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits except Y joint/separation tubes.
- ii. Before joining any copper pipe or fittings, its internals shall be thoroughly cleaned by passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently it shall be thoroughly blown out using nitrogen gas.
- iii. After completion of installation of the refrigerant piping, the refrigerant piping system shall be pressure tested using nitrogen gas at a suitable pressure as specified by OEM (Original Equipment Manufacturer).

Pressure shall be maintained in the system for 48 hours. The system shall then be evacuated to vacuum of not less than 700 mm Hg and held for 24 hours.

- iv. The suction line pipe size and the liquid line pipe sizes shall be selected according to the manufacturer's specified diameter. All refrigerant pipes shall be properly supported and anchored to the building/structure using steel hangers, fasteners, brackets and supports which shall be fixed to the building/structure by means of inserts or expansion shields or anchor fasteners of adequate size and number to support the load imposed thereon.
- v. The refrigerant piping should be laid in such a way that it should not distort the interior of the room, wherever the refrigerant pipe has to be laid across the room, it should be laid properly.
- viii. Entire liquid and suction refrigerant pipe lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm thick electometric nitrile rubber as specified in BOQ.

**ACCEPTABLE MAKES FOR AC SYSTEM WORK**

| <b>Sl. No.</b> | <b>Items</b>                                                | <b>Acceptable makes</b>                                                              |
|----------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1              | VRV/VRF System, Outdoor units, Indoor Unit                  | Hitachi / Carrier / Mitsubishi Electric / O-General / Daikin / Blue Star / LG/Voltas |
| 2              | AHU                                                         | System Air / Waves / Zeco / Edge Tech                                                |
| 3              | Copper Tubes / Pipe                                         | Met-Tube / Hindustan / Rajco/Total line / Mandav tubes / Jindal Refrigeration        |
| 4              | Nitrile Rubber                                              | Armaflex / Eurobatex / Aeroflex / K-Flex                                             |
| 5              | PVC Pipe                                                    | Polypack / Prakash / Surya /JPPL/ Malhotra / Finolex                                 |
| 6              | G I Pipe                                                    | Tata /Jindal (ISI Marked)                                                            |
| 7              | G.I. Sheets                                                 | Tata / Sail                                                                          |
| 8              | Flexible Duct                                               | Caryaire / Role Star / GP Spiro / Atco                                               |
| 9              | MS Dampers/Louvers                                          | Caryaire / Mapro / Servex / Airflow                                                  |
| 10             | Polyurethane Foam                                           | Malanpur / Lloyd                                                                     |
| 11             | Diffuser/grills                                             | Caryair / Mapro / Dynacraft                                                          |
| 12             | PPR PIPE                                                    | Fusion / Aquaplast India / Vector / Hindustan Plastic / Sanitube                     |
| 13             | Power Cables, Control Cables                                | Polycab / RR Kabel / Havells / Finolex / KEI                                         |
| 14             | LT Cables (ISI Marked)                                      | Polycab / RR Kabel / Havells / Finolex / KEI                                         |
| 15             | Cubical type LT Panel Board / Feeder Pillar (CPRI approved) | As per Part C-1                                                                      |
| 16             | Selector Switch                                             | ABB / Siemens / Schneider / Legrand / L&T / Kaycee / BCH                             |
| 17             | Digital type Ammeter / Voltmeter / Multifunction meter      | ABB / Siemens / Schneider / Legrand / L&T / Automatic Electric / Kappa               |
| 18             | LED Type Indicating Lamps                                   | ABB / Siemens / Schneider / Legrand / L&T                                            |
| 19             | Push Buttons                                                | ABB / Siemens / Schneider / Legrand / L&T                                            |
| 20             | Control fuses with base                                     | Siemens / BCH / L&T / GE                                                             |
| 21             | CT / PT                                                     | As per manufacturer's practice.                                                      |

# PART C-10

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.(SH :- SITC of Solar Photo Voltaic System Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of Solar Photo Voltaic System Work”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below: |                                         |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                               | Component of E&M works                  | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| I                                                                                                     | SITC of Solar Photo Voltaic System Work | 16,28,400/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means <b>“SITC of Solar Photo Voltaic System Work”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.

**OR**

- ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## **SOLAR PHOTO VOLTAIC POWER PLANT SYSTEM WORK**

### **1. Specifications:-**

This specification is intended to cover the complete installation of Solar Power Plant System to be provided in Building. The work shall be carried out in accordance with the CPWD General Specifications for Electrical Work Part-I (Internal) 2013, Part-II (External) 1994, BIS specification, MNRE, Indian Electricity Act & Rules relevant IS specifications which govern the requirements of the Solar Power Plant System and as per direction of Engineer-in-Charge including amendments up to date of the specifications, standards and regulations. Nothing extra shall be paid on account of the additional specifications and conditions as the same are to be read along with schedule of quantities for the work.

### **2. Terms of Payments:-**

Following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein on pro – rata basis.

- (i) No advance payment shall be made.
- (ii) 80% after initial inspection and delivery at site in good condition on pro-rata basis.
- (iii) 10% after completion of installation in all respect.
- (iv) Balance 10% will be paid after Testing, Commissioning & Handing Over to the department for beneficial use.

**3. Storage:-** Responsibility for storage of material for execution of work shall be of main contractor.

**4. Power & Water Supply:-** Responsibility for supply of power & water for execution of work shall be of main contractor.

5. The material in required quantity to be used in the work shall be got approved from the Engineer-in-charge before its use at site. The Engineer-in-charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.

6. Contractor shall preserve the copies of invoices, test certificates, gate passes etc. to prove the genuineness of material/purchases. The responsibility of procurement of genuine material of specialized works shall rest with the contractor.

7. No inspection out side the country is permissible if required so the same will be deemed to be waived off and necessary test reports shall be submitted before the dispatch of equipment.

8. All works required for proper installation of Solar PV Power Plant including necessary civil works for mounting structures of solar module, shall be done by the contractor. The entire work shall be performed on turnkey basis. All the works related to the proper installation and functioning of the systems shall have to be carried out by the contractor in the prices offered by him.

9. All necessary electrical wiring from existing electrical distribution box up to Grid Tie Inverter / PCU of Solar PV Power Plant and back from Grid Tie Inverter/PCU to distribution box shall have to be done by the contractor including supply of all required materials.

10. Supply and Installation of Display board of 6' X 4' size showing all technical information of SPV plant shall be done by the contractor. The matter written on these boards shall be finalized with CPWD.

11. The complete Solar PV Power Plant shall be warranted and maintained by the contractor against any manufacturing/ design/ installation defects for a minimum period of 5 years from the date of installation.

12. Warrantee and Maintenance period will include rectification /replacement of all the defective and consumable components/items including batteries. However all the non functional parts/ materials/ items replaced during the Warrantee period shall be the property of the contractor.

13. After commissioning of the plant, the contractor will conduct one on-site training of the purchaser's/user's personnel regarding assembly, start-up, operation, maintenance and repairs of the Solar PV Power Plant.

14. **Processing, Net metering connection and it should be functional all should be done by the agency.**

15. During 5 year's Warrantee period, the contractor will have to make all necessary arrangements including placement of required manpower at site for satisfactory performance of the Power Plant.

The security deposit deducted from the contractors' bill as per norms shall be refunded to the agency on successful completion of this warranty period of 5 years.

16. Rectification of all the defects developed in the Solar PV Power Plant during Warrantee period shall have to be done by the contractor promptly, at the most within 7 days from the date of receipt of complaint.

17. During Warrantee period, the contractor shall have to submit annual performance & functionality report to user agency.

18. During the Warrantee period, CPWD / users will have all the rights to cross check the performance of the Solar PV Power Plant. CPWD may randomly pick up its components to get them tested at Govt. / MNRE approved any test center. If during such tests any part is not found as per the specified technical parameters, CPWD will take the necessary action to recover the losses and the same may be communicated to MNRE and other nodal agencies. The decision of CPWD in this regard will be final and binding on the tenderer.

## TECHNICAL SPECIFICATION OF E&M WORK

- i) The work shall be carried out in conformity with CPWD General specification Part – I (Internal) 2023 and CPWD General specification Part – II (External) 2023 for electrical works as amended up to date and as per instructions of the Engineer-in-Charge of the work wherever the specification is silent relevant. Indian standard specifications are to be followed.
- ii) Wherever makes of materials are not mentioned in the schedule of work / additional condition & specification of the work, the contractor shall quote clearly the make of materials in his tender. If it is not mentioned so, makes of the materials shall be decided by the Executive Engineer (E), & decision of the Engineer in Charge shall be final & binding.
- iii) The contractor will make his own arrangement for storage of material arranged by him, and material issued from the department. The material, if issued, shall be issued to him from store of the Junior Engineer (E). The watch and ward of the materials and of the installations would be responsibility of the contractor till the work is completed & handed over to the client department. Nothing extra shall be paid to the contractor on this account. The contractor shall make his own arrangement for carriage of materials, etc. issued to him departmentally from the site store to the site of work at his own cost. Nothing extra shall be paid on this account.
- iv) All the material should be ISI marked wherever not specified, if ISI marked material is not available it should be conforming to BIS specification amended up to date, approval of Engineer in Charge in such case shall be final & binding to contractor.
- v) The field units may also pursue with contractors of the existing contract to make payment to the labour by contractor through Bank or ECS or online transfer also.
- vi) The Lowest tenderer shall submit, along with the performance guarantee after the acceptance of tender, an undertaking from the OEM vide **OM No. DG/MISC.(ELECT.)/1 dated 30.03.2017.**
  - a) Authorization certificate.
  - b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for Maintenance / comprehensive maintenance contract for the useful life of the system.
  - c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
- vii) Acceptable makes of materials to be used in the work are as under. However approval of the makes of material out of acceptable make shall be got from Engineer-in-Charge.

## TECHNICAL SPECIFICATIONS FOR SOLAR PHOTO VOLTAIC POWER PLANT SYSTEM

**1.0 SITE CONDITION:** The work is to be carried out for Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.

### **A) SOLAR PV MODULE**

#### **General Description**

The SPV power plant shall have a total capacity of 30 KWp. The power plant shall provide a reliable and independent power supply to the LT Panel at 415 V. The proper design of the system is to be approved by Engineer-in-charge.

#### **1. Solar Photovoltaic Modules**

- 1.1** The minimum array capacity Solar PV power plant should be 30 KWp. Solar Photovoltaic Module of manufactured in India, conforming to IS 14286/IEC 61215, IS/IEC 61730-Part-1, IS/IEC 61730-Part-2. **The solar panel including solar cells should be Indian make.**
- 1.2** Solar Photovoltaic Module conversion efficiency shall not be less than 16.5%.
- 1.3** PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
- 1.4** Since the modules would be used in a high voltage circuit, the high voltage insulation test shall be carried out on each module and a test certificate to that effect provided.

- 1.5** Manufacturers / Contractors should confirm whether they are supplying PV module using a RF identification tag (RFID), which must contain the following information. The RFID can be inside or outside the module laminate, but must be able to withstand harsh environmental conditions.
- Name of the manufacturer of PV Module
  - Name of the Manufacturer of Solar cells
  - Month and year of the manufacture (separately for solar cells and module)
  - Country of origin (separately for solar cells and module)
  - I-V curve for the module
  - Peak Wattage,  $I_m$ ,  $V_m$  and FF for the module Unique Serial No and Model No of the module
  - Date and year of obtaining IEC PV module qualification certificate
  - Name of the test lab issuing IEC certificate
  - Other relevant information on traceability of solar cells and module as per ISO 9000 series.

**1.6** Other general requirement for the PV modules and subsystems shall be the following

- Module shall be made up of mono or poly crystalline silicon cells.
- The module frame is made of corrosion resistant materials, preferably having aluminium anodized finish.
- The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP65 rated.

**B) GRID TIE INVERTER OR PCU**

- Grid Tie Inverter or Power Conditioning Unit (PCU) should convert DC power produced by SPV modules in to AC power.

| Sl. No.  | Parameters                         | Specifications                                 |
|----------|------------------------------------|------------------------------------------------|
| <b>A</b> | <b>Input DC</b>                    |                                                |
| i        | Maximum Input PV Power             | As per design                                  |
| ii       | Maximum Input Voltage              | 1000 V                                         |
| iii      | DC Input Voltage Range             | 350-800 V                                      |
| iv       | Number of Independent MPPT         | As per design                                  |
| v        | MPPT Voltage range (Minimum range) | As per design                                  |
| vi       | Maximum DC Current                 | Design to be submitted                         |
| <b>B</b> | <b>Output AC</b>                   |                                                |
| i        | Rated & Maximum AC Power Output    | As per design                                  |
| ii       | Output AC Voltage                  | 400 V AC, three phase, 4 wire, 50Hz +/- 2.5 Hz |
| iii      | Frequency                          | 50 Hz                                          |
| iv       | Total harmonic distortion          | < 3%                                           |
| v        | Night Time Loss                    | <3 W                                           |
| vi       | Power Factor                       | 1 (Adjustable +/-0.8)                          |
| <b>C</b> | <b>Performance</b>                 |                                                |
| i        | Maximum Efficiency                 | Not less than 97%                              |
| ii       | Self Consumption At Night          | <1 W                                           |

|          |                                          |                                                                 |
|----------|------------------------------------------|-----------------------------------------------------------------|
| iii      | MPPT Efficiency                          | >99%                                                            |
| <b>D</b> | <b>Protection</b>                        |                                                                 |
| i        | DC Reverse Polarity Protection           | Yes                                                             |
| ii       | DC Switch                                | Yes                                                             |
| iii      | Protection Class / Over Voltage Category | I / III                                                         |
| <b>E</b> | <b>Certification</b>                     |                                                                 |
| <b>F</b> | <b>Communication</b>                     |                                                                 |
| i        | Power Management Unit                    | According to certification                                      |
| ii       | Standard Communication Port              | RS485                                                           |
| iii      | Operation Data Storage                   | 25 Years                                                        |
| <b>G</b> | <b>General Data</b>                      |                                                                 |
| i        | Ambient Temperature Range                | -25° C To +60° C                                                |
| ii       | Degree of Protection                     | IP65                                                            |
| iii      | Dimension / Weight                       | As per Manufacturer design.                                     |
| iv       | Noise level                              | < 65 dBA                                                        |
| v        | Cooling                                  | Natural                                                         |
| vi       | Surge Rating                             | Up to 150% of the continuous rating for a minimum of 30 Seconds |
| vii      | Display                                  | LCD                                                             |
| viii     | Warranty                                 | 10 Years                                                        |

**2. Other important Features/Protections required in the Grid Tie Inverter or Power Conditioning Unit (PCU)**

**2.1** Automatic morning wake-up and nightly shutdown

**2.2** Grid Tie Inverter or Power Conditioning Unit (PCU) must have the feature to work in tandem with other similar Grid Tie Inverter or Power Conditioning Unit (PCU) and be able to be successively switched ON and OFF automatically based on solar radiation variations during the day.

**2.3** Authentic tracking of the solar arrays maximum power operation voltage (MPPT).

**2.4** Array ground fault detection.

**2.5** LCD and piezoelectric keypad operator interface Menu driven Automatic fault conditions reset for all parameters like voltage, frequency and/or black out.

**2.6** MOV type / Category II surge arresters/ on AC and DC terminals for over voltage protection from lightning-induced surges or else suitable arrangement shall be provided externally.

**2.7** The Grid Tie Inverter or Power Conditioning Unit (PCU) shall have AC /DC side disconnecter of appropriate rating or else suitable arrangement shall be provided externally. DC disconnecter can be provided in String Combiner box alternatively.

**2.8** All parameters should be accessible through an industry standard communication link.

**3. Electrical safety, Earthing and protection**

**3.1** Internal Faults: In built protection for internal faults including excess temperature, commutation failure, overload and cooling fan failure (if fitted) is required.

**3.2** Over Voltage Protection: Over Voltage Protection against atmospheric lightning discharge to the PV array is required.

- 3.3 Earth fault supervision: An integrated earth fault device shall have to be provided to detect eventual earth fault on DC side and shall send message to the supervisory system.
- 3.4 The Grid Tie Inverter or Power Conditioning Unit (PCU) shall include an easily accessible emergency OFF button located at an appropriate position on the unit
- 3.5 The Grid Tie Inverter or Power Conditioning Unit (PCU) shall include ground lugs for equipment and PV array grounding. The DC circuit ground shall be a solid single point ground connection in accordance with IEC 69042.

**4. General Features of Grid Tie Inverter or Power Conditioning Unit (PCU):**

The Grid Tie Inverter or Power Conditioning Unit (PCU) enclosure shall be weatherproof and capable of surviving climatic changes and should keep the Grid Tie Inverter or Power Conditioning Unit (PCU) intact under all conditions in the room where it will be housed. The Grid Tie Inverter or Power Conditioning Unit (PCU) shall be located outdoor with suitable protection and should be either wall/ pad mounted. Moisture condensation and entry of rodents and insects shall be prevented in the Grid Tie Inverter or Power Conditioning Unit (PCU) enclosure.

**5. Operating Modes:**

The following operating modes are to be made available: Night or Sleep mode: Where the Grid Tie Inverter or Power Conditioning Unit (PCU) is almost completely turned off, with just the timer and control system still in operation, losses should not exceed 1 watts per 5 kilowatt.

- a. Standby mode : Where the control system continuously monitors the output of the solar generator until pre-set value is exceeded (typically 10 watts)
- b. Operational or MPPT tracking mode : The control system continuously adjust the voltage of the generator to optimize the power available. The power conditioner must automatically re-enter stand-by mode when input power reduces below the standby mode threshold. Front Panel display should prove the status of the Grid Tie Inverter or Power Conditioning Unit (PCU), including AC Voltage, Current, Power output & DC Current, Voltage and Power input, and fault Indication (if any).

**C) SPV MONITORING SYSTEM**

SPV monitoring system which should be capable of communicating with each individual PV module through the solar inverter to provide MPPT level real time monitoring (web and mobile) for 25 Years to display the following parameters –

Control and Communication Gateway along with Sensors - Control and Communication Gateway has an interface that allows for controlling of the Grid Tie inverters power through wireless connections & RS 485 to Ethernet converter suitable for Irradiance Sensor.

**D) ARRAY STRUCTURE**

1. Wherever required, suitable number of PV panel structures shall be provided.
2. Structural material shall be corrosion resistant and electrolytically compatible with the Materials used in the module frame, its fasteners, nuts and bolts. Galvanizing should meet ASTM A-123 hot dipped galvanizing or equivalent which provides thickness of 80 microns on steel as per ISI 5905, if steel frame is used. Aluminum frame structures with adequate strength and in accordance with relevant BIS/international standards can also be used.
  - (i) Structures shall be supplied complete with all members to be compatible for allowing easy installation.
  - (ii) The structure should be capable of withstanding a wind load of 150 km/hr after grouting & installation.
  - (iii) The structures shall be designed for simple mechanical and electrical installation. There shall be no requirement of welding or complex machinery at the installation site. If prior civil work or support platform is absolutely essential to install the structures, the Contractor shall clearly and unambiguously communicate such requirements along with their specifications in the bid. Detailed engineering drawings and instructions for such prior civil work shall be carried out prior to the supply of Goods.
  - (iv) The Contractor shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings. Such details shall include, but not limited to, the following;
    - a) Determination of true south at the site;
    - b) Array tilt angle to the horizontal, with permitted tolerance;
    - c) Details with drawings for fixing the modules;
    - d) Details with drawings of fixing the junction/terminal boxes;
    - e) Interconnection details inside the junction/terminal boxes;
    - f) Structure installation details and drawings;
    - g) Electrical grounding (earthing);
    - h) Inter-panel/Inter-row distances with allowed tolerances; and
    - i) Safety precautions to be taken.

The array structure shall support SPV modules at a given orientation and absorb and transfer the mechanical loads to the terrace columns and beams properly. All nuts and bolts shall be of very good quality stainless steel. Detailed design and Drawing shall have to submitted to the consultant engaged by client or the Engineer-in-charge for acceptance and approval before execution of work.

**E) FOUNDATION BASE:** The legs of the structures made with GI angles will be fixed and grouted in the PCC foundation columns made with 1:2:4 cement concrete depending on the site condition.

**F) SURGE ARRESTOR**

**1. SURGE PROTECTOR CATEGORY II**

**1.1** The surge Protection manufacturer shall offer a complete line of surge Protection product to support the requirements for the Distribution. The surge protector at this stage shall be provided to protect the downstream electrical and electronics against any induced switching surges that may be passed on to the downstream electrical & electronic system.

**1.2** The Protection unit shall be based on Single High Capacity Metal Oxide Varistors (MOV), capable of handling 8/20  $\mu$ s surges and shall be able to give an indication in the event module failure and be pluggable to facilitate the in-service replacement without distributing the lines.

**G) PLANT METERING/DATA LOGGING**

All major parameters should be available on the digital bus and logging facility for energy auditing through the internal microprocessor and can be read on the digital front panel at any time the current values, previous values for up to a month and the average values. The following parameters should be accessible via the operating interface display.

- a. AC Voltage
- b. AC Output current & Output Power
- c. DC Input Voltage
- d. DC Input Current
- e. Active Time disabled
- f. Time Idle
- g. Temperatures
- h. Inverter Status

Protective function limits (AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage, Over voltage delay, Under voltage delay over frequency, Ground fault delay, PV starting delay, PV stopping delay).

**H) MAXIMUM POWER POINT TRACKER (MPPT)**

Maximum power point tracker shall be integrated in the Inverter to maximize energy drawn from the array. The MPPT should be microprocessor based to minimize power losses. The details of working mechanism of MPPT shall be mentioned. The MPPT must have provision (manual setting) for constant voltage operation.

**I) JUNCTION BOXES**

The junction boxes if provided (on the basis of design) in the PV array for termination of connecting cables. The Junction Boxes shall be made of FRP/Powder Coated Aluminum with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs and connectors. The Junction Boxes shall be such that input & output termination can be made through suitable cable glands.

- Made of FRP or cast aluminum
- Copper bus bars/terminal blocks housed in the junction box with suitable termination threads
- Conforming to IP65 standards and IEC 62208
- Hinged door with EPDM rubber gasket to prevent water entry.
- Single compression cable glands.
- Provision of earthing

**J) AC DISTRIBUTION PANEL BOARD**

AC Distribution Panel Board (DPB) shall control the AC power from inverter and Interconnection from ACDB to transformer and then to HT bus (if required to export power) be carried out and complete equipment along with metering (if required to export power) to be installed in the ACDB. Requirement/specifications of ACDB may be changed as per site conditions. The AC panel shall be provided with adequate safety features to prevent transmission of fault.

**K) LIGHTNING AND OVER VOLTAGE PROTECTION**

There shall be the required number of suitable lightning arrestors installed in the array field. Suitable earthing such that induced transients find an alternate route to earth. Protection shall meet the safety rules as per Indian Electricity Act. All building earth conductors shall be interconnected through the concept of earth mats for interconnection with separate earth pits. For each earth pits necessary test points shall have to be provided.

**L) EARTHING PROTECTION**

Each array structure should be grounded properly. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian electricity Act./IE Rules. Earth Resistance should be tested in presence of the representative of CPWD after earthing by calibrated earth tester. Inverters, ACDB and DCDB should also be earthed properly. The 11KV side equipments and parts shall be earthed in compliance to Indian Electricity Rules, all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.

**M) CABLES & WIRES**

- 1. Cabling:** Cabling shall be carried out as per IE Rules. All other cabling above ground should be suitably mounted on cable trays with proper covers. The cable shall be XLPE insulated PVC sheathed aluminium / copper conductor cables.
- 2. Wires:** Only FRLS copper wires of appropriate size and of reputed make shall have to be used.
- 3. Cables Ends:** All connections are to be made through suitable cable/lug/terminals/ connectors; crimped properly & with use of Cable Glands.
- 4. Cable Marking:** All cable/wires are to be marked in proper manner by good quality ferule or by other means so that the cable can be easily identified.  
Any change in cabling schedule/sizes if desired by the Contractor/Contractor be got approved after citing appropriate reasons. All cable schedules/layout drawings have to be got approved from the Department prior to installation. All cable tests and measurement methods should confirm to IEC 60189.
- 5. Multi Strand, Annealed high conductivity copper conductor**
  - Overall PVC insulation for UV protection and confirm to IEC 69947
  - All cables shall conform to BIS standards (IS 694) and (IS 1554) 28
  - The size of each type of cable selected shall be based on minimum voltage drop, however, the maximum drop shall be limited to 2%
  - Selected cable should carry a current density of minimum 1.2 Amp/Sq.mm
  - All electrical control / power cables / wires inside the building to be fixed in accordance with CPWD specifications for electrical works Part-I internal only Rigid Steel Conduit should be used for wiring inside the building
  - Proper laying of cables have to be ensured in appropriate cable trays, pipes / trenches as per site requirement.
  - For laying / termination of cables, latest BIS / IEC codes / standards be followed.

**ACCEPTABLE MAKES OF SPV SYSTEM**

| SL. NO. | ITEMS                                      | MAKES                                                                                      |
|---------|--------------------------------------------|--------------------------------------------------------------------------------------------|
| 3.      | SPV modules                                | Tata Power / RenewSys / Havells / Adani / Vikram Solar / Waaree/Loom solar (MNRE Approved) |
| 4.      | SPV module GI mounting structure           | As per BIS                                                                                 |
| 5.      | PCUs (Inverter)                            | Delta / ABB / Havells / SMA / Waaree (MNRE Approved)                                       |
| 6.      | Junction Boxes                             | As per OEM                                                                                 |
| 7.      | Data Logging system with remote monitoring | As per OEM                                                                                 |
| 8.      | AC / DC Distribution units                 | Siemens / ABB / Schneider Electric / Legrand / Havells / L&T                               |
| 9.      | Wires / Cables                             | As per part C-1                                                                            |
| 10.     | Lightning Arrestor                         | JMV / Electro power / Stemon                                                               |
| 11.     | Earthing Kit                               | JMV / Electro power / Stemon                                                               |

# PART C-11

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH : SITC of 50 KLD STP Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of 50 KLD STP Work”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below : |                         |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------|-------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                                | Component of E&M works  | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| I                                                                                                      | SITC of 50 KLD STP Work | 46,28,331/-        | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means <b>“SITC of 50 KLD STP Work”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.
  - OR**
  - ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.

4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (E&M) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (E&M) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.

13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## Additional terms and conditions of STP

### Capacity and Details of STP

- System: Sewage Treatment Plant (STP)
- Capacity : 50 KLD Sewage Treatment Plant
- Technology Used : MBBR STP

### SALIENT FEATURES

1. The plant should have considered the addition of Acclimatized Bacterial Culture into the Aeration Tank to give the following advantages:
  - ⌘ For quick start up of the plant, there by minimizing the commissioning period.
  - ⌘ To get the better clarified effluent as addition of this culture improves effective settling of solids
  - ⌘ To take care of the system upset due to shock load interms of organic oil etc.
  - ⌘ No extra dosing system is required for adding acclimatized bacterial culture.
2. The agency should provide the diffusers of silicone/EPDM Membrane. Although the cost of these diffusers have included cost, and should have adequate long life and oxygen transfer efficiency.
3. The agency shall also be providing the exhaustive OEM manuals and training manual.
4. **STP will cater additional 10% hydraulic as well as organic load.**

### INTRODUCTION

Sewage treatment plants of capacity 50 m<sup>3</sup>/day to treat the domestic sewage. The Sewage water will be generated from Toilets, Bathrooms, Canteens and floor washings etc. The sewage water requires treatment in order to meet the standard norms set by the Pollution Control Board. This proposal shall consider various aspects covering the parameters of sewage water (both quality and quantity), the Scheme & process of treatment, process units involved in the treatment

### 2.0 RAW SEWAGE WATER CHARACTERISTICS

| S.No. | Parameter | Unit | Sewage   |
|-------|-----------|------|----------|
| 1     | pH        | -    | 6.5- 7.5 |
| 2.    | BOD       | mg/l | 250-400  |
| 3.    | COD       | mg/l | 500-800  |
| 4.    | TSS       | mg/l | 300-500  |
| 5     | O&G       | mg/l | 50       |
| 6     | TDS       | mg/l | <2000    |

### **3.0 TREATED SEWAGE WATER CHARACTERISTICS**

The required characteristics of the treated sewage water as per the PCB are given below:

| Sr. No. | Parameter              | Unit | Value    |
|---------|------------------------|------|----------|
| 1.      | pH                     | -    | 6.5to9.0 |
| 2.      | COD                    | mg/l | <50      |
| 3.      | BOD <sub>3</sub> @27°C | mg/l | <10      |
| 4.      | TSS                    | mg/l | <10      |
| 5.      | O&G                    | mg/l | 5-10     |

### **4.0 END USE OF THE TREATED SEWAGE WATER**

The treated effluent will be used for the following purpose

- Gardening/Irrigation

### **5.0 TREATMENT SCHEME**

The STP is of modular construction and the treatment process will consists of four stages.

- ≡ Stage1 : Primary Treatment

Screen Chamber, Oil & Grit Trap, and sewage collection tank.

- ≡ Stage2 : Secondary or biological treatment

Aeration Tank, Secondary Clarifier.

- ≡ Stage3 : Tertiary treatment

Filter Feed Tank, Pressure sand Filter, Activated carbon filter, Hypo Dosing System,

U.V. Disinfection System

- ≡ Stage4 : Sludge Treatment

### **6.0 PROCESS UNITS / TANKS**

The process units alongwith their brief purpose to be used for the treatment of sewage water are given in the following table:

| SR. NO. | PROCESS UNIT                | Utilization                                        |
|---------|-----------------------------|----------------------------------------------------|
| 1.      | Screen Chamber              | For removal of coarse particle/matter              |
| 2.      | Sewage Collection tank      | For collection of Sewage Water                     |
| 3.      | Aeration Tank               | For biological aerobic treatment                   |
| 4.      | Secondary Clarifier         | For separation of bio solids                       |
| 5.      | Filter Feed tank/ C.C. Tank | To store the clarified water for further polishing |
| 6.      | Treated water Tank          | To store the final treated sewage water            |
| 7.      | Sludge Thickening Tank      | To store the sludge before dewatering & drying     |

## **BRIEF PROCESS DESCRIPTION**

### **PRIMARY TREATMENT**

Sewage waste water will first pass through a screen chamber for removal coarse materials. From there the sewage water will be pumped to Aeration Tank for Biological Treatment.

### **SECONDARY (BIOLOGICAL) TREATMENT**

The Aeration Tank oxidizes the organic matter in effluent to  $\text{CO}_2$  &  $\text{H}_2\text{O}$  by the aeration principle. In Aeration Tank Aeration Tank is fitted with no of air diffusers of suitable capacity to provide necessary dissolved oxygen mixed to the effluent. Twin-Lobe Blowers for oxidation provides the aeration. The biological system has to be operated continuously all 20 hours and there by constant feed of Sewage water is required.

The secondary Tube Settler, which designed on low overflow rate, is provided after the Aeration Tank to enable separation of solids. A part of the sludge is re-circulated to the Aeration Tank in order to maintain MLSS levels and a part is drained to the sludge Holding tank/ Filter Press. Acclimatized Bacterial Culture will be added into the Aeration Tank to give the following advantages as mentioned in the salient points of our offer.

Excess sludge needs to be dewatered and dried for easy disposal. The sludge from the Secondary Clarifier is collected in sludge drying beds. Dewatered sludge will get dried by the natural heat of the sunlight. Dried Sludge can be used for manure.

The Clarifier water collected from the collection launder of the Secondary Tube Settler is then passed to the Filter Feed tank.

### **TERTIARY TREATMENT**

It is necessary to pass the sewage water further through tertiary treatment comprises of filtration with Pressure Sand Filter for removal of suspended solids then with Activated Carbon filter for removal of trace organic matter, colour & odour. The treated sewage water will be given dose of chlorine for killing of pathogens (Disinfection). Then this treated water will discharge to irrigation/plantation.

## LIST OF MECHANICAL EQUIPMENTS

The list of the mechanical equipment required for the STP is given below :

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Design, Fabrication, Supply, installation, testing, trial run & commissioning of sewage Treatment Plant of capacity 50 KLD based on Physio-chemical and aerobic, attached growth, moving bed bio reactor technology equipped PVC UV stabilized plastic media attachment for bacteria growth. The said plant cost include following ; All the tanks accessories, pipes etc. shall be in the scope of this Item. of sewage and effluent at inlet:<br>PH : 6.5 - 8.5<br>BOD 5 : 250-300 mg/l<br>S. Solids : 200 mg/l<br>COD : 400-550 mg/l<br>Coliform : $10^6$ - $10^7$ counts / 100 ml<br>Treated Sewage characteristic as per PCB norms.<br>i. pH : (5.5 to 9)<br>ii. BOD : < 6 Mg/L<br>iii. TSS : < 10 Mg/L<br>iv. COD: <50 Mg/L<br>Coliform : Nil<br>The treated effluent shall be odourless, free from oil, grease and other obnoxious matters. |
| 18.1    | BAR SCREEN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| a)      | SITC of SS-304 perforated bar screen with 8-12mm normally placed gaps in screen to allow sewage water flow and prevent higher size debris from entering into the Collection tank at the very entry point itself of the tank. Screen kept inclined at 45 degree to the horizontal with hand track as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 18.2    | Anoxic Mixer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| a)      | SITC of energy efficient 3 blades mixer with minimum of 0.8 KW and RPM of 1450 suitable for operation on 3 phase 400Volt AC supply as required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 18.3    | MS Treatment Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|         | Providing & fixing of 4 MM MSEP tank including design engineering & fabrication comparing of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|         | Anoxic Tank X 1 Nos<br>MBBR 1&2 X 1 No Each<br>Secondary Settling tank X 1 No<br>Filter Feed Tank X 1 No<br>Sludge Holding Tank X 1 No<br>UF Tank X 1 No<br>Treated Water Tank X 1 No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 18.4    | OIL SKIMMER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         | Supplying, Installation, Testing and Commissioning of oil and grease skimmer of 0-4 LPH with required motor and base frame suitable for mounting on Oil chamber as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 18.5    | Sewage Lifting Pump                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| a)      | SITC of Sewage disposal pumps: submersible sewage pump complete with valves, suction and delivery header of an approved make of suitable capacity capable of handling minimum 15 mm size solids for untreated effluent with suitable HP to work on 400/440 volts, 3 phase, 50 cycles AC supply with suitable rpm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Capacity 2.5 Kl/hr at 10 m head                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 18.6    | Coarse Bubble Diffuser                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| a)      | SITC of coarse bubble diffuser of 90 mm dia with provide clog free oxygen for equalization tank. The Coarse aeration system with diffuser shall be arranged to provide mixing throughly whole depth & area of toxic volume & shall prevent media from floating at the tank surface etc as required.                                                                                                                                                                                                                                                                                       |
| 18.7    | Fine Bubble Diffuse                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| a)      | SITC of fine bubble diffuser with Tubular Fine Membrane set of EPDM/Silicon with anti-fungal treatment of size 63mm X 610 mm Long to provide clog free oxygen for aeration tank as required.                                                                                                                                                                                                                                                                                                                                                                                              |
| 18.8    | Air Blower with motors(1W+1S)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| a)      | SITC of twin type rotary air blowers capable of delivering 70 cum/hr of Air and 0.51 kg/cm <sup>2</sup> pressure driven through "V" belt or directly coupled through flexible coupling to a TEFC motor of suitable capacity with accessories MS base plate, safety valves, suction filter, NRV, PRV, ant vibration pad, V - belt, Belt guard, Drive and driven pulleys Suitable for 415 ± 10% volts, 3 phase, 50 cycles A/C supply as required.                                                                                                                                           |
|         | Capacity- 150 cum/hr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 18.9    | MBBR Media                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| a)      | SITC of MBBR media of PP/PVC self-supporting, cylindrical shaped structure with fins having specific gravity of 0.90- 0.95gm/cm <sup>3</sup> for enhanced Dwelling space for bacterial growth installed in Aeration tank as required. SIZE 16 X 22 MM                                                                                                                                                                                                                                                                                                                                     |
| 18.10   | SECONDARY TUBE SETTLING MEDIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| a)      | SITC of Tube settling media of PP/PVC for for solid and liquid separation to be installed in secondary tube settler tank as required CROSS SECTIONAL AREA 120 X 44 mm                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 18.11   | BIO - SLUDGE RECYCLE PUMP – (1w+1s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| a)      | SITC of Centrifugal, mono block sludge recycle pump to recycle sludge to Aeration Tank & excess sludge to sludge tank having discharge rate of minimum 1 m <sup>3</sup> /hrs. at a head of 10-12 meters suitable for operation on 3phase 400Volt AC supply.                                                                                                                                                                                                                                                                                                                               |
| 18.12   | FILTER FEED PUMP – (1w+1s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| a)      | Supplying, installation, testing, commissioning of Filter Feed pump Centrifugal type, mono block, self priming pumps with CI impeller of an approved make and complete with valves, suction and delivery headers capable of handling clear water complete with TEFC induction motor class B insulation, mounted on a common structural base plate with gun metal isolation cock and suitable anti vibration pads for pump foundation, motor of suitable HP to match with the capacity of the Pressure Feed pump to work on 400/440 volts, 3 phase, 50 cycles AC supply with suitable rpm. |
|         | Capacity 2.5 Kl/hr at 35 m head                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 18.13   | ACTIVATED CARBON FILTER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| a)      | Supply of Activate carbon filter comprising of FRP vessel with frontal piping and multiport valve of size: 18 X 65 complete with all fittings to remove Color & Odor as required                                                                                                                                                                                                                                                                                                                                                                                                          |
| 18.14   | PRESSURE SAND FILTER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Sl. No.                                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a)                                                        | Supply of Multi Grade filter comprising of FRP vessel with frontal piping and multiport valve of size: 18 X 65 complete with all fittings to remove fine suspended solids, as required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 18.15                                                     | DOSING PUMP FOR HYPO DOSING TANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| a)                                                        | SITC of single phase dosing pump-motor set having flow rates 0-4 LPH and PVC dosing tank for storage of chlorine dosing solution suitable for chlorine dosing in Chlorine contact tank as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 18.16                                                     | Centrifuge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| a)                                                        | Supply, installation, testing and commissioning Centrifuge system for online drying of sludge for 50 KLD capacity STP including required size of pumps/ motors including standby arrangement (Capacity 1.0 Cum/hr at 10 m head) including all required fittings, accessories and connections as per GFC drawings and direction of Engineer in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 18.17                                                     | Ultra Violet Systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| a)                                                        | Supply, installation, testing & commissioning of UV lamps for disinfection of tertiary treatment wastewater with minimum capacity as required with high output UV lamp. Disinfection capacity of 2.5 m <sup>3</sup> /hr 80-85% UVT at the EOL as required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 18.18                                                     | INTERCONNECTING PIPING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| a)                                                        | Providing and fixing of all necessary uPVC pipes and MS pipe (medium duty) including valve, fittings including fixing at site and air grid piping in Equalization , MBBR and sludge tank for providing air for mixing complete with piping, valves and other accessories of MSEP/UPVC as required. complete in all respect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 18.19                                                     | CONTROL PANEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                           | Fabricating, supplying, installation testing & commissioning of cubical (Weather-proof outdoor cabinet) in IP55 Protection rating, material aluminium with fan. Including lock with 2 keys, Cabling, Switchgear of required capacity for operation of pumps, metering devices etc. as required at site. The panel should be compartmentalized feeder pillar, free standing totally enclosed completed dust and vermin proof suitable for 415 V 3 Phase, 50 Hz supply having hinged gasketed and lockable centre opening double door fabricated from 2 mm thick CRCA sheet front open able complete with interconnection with copper wire, painting, earthing the body i/c providing and fixing of accessories i.e. relays, contactors, pump set starters with over load relays and single phase preventors starters, sequential pump controllers, Aluminium Bus Bars of required capacity, designation labels as per requirement, continuous copper earth bar of size , panel separators, cable clamping support system, bottom cable gland plates for incoming and outgoing cable entries, etc as required. duly powder coated with 7 tank process with copper interconnections, earth strip of 25mm x 5mm with 2 Nos earth terminals with suitable switch gears, and accessories for ON /OFF, protection and controlling of all the pumps etc complete as reqd. |
|                                                           | INCOMER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                           | a) 63 Amp 25 KA FP MCCB Thermal Magnetic Release with Adjustable over load & short circuit setting (Ics=100%Icu) complete with spreader links phase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                           | 1) barrier and rotary handle -1 No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                           | 2) 0-500 V digital volt meter with inbuilt selector switch - 1 set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <div>AE(C)</div> <div>AE(E)</div> <div>EE(C)Page248</div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | 3) 0-100 Amp. Digital Ammeter with inbuilt selector switch and 100/5 amps CT- 3 Nos. - 1 set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|         | 4) RYB Indication lamp set with holder, toggle switch and MCB protection- 1 set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|         | 5) 200 Amp capacity Suitable size aluminium bus with PVC sleeves-1set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|         | Outgoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|         | DOL starter for 1.00 to 7.5 HP 3 phase rating for pump/motors i/c 3 pole Power contactor AC 3 duty ,MPCB, Push button - Start & Stop, Indication lamp; etc for each blower and each pump i/c connection with copper lugs(with spare compartment)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 18.20   | INSTRUMENTATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|         | SITC of following complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| a)      | PRESSURE GAUGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|         | SITC of Bourdon / Diaphragm type pressure gauges to Indicate the Pressure having range of 0 to 4 Kg/ cm2 for Pumps & 0 to 1.0 Kg/cm2 for Blowers etc as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| b)      | LEVEL SWITCHES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|         | SITC of level switches to Indicate the low & High level inside the tanks as required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| c)      | PH- METER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|         | SITC of online p-H meter to measure acidity or alkality of the treated water. Push button Front keys; individual High & Low Set Point Relay; Programmable Control Delay Time to prevent Chattering; Hysteresis to Prevent Relay Chattering; IN- Built Diagnostics; IN - Built Alarm Annunciator etc as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| d)      | ELECTRO MAGNETIC FLOW METER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         | SITC of Electromagnetic Flow meter 1" line size. Suitable for 2- 10 m3/hr with flow rate for sewage water. Indicator ; enclosure - cast aluminum, weather proof ip-65; mounting-field(direct on sensor); supply power- 230volt ac as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 18.21   | ULTRA - FILTRATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|         | Supply, installation, testing and commissioning of Package type Ultra Filtration System for STP of 50 KLD capacity and designed for maximum hourly flow of 2.5 Cum/ hr fitted with required no of UF membranes as per calculations .UF Module (Hollow Fibre-outside in type porosity 0.1 to 0.01 micron) including micron cartridge filter in PP housing,Valve, Automatic Electrical Panel, flow meter and all other accessories making the system complete. The Complete system shall be Skid mounted and membearne shall be housed in PVC Chamber along with required size of pumps/ motors. Dosing system for UF cleaning shall be based on electric dosing .Flushing and backwash system shall consists of SS pump with HDPE filtrate tank of 500 litre capacity. All piping shall be of UPVC including flushing & cleaning and butterfly valves complete as per manufacturer specification, GFC and direction of Engineerin- charge. The following shall be part of UF system |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                            |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | UF MEMBRANE - As per manufacturer calculation<br>UF BAG FILTER - 1 No<br>ROTAMETER - 1 No<br>SS UF SKID - 1 no<br>UF VALVE - 5 nos<br>UF FEED PUMP - 2 nos (1W+1Stby)<br>UF BACKWASH PUMP - 2 nos (1W+1Stby)<br>UF FLUSHING TANK - 2 nos (1W+1Stby)<br>UF ACID DOSING PUMP WITH TANK - 0-10 LPH<br>UF HYPO DOSING PUMP WITH TANK - 0-10 LPH<br>UF PIPING - UPVC<br>UF PLC PANEL - 1 No |
| 18.22   | Supply, laying & fixing of PVC insulated and PVC sheathed / XLPE power armoured Copper control cable of 1.1 KV grade confirming to IS 694 of following size on cable tray as required.                                                                                                                                                                                                 |
| a)      | 3x1.5 Sqmm                                                                                                                                                                                                                                                                                                                                                                             |
| b)      | 3x2.5 Sqmm                                                                                                                                                                                                                                                                                                                                                                             |
| 18.23   | Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with two numbers GI Suspenders i/c base of suitable size GI angle, GI bolts & nuts, fastner etc as required.           |
| a)      | 100 mm width X 50 mm depth X 1.6 mm thickness                                                                                                                                                                                                                                                                                                                                          |

**LIST OF ACCEPTABLE MAKES OF ACCESSORIES**

| <b>S.NO.</b> | <b>ITEMS</b>                                                                    | <b>APPROVED MAKES</b>                           |
|--------------|---------------------------------------------------------------------------------|-------------------------------------------------|
| <b>A</b>     | <b>STP COMPONENT</b>                                                            |                                                 |
| 1.           | MS PIPE                                                                         | JINDAL/TATA/SAIL                                |
| 2.           | PIPE FITTINGS                                                                   | ZOLOTO / UNIK                                   |
| 3.           | CPVC PIPES & FITTINGS                                                           | SUPREME / PRINCE / ASTRAL                       |
| 4.           | UPVC PIPES & FITTINGS                                                           | SUPREME / PRINCE / ASTRAL                       |
| 5.           | BALL VALVE, BUTTERFLY VALVE, NON RETURN VALVE, MOTORISED VALVE, PRV, Y-STRAINER | ZOLOTO/ SANT/ KARTAR / LEADER                   |
| 6.           | MS TANKS                                                                        | VENZA / THERMAX / EUREKA FORBES                 |
| 7.           | RAW SEWAGE PUMP/ SLUDGE RECYCLE PUMP/ DISPOSAL PUMPS                            | CROMPTON / KIRLOSKER/CG                         |
| 8.           | PRESSURE GAUGE                                                                  | H GURU / FEIBIG/GLUCK                           |
| 9.           | PRESSURE SWITCH                                                                 | INDOFOS/SYSTEM SENSOR / DANFOS                  |
| 10.          | SLUDGE FEED PUMP                                                                | CROMPTON / KIRLOSKER/CG                         |
| 11.          | AIR BLOWER                                                                      | CLEANTEK/ EVEREST / AMICON / TMVT/ USHA         |
| 12.          | FILTER (PRESSURE SAND FILTER & ACTIVATED CARBON FILTER)                         | VENZA/THERMAX/EUREKA FORBES/PENTAIR / FIBERTECH |
| 13.          | OIL AND GREASE SKIMMER                                                          | UNIVERSAL/VENZA/MACSUN/PP AQUA                  |
| 14.          | FRP VESSELS                                                                     | TATA/PENTAIR/AQUANOMICS                         |
| 15.          | FILTER PRESS                                                                    | AIRVAK/VENZA/MACSUN/PHARMATECH/SACHIN           |
| 16.          | DIFFUSER                                                                        | VENZA/UNIVERSAL/MM AQUA/PP AQUA /TECHNO         |
| 17.          | MBBR & TUBEDEK MEDIA                                                            | VENZA/MM AQUA/PP AQUA/ TECHNO/PP AQUA           |
| 18.          | FLOW METER                                                                      | EMBARK/PELTELK/FORBES MARSHAL                   |
| 19.          | HDPE/PVC TANK                                                                   | ISI MARKED                                      |
| 20.          | MIXER                                                                           | CRI/CNP/XYLEM/KSB/AMIT ENG                      |
| 21.          | ODOUR REMOVAL SYSTEM                                                            | OZ INDIA/PUREAIR/RUKS/                          |

|          |                          |                                                            |
|----------|--------------------------|------------------------------------------------------------|
| 22.      | pH SENSOR                | ASTER/DGITAL/HM DIGITAL                                    |
| 23.      | TUBE SETTLER MEDIA       | VENZA/AIRVAK/MM AQUA/PP AQUA                               |
| <b>B</b> | <b>ELECTRICAL</b>        |                                                            |
|          | <b>CONTROL PANEL</b>     | <b>CPRI APPROVED</b>                                       |
| 1.       | LT CABLES/CONTROL CABLES | HAVELL'S / RR CABLE / POLYCAB / FINOLOEX                   |
| 2.       | METERS                   | ENERCON / RISHABH / LK (L&T) /<br>LEGRAND/SCHINIDER/ABB    |
| 3.       | SELECTOR SWITCHES        | L & T / LEXIC (LEGRAND) / SAZLER / C & S<br>SCHINIDER/ABB  |
| 4.       | MCCB/MCB                 | L & T / LEXIC (LEGRAND) / SAZLER / C & S<br>/SCHINIDER/ABB |



# PART C-12

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH : SITC of Boom Barrier Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. **“SITC of Boom Barrier Work”**. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below : |                                  |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------|----------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                                | Component of E&M works           | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| I                                                                                                      | <b>SITC of Boom Barrier Work</b> | <b>18,12,496/-</b> | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means <b>“SITC of Boom Barrier Work”</b>.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.
  - OR**
  - ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.

5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in

time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.

14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C **(E&M)** Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in procession of valid electrical contractor license before tart of work

## Technical Specification of Boom Barrier

### Boom Barrier Gate

| Sl. No. | Parameter                   | Technical Specification                                                                                                                                                                                          |
|---------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Equipment                   | Automatic Boom Barrier Gate with straight arm                                                                                                                                                                    |
| 2       | Boom Arm Length             | Suitable for clear passage/opening <b>up to 3.0 metre</b>                                                                                                                                                        |
| 3       | Boom Arm                    | Straight, lightweight, high-strength aluminium/approved equivalent boom arm with reflective strips/LED indication for night visibility                                                                           |
| 4       | Motor                       | <b>BLDC Motor operated</b> , maintenance-free/high-efficiency motor suitable for continuous operation                                                                                                            |
| 5       | Duty Cycle                  | <b>100% duty cycle</b> , suitable for continuous and heavy-duty operation                                                                                                                                        |
| 6       | Opening/Closing Time        | <b>2–6 seconds</b> , adjustable as per site requirement                                                                                                                                                          |
| 7       | Drive Mechanism             | Heavy-duty electromechanical drive mechanism suitable for frequent operation                                                                                                                                     |
| 8       | Boom Swing-Away / Breakaway | Boom arm shall be provided with <b>swing-away/breakaway flange mechanism</b> to prevent damage/breakage to the boom arm when accidentally struck by a vehicle                                                    |
| 9       | Obstruction Safety          | <b>Auto-reverse function</b> shall be provided to automatically reverse/raise the boom arm immediately upon sensing an obstruction during the closing cycle, preventing injury to persons and damage to vehicles |
| 10      | Manual Operation            | Provision for <b>manual opening/closing of the barrier during power failure/emergency condition</b> shall be provided                                                                                            |
| 11      | Control System              | Microprocessor/electronic control panel with adjustable opening/closing speed, automatic closing facility and necessary safety controls                                                                          |
| 12      | Safety Sensors              | Provision for compatible <b>photoelectric safety sensor/loop detector</b> or equivalent vehicle/obstruction detection system                                                                                     |
| 13      | Limit Control               | Electronic/mechanical limit switches/sensors for accurate boom arm open and closed positions                                                                                                                     |
| 14      | Power Supply                | <b>230 V ±10%, 50 Hz, single phase AC</b> or as required by the manufacturer                                                                                                                                     |
| 15      | Enclosure                   | Robust, weather-resistant, corrosion-resistant housing suitable for outdoor installation, minimum <b>IP54 or better</b>                                                                                          |
| 16      | Operating Temperature       | Suitable for outdoor operation under Indian climatic conditions                                                                                                                                                  |
| 17      | Indication                  | LED/reflective warning indication on boom arm and/or suitable status indication on control unit                                                                                                                  |
| 18      | Emergency/Safety            | Emergency release/manual override facility shall be provided for safe operation during power failure or system malfunction                                                                                       |
| 19      | Mounting                    | Floor/pedestal mounted with suitable foundation bolts, base plate and all necessary accessories                                                                                                                  |
| 20      | Accessories                 | Complete with control panel, boom arm, mounting hardware, sensors, wiring, connectors and all accessories required for complete functioning                                                                      |
| 21      | Installation                | Complete installation, testing and commissioning at site including necessary electrical connections and interconnections                                                                                         |
| 22      | Testing                     | The system shall be tested for repeated opening/closing operation, auto-reverse function, manual operation, obstruction detection and power-failure operation                                                    |
| 23      | Warranty                    | Minimum <b>12 months from the date of successful commissioning</b> or as specified in the tender                                                                                                                 |
| 24      | Documentation               | Operation & Maintenance manual, manufacturer's test certificate, warranty certificate and necessary technical literature shall be submitted                                                                      |

## IR Beam Photo Sensor for Boom Barrier

| Sl. No. | Parameter                | Technical Specification                                                                                                                                                                        |
|---------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Equipment                | Infrared (IR) Beam Photoelectric Safety Sensor suitable for automatic boom barrier system                                                                                                      |
| 2       | Application              | Safety/obstruction detection for all boom barrier systems to prevent boom arm closure on vehicles/persons                                                                                      |
| 3       | Sensor Type              | <b>Through-beam photoelectric type</b> , consisting of separate <b>Transmitter (TX) and Receiver (RX)</b> modules                                                                              |
| 4       | Operating Voltage        | <b>24 V DC</b>                                                                                                                                                                                 |
| 5       | Detection Range          | Minimum <b>15 metres</b> , with reliable IR beam transmission and reception throughout the specified range                                                                                     |
| 6       | Output Contact           | <b>Potential-free (volt-free) relay contacts</b> , having <b>NO/NC</b> contacts for interfacing with boom barrier control panel                                                                |
| 7       | Safety Function          | On interruption of the IR beam by a vehicle/person/obstruction, the sensor shall provide a signal to the boom barrier controller to prevent closing and/or initiate auto-reverse as applicable |
| 8       | Alignment                | TX/RX units shall have <b>adjustable mounting/alignment arrangement</b> for accurate alignment of the IR beam                                                                                  |
| 9       | Sensor Housing           | Rugged, weather-resistant housing suitable for outdoor installation                                                                                                                            |
| 10      | Mounting Poles           | Sensors shall be mounted on <b>MS poles</b> , suitably fabricated and <b>powder coated</b> for protection against corrosion and outdoor environmental conditions                               |
| 11      | Base Plate               | Each MS pole shall be provided with suitable <b>base plate with holes for bolting/fixing to floor/foundation</b>                                                                               |
| 12      | Sensor Fixing            | MS poles shall have suitable provision/bracket for secure fixing and adjustment of both TX and RX modules                                                                                      |
| 13      | Cable Entry              | Poles shall have suitable <b>cable entry provision</b> with necessary glands/openings for routing and termination of cables                                                                    |
| 14      | Cabling                  | Complete with required control/signal cabling between TX/RX sensors and boom barrier control panel, including necessary conduits/ducting, glands, connectors and accessories                   |
| 15      | Cable Protection         | Cables shall be suitably protected through PVC/GI conduit/ducting as required at site and neatly routed                                                                                        |
| 16      | Alignment Range          | Adjustable eye/mounting arrangement shall permit precise alignment of the IR beam over a minimum distance of <b>15 m</b>                                                                       |
| 17      | Relay                    | Potential-free relay output suitable for connection to the boom barrier control circuit, with NO/NC configuration                                                                              |
| 18      | Response                 | Fast response suitable for real-time safety operation of the boom barrier                                                                                                                      |
| 19      | Environmental Protection | Sensor assembly shall be suitable for outdoor installation and resistant to dust, moisture and normal climatic conditions                                                                      |
| 20      | Installation             | Complete installation, alignment, testing and commissioning of TX/RX units, MS poles, cabling, ducting and all accessories                                                                     |
| 21      | Testing                  | The system shall be tested by interruption of the IR beam at various points within the operating range to verify proper safety signal and boom barrier response                                |
| 22      | Compatibility            | Sensors shall be fully compatible with the proposed/installed boom barrier control system and shall operate reliably without false triggering                                                  |
| 23      | Accessories              | Complete with mounting brackets, MS poles, base plates, fixing hardware, cable glands, conduits/ducts, connectors and all other accessories required for complete installation                 |
| 24      | Documentation            | Manufacturer's technical datasheet, installation/operation manual and warranty certificate shall be provided                                                                                   |

## **LED Traffic Light**

| <b>Sl. No.</b> | <b>Parameter</b>       | <b>Technical Specification</b>                                                                                                                  |
|----------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | Equipment              | LED Traffic Light Signal suitable for outdoor traffic/access control applications                                                               |
| 2              | Configuration          | <b>2 Red + 2 Green LED signal lights</b>                                                                                                        |
| 3              | Rated Voltage          | <b>24 V DC</b>                                                                                                                                  |
| 4              | Signal Colours         | <b>Red and Green</b> , high-intensity LED                                                                                                       |
| 5              | LED Type               | High-brightness, long-life LED modules suitable for continuous outdoor operation                                                                |
| 6              | Visibility             | High-intensity LEDs providing clear visibility in daylight and low-light conditions                                                             |
| 7              | Housing                | Rugged, weather-resistant housing suitable for outdoor installation                                                                             |
| 8              | Protection             | Minimum <b>IP65</b> protection against dust and water ingress                                                                                   |
| 9              | Lens/Diffuser          | UV-resistant, impact-resistant coloured lens/diffuser suitable for outdoor use                                                                  |
| 10             | LED Life               | Minimum <b>50,000 hours</b> or better under normal operating conditions                                                                         |
| 11             | Power Supply           | 24 V DC, complete with suitable power supply/SMPS where required                                                                                |
| 12             | Power Consumption      | Low power consumption LED technology; suitable for continuous operation                                                                         |
| 13             | Mounting Arrangement   | Complete with suitable <b>pole/wall mounting brackets, clamps, fasteners and accessories</b>                                                    |
| 14             | Electrical Connections | Complete with terminal block/connectors and necessary interconnecting wiring                                                                    |
| 15             | Switching/Control      | Suitable for ON/OFF control through external traffic/access-control controller                                                                  |
| 16             | Operating Condition    | Suitable for continuous outdoor operation under Indian climatic conditions                                                                      |
| 17             | Safety                 | Proper electrical insulation, earthing provision and protection against short circuit/over-voltage shall be provided                            |
| 18             | Installation           | Complete installation, alignment, electrical connection, testing and commissioning at site                                                      |
| 19             | Accessories            | All necessary mounting hardware, brackets, clamps, connectors, glands, wiring and accessories required for complete operation shall be included |
| 20             | Warranty               | Minimum <b>12 months from the date of successful commissioning</b> or as specified in the tender                                                |
| 21             | Documentation          | Manufacturer's technical literature, warranty certificate and operation/installation instructions shall be submitted                            |

## **Interlocking Relay Circuit Panel**

| <b>Sl. No.</b> | <b>Parameter</b>          | <b>Technical Specification</b>                                                                                                                                                    |
|----------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | Equipment                 | <b>Interlocking Relay Circuit Panel</b> for integration of automatic Boom Barrier with LED Traffic Light system                                                                   |
| 2              | Function                  | The panel shall automatically control the <b>Red/Green traffic lights</b> based on the Raise/Lower position/status of the boom barrier                                            |
| 3              | Boom Barrier Interface    | Compatible with Boom Barrier controller having <b>Raise/Open and Lower/Close proximity limit/status signals</b>                                                                   |
| 4              | Control Logic             | The interlocking circuit shall be designed such that the traffic signal changes automatically according to the actual raised/lowered position of the boom barrier                 |
| 5              | Raise Command             | On receipt/confirmation of <b>Raise/Open</b> command and corresponding limit indication, the circuit shall operate the designated traffic light as per approved control logic     |
| 6              | Lower Command             | On receipt/confirmation of <b>Lower/Close</b> command and corresponding limit indication, the circuit shall operate the designated traffic light as per approved control logic    |
| 7              | Interlocking              | Electrical interlocking shall be provided to prevent simultaneous/incorrect operation of conflicting traffic light signals                                                        |
| 8              | Relay                     | Industrial-duty, suitable-rated electromagnetic relays/contactors with adequate contact rating and electrical isolation shall be provided                                         |
| 9              | Relay Contacts            | Adequate NO/NC potential-free contacts shall be provided for interfacing with boom barrier controller and traffic light circuits                                                  |
| 10             | Control Voltage           | <b>12 V DC</b> relay/control circuit                                                                                                                                              |
| 11             | Power Supply              | <b>12 V DC, 1.5 Amp SMPS/power supply</b> , suitable for continuous operation, complete with necessary protection                                                                 |
| 12             | Power Protection          | Suitable input/output fuse/MCB, surge/over-voltage and short-circuit protection shall be provided                                                                                 |
| 13             | Panel Enclosure           | Robust, powder-coated/painted metal enclosure with suitable cable entry arrangements and terminal blocks                                                                          |
| 14             | Protection                | Panel shall be suitable for indoor installation and adequately protected against dust and accidental contact; minimum <b>IP54</b> enclosure preferred                             |
| 15             | Terminal Arrangement      | Properly labelled terminal blocks shall be provided for power supply, boom barrier Raise/Lower limits, control signals and traffic light outputs                                  |
| 16             | Indication                | LED indication shall be provided for <b>Power ON, Raise/Open status, Lower/Close status and respective relay outputs</b>                                                          |
| 17             | Controller Re-programming | Re-programming/configuration of the existing Boom Barrier controller shall be carried out to enable proper integration of <b>Raise/Lower commands and traffic light functions</b> |
| 18             | Software/Logic            | Control logic shall be configured and tested in accordance with the approved sequence of operation and site requirements                                                          |
| 19             | Cabling                   | Supply and laying of necessary control/power cables between Boom Barrier, relay panel and traffic lights shall be included                                                        |
| 20             | Cable Specification       | Suitable copper, FR/FRLS insulated control cable of adequate size and number of cores, as required for the system, shall be provided                                              |
| 21             | Ducting                   | Necessary PVC/GI cable duct/conduit/trunking including bends, couplers, supports and accessories shall be provided for neat and protected cable routing                           |
| 22             | Cable Termination         | All cable termination shall be complete with suitable glands, lugs, ferrules, markers, cable ties and termination accessories                                                     |

| Sl. No. | Parameter            | Technical Specification                                                                                                                                                                  |
|---------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23      | Electrical Isolation | Relay interface shall provide suitable electrical isolation between the Boom Barrier controller and Traffic Light control circuits                                                       |
| 24      | Fail-Safe Operation  | The interlocking logic shall be designed to avoid an unsafe/conflicting traffic indication in case of failure of control signal/power supply, as applicable to the approved system logic |
| 25      | Testing              | Complete system shall be tested for Raise, Lower, proximity-limit operation, traffic light changeover, interlocking and power-failure/recovery conditions                                |
| 26      | Commissioning        | Complete integration, programming, testing and commissioning at site shall be carried out by qualified personnel                                                                         |
| 27      | Documentation        | Wiring diagram, control logic/sequence, terminal schedule, relay details and operation instructions shall be submitted after commissioning                                               |
| 28      | Warranty             | Minimum <b>12 months from the date of successful commissioning</b> or as specified in the tender                                                                                         |

**ACCEPTABLE MAKES OF BOOM BARRIER**

| SL. NO. | ITEMS                            | MAKES                                                                                     |
|---------|----------------------------------|-------------------------------------------------------------------------------------------|
| 1.      | Boom Barrier                     | AUTOMATIC SYSTEMS, Tescon, Godrej, KABA, Gunnebo, Magneticfaac, Houston Systems / Motwane |
| 2.      | IR Beam Photo Sensor             | Optex / Honeywell / Omron / Autonics / Schneider Electric / SICK                          |
| 3.      | LED Traffic Light                | TRAFITRONICS / Atreyo / Nucleonics / Osho Automation / SEG Greenway                       |
| 4.      | Interlocking Relay Circuit Panel | Schneider Electric / Omron / Finder / Phoenix Contact / ABB / Siemens / WAGO              |

# PART C-13

**Name of Work :Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand. (SH : SITC of Audio Visual System Work)**

1. The work shall be carried out under the scope of composite tender which shall be executed under one agreement. Schedule for Electrical Works is Part-C of the tender documents. The main contractor for Civil work will Associate appropriate & eligible CPWD registered contractor for carrying out Electrical Component of work as given in Part-C (Electrical Works) of the tender documents. The eligible tenderers for major component in Association of Electrical Contractor will quote rates for Electrical Component (Part-C Electrical Work) also. The lowest tenderer would be decided based on quoted rates in respect of all the schedules attached in tender documents.
2. The main contractor will associate specialized agency for this E&M works i.e. “**SITC of Audio Visual System Work**”. He shall be allowed to execute the same after due verification & approval of the Executive Engineer (E). If the contractor himself is eligible, he will submit eligible documents.

| For components of E&M works, the eligibility criteria for associate agency will be as detailed below : |                                         |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.                                                                                                | Component of E&M works                  | Estimated Cost Rs. | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| I                                                                                                      | <b>SITC of Audio Visual System Work</b> | 1,35,28,139/-      | <p>The successful bidder shall associate with him specialized agencies/Firms/bidders, who fulfill the following requirements to undertake the work. Joint ventures are not accepted.</p> <p>a) Should have satisfactorily completed similar works during the last seven years ending last date of the month previous to the one in which tenders are invited. For this purpose, the cost of work shall mean gross value of the completed work including cost of material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.</p> <p>(i) Three similar works each of value not less than 40% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(ii) Two similar works each of value not less than 60% of the estimated cost of this sub head</p> <p style="text-align: center;">OR</p> <p>(iii) One similar work of value not less than 80% of the estimated cost of this sub head</p> <p>Similar work shall means “<b>SITC of Audio Visual System Work</b>”.</p> <p>The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from the date of completion to previous day of last day of submission of bids.</p> |

3. The main contractor (B&R) shall also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided,
  - i He fulfills the prescribed eligibility criteria respectively for these works as stipulated in NIT.

**OR**

- ii He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.
4. The main contractor and the associated specialized agencies is required to give affidavit to confirm their association.
5. In case the main contractor intends to change sub-agency during the currency of the contract, prior approval of Engineer-in-charge shall be obtained before engagement.
6. The lowest tenderer is required to submit, alongwith the performance guarantee after the acceptance of tender, an undertaking form the OEM regarding.
  - (a) Authorization certificate.
  - (b) The OEM shall unconditionally support the lowest tenderer technically throughout the execution of contract as well as for maintenance/comprehensive maintenance contract for the useful life of the system, and
  - (c) OEM shall provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment.
7. No condition is incorporated in the NIT's regarding visits of CPWD officers within country or outside India to inspect equipments/materials/stores where such expenditure is to be borne either by the contractor. Officers of the department may conduct inspection before dispatch of equipments/materials at manufacturer's works. The contractor has to arrange facilities for inspection of equipments/materials including conducting the required tests in the manufacturing unit. However, no condition is incorporated in the NIT regarding inspection of equipments/materials in the manufacturing unit located outside India without prior permission of MoHUA.
8. After the work is awarded, one set of agreement shall be handed over to **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** who will be Engineer in charge of minor component Part-C (E&M) Works. **EE & SM (C)-I, Simbo, CPWD**, of major component will operate Part-A and part-B of the agreement. Executive Engineer (E) in charge of minor components shall operate Part-C Electrical Work along with Part-A of the agreement. The main contractor will have to sign another agreement for Part-C (E&M) Work with the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD**. The main contractor has to enter in agreement with the contractor associated by him for execution of minor component Part-C (E&M) Work. Copy of such agreement shall be submitted to the **EXECUTIVE ENGINEER (E) RANCHI-I, CPWD** the Engineer in Charge of minor component (Electrical) as well as the **EE & SM (C)-I, Simbo, CPWD** Engineer in charge of major component. Running payments for the major component shall be made by the Executive Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Executive Engineer (E) in charge of the discipline of minor component either directly to the main contractor or Associated Electrical Contractor as agreement executed in between if so.
9. If Running Payments for minor components is made to the main contractor by the Executive Engineer (E) for Part-C (**E&M**) Work in charge of the discipline of minor component directly to the main contractor, The Main Contractor shall make payment to Associated Electrical Contractor within fifteen days positively. In case main contractor fails to make the payment to the contractor associated by him within 15 days of receipt of each running account payment then on the written complain of contractor associated for such minor component Executive Engineer (E) in charge of minor component shall serve the show cause notice to main contractor and after considering the reply of the same he may make the payment directly to the contractor associated for minor component as per the terms & conditions of the agreement drawn between main contractor and associate contractor fixed by him, if reply of main contractor either not received or found unsatisfactory, such payment made to the associate contractor shall be recovered by Executive Engineer in charge of major or minor component from the next RA/final bill due to main contractor as the case may be. The payment of minor component of the work i.e. Part-C shall be made as per terms and conditions of the tripartite agreement among main agency, associated agency and Engineer-in-Charge of minor component. The tripartite agreement shall be submitted to Engineer-in-Charge of major component also.
10. If the main contractor fails to associate Electrical Contractor for execution of minor components (Part-C (**E&M**) Work) within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
11. In case the main contractor intends to change the Associated Electrical Contractor during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new Electrical Contractor shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

12. Final bill of the whole work shall be finalized and paid by the Executive Engineer in charge of major component. Executive (E) will prepare and pass the final bill for his component of work and pass on the same to the **EE & SM (C)-I, Simbo, CPWD** in charge of major component for including in the final bill for composite work.
13. Some milestones shall be applicable for Part-C (**E&M**) components of work as given in CPWD 7/8 under clause-5. The Associated Agency of Electrical Components will ensure that their components of the work are executed in time without giving any chances for slippage of milestones of the project. The amount to be withheld under Clause 5 of the contract will be decided by the Executive Engineer of the main discipline and not by the Executive Engineer (E). In the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of will be withheld for failure of each milestone.
14. Arbitration case if any shall be handled by the Executive Engineer of the major discipline along with the support of the Executive Engineer (E) of minor discipline i.e. Part-C (**E&M**) Work.
15. The associated agency or main agency, whoever undertakes the work, shall be in possession of valid electrical contractor license before start of work

## Technical Specification of Audio & Visual System

### Chairman Discussion Unit

| Sl. No. | Parameter                     | Minimum Technical Requirement                                                                                                   |
|---------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 1       | Equipment                     | Chairman Discussion/Conference Unit with integrated microphone and loudspeaker                                                  |
| 2       | Signal Processing             | <b>Digital Signal Processing (DSP)</b> based                                                                                    |
| 3       | Chairman Priority             | Dedicated <b>Priority button</b> ; pressing it shall silence/mute all delegate microphones and allow only the Chairman to speak |
| 4       | Next-in-Line                  | Dedicated <b>Next-in-Line button</b> to give speaking permission to the next participant in the waiting/request list            |
| 5       | User Button                   | User/request-to-speak button with visual feedback                                                                               |
| 6       | Loudspeaker                   | High-quality integrated loudspeaker, <b>minimum 4 W or better</b>                                                               |
| 7       | Audio Resolution              | <b>16-bit digital audio or better</b>                                                                                           |
| 8       | Microphone Frequency Response | <b>25 Hz–15,000 Hz or better</b>                                                                                                |
| 9       | Headphone Output              | <b>3.5 mm stereo headphone jack</b> with individual volume adjustment                                                           |
| 10      | Conference Bus                | Concealed conference-bus connections                                                                                            |
| 11      | Network/Bus Ports             | <b>2 × RJ45 Ethernet ports (IN/OUT interchangeable)</b>                                                                         |
| 12      | Cabling                       | Loop-through/daisy-chain configuration using <b>non-proprietary cabling</b>                                                     |
| 13      | Status Indicator              | Bi-colour bar indicator for microphone/speaking/request status                                                                  |
| 14      | Microphone Connection         | <b>Screw-lock detachable microphone connector</b>                                                                               |
| 15      | Microphone                    | 400 mm gooseneck microphone                                                                                                     |
| 16      | Polar Pattern                 | Unidirectional/Cardioid                                                                                                         |
| 17      | Microphone Type               | Shielded <b>back-electret condenser</b> microphone                                                                              |
| 18      | Mobile Interference           | Microphone shall be shielded/immune to interference from mobile phones/RF sources                                               |
| 19      | Maximum SPL                   | <b>110 dB SPL @ 1 kHz at 1% THD+N or better</b>                                                                                 |
| 20      | S/N Ratio                     | <b>&gt;67 dB(A)</b>                                                                                                             |
| 21      | Sensitivity                   | <b>-40.5 ± 2 dBV @ 1 Pa, 1 kHz</b>                                                                                              |
| 22      | Microphone Connection         | Screw-lock type detachable connection                                                                                           |
| 23      | Microphone Ring Indicator     | <b>Red</b> when microphone is active; <b>Green</b> when microphone is in request/waiting mode                                   |
| 24      | Cable                         | <b>2 m shielded CAT5e cable</b> to be supplied with each unit                                                                   |
| 25      | Communication                 | Digital conference bus communication with daisy-chain/loop-through arrangement                                                  |
| 26      | Power                         | Supplied through conference system bus or dedicated OEM-approved supply                                                         |
| 27      | Installation                  | Complete with mounting/accessories, connection, configuration, testing and commissioning                                        |

| Sl. No. | Parameter       | Minimum Technical Requirement                                                                                                                                       |
|---------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28      | Certifications  | <b>CE and BIS</b> certification/registration, wherever applicable to the offered equipment                                                                          |
| 29      | OEM Requirement | OEM/manufacturer shall comply with applicable procurement requirements, including <b>GFR 144(xi)</b> provisions regarding countries sharing land borders with India |
| 30      | Warranty        | Minimum <b>12 months from successful commissioning</b> or as specified in tender                                                                                    |
| 31      | Documentation   | OEM datasheet, compliance statement, warranty certificate, installation/operation manual and test certificates shall be submitted                                   |

#### **Delegate Discussion Unit**

| Sl. No. | Parameter                     | Minimum Technical Requirement                                                             |
|---------|-------------------------------|-------------------------------------------------------------------------------------------|
| 1       | Equipment                     | Digital Delegate Discussion/Conference Unit with integrated microphone and loudspeaker    |
| 2       | Signal Processing             | <b>Digital Signal Processing (DSP)</b> based                                              |
| 3       | Microphone Control            | Dedicated <b>Microphone ON/OFF button</b>                                                 |
| 4       | User Button                   | User/Request-to-Speak button with visual feedback                                         |
| 5       | Loudspeaker                   | High-quality integrated loudspeaker, <b>minimum 4 W or better</b>                         |
| 6       | Audio Resolution              | <b>16-bit digital audio or better</b>                                                     |
| 7       | Microphone Frequency Response | <b>25 Hz–15,000 Hz or better</b>                                                          |
| 8       | Headphone Output              | <b>3.5 mm stereo headphone jack</b> with volume adjustment                                |
| 9       | Conference Bus                | Concealed conference-bus connections                                                      |
| 10      | RJ45 Ports                    | <b>2 × RJ45 Ethernet ports</b> , IN/OUT interchangeable                                   |
| 11      | Cabling Topology              | Loop-through/daisy-chain configuration                                                    |
| 12      | Cable Type                    | <b>Non-proprietary CAT5e cabling</b>                                                      |
| 13      | Status Indicator              | Bi-colour bar indicator for operating/request/speaking status                             |
| 14      | Microphone Connector          | Compatible <b>screw-lock detachable microphone connection</b>                             |
| 15      | Microphone                    | <b>400 mm gooseneck</b> microphone                                                        |
| 16      | Polar Pattern                 | <b>Unidirectional or Cardioid</b>                                                         |
| 17      | Microphone Type               | Shielded <b>Back Electret Condenser</b> microphone                                        |
| 18      | RF/Mobile Interference        | Microphone shall be shielded and suitably immune to mobile-phone/RF interference          |
| 19      | Maximum SPL                   | <b>110 dB SPL @ 1 kHz at 1% THD+N or better</b>                                           |
| 20      | Signal-to-Noise Ratio         | <b>&gt;67 dB(A)</b>                                                                       |
| 21      | Sensitivity                   | <b>-40.5 ± 2 dBV @ 1 Pa, 1 kHz</b>                                                        |
| 22      | Microphone Connection         | Screw-lock detachable type                                                                |
| 23      | Microphone Ring Indicator     | <b>Red when microphone is active and Green when microphone is in request/waiting mode</b> |
| 24      | Interconnection Cable         | <b>2 m shielded CAT5e cable</b> to be supplied with each unit                             |
| 25      | Power/Communication           | Through conference bus/system controller or OEM-approved arrangement                      |

| Sl. No. | Parameter            | Minimum Technical Requirement                                                                                                                         |
|---------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26      | Installation         | Complete with mounting, connection, cable termination and accessories                                                                                 |
| 27      | System Compatibility | Shall be fully compatible with the proposed Chairman Discussion Unit and central conference control system                                            |
| 28      | Certification        | <b>CE and BIS</b> , wherever applicable                                                                                                               |
| 29      | OEM Compliance       | OEM, product and bidder shall comply with applicable <b>GFR 144(xi)</b> procurement requirements concerning countries sharing land borders with India |
| 30      | Warranty             | Minimum <b>12 months from successful commissioning</b> or as specified in tender                                                                      |
| 31      | Documentation        | OEM datasheet, technical compliance statement, warranty certificate, installation/operation manual and relevant certificates shall be submitted       |

#### **Hybrid Ready Central Conference Controller**

| Sl. No. | Parameter              | Minimum Technical Requirement                                                              |
|---------|------------------------|--------------------------------------------------------------------------------------------|
| 1       | Equipment              | Hybrid Ready Central Conference Controller with Integrated Recording & Web Server          |
| 2       | Mounting               | Standard 19-inch Rack Mountable design                                                     |
| 3       | Hybrid Meeting         | Hybrid-ready conference operation through direct USB interface                             |
| 4       | Conference Bus         | 4 conference bus connections configurable as 4 branches or 2 closed loops                  |
| 5       | Redundancy             | Closed-loop fail-safe redundancy architecture                                              |
| 6       | Branch Cable Length    | Minimum 400 m total cable length per branch/loop                                           |
| 7       | Distance Between Units | Minimum 80 m between conference units or between controller and unit                       |
| 8       | Configuration          | Complete configuration through Integrated Web Server                                       |
| 9       | Web Interface          | Browser-based configuration without dedicated proprietary software for basic configuration |
| 10      | USB Integration        | Direct USB Audio Interface for hybrid meetings                                             |
| 11      | AES67                  | Built-in AES67 network audio support                                                       |
| 12      | Analog Audio           | Built-in analogue audio inputs and outputs                                                 |
| 13      | System Capacity        | Support for 250 or more discussion units using network extenders/expanders                 |
| 14      | Conference Mode        | Hands-free mode supporting minimum 16 simultaneously active microphones or higher          |
| 15      | Camera Integration     | Support for camera control/automatic camera tracking integration                           |
| 16      | Cabling                | Daisy-chain conference units using shielded CAT5e or better non-proprietary cable          |
| 17      | DSP                    | Built-in Digital Signal Processing                                                         |
| 18      | Audio Configurator     | Configurable audio routing with microphone and speaker grouping                            |
| 19      | Mix-Minus              | Built-in Dynamic Mix-Minus functionality                                                   |
| 20      | Gain Control           | Automatic Gain Sharing                                                                     |
| 21      | API                    | Open/API control capability for third-party integration                                    |
| 22      | Internal Recording     | Internal recording storage of minimum 3 GB                                                 |
| 23      | External Recording     | Recording to external USB flash drive through USB-C                                        |
| 24      | PC Recording           | Multi-channel USB recording directly to a PC                                               |
| 25      | Recording Control      | Dedicated front-panel Record Button                                                        |
| 26      | Volume Control         | Front-panel Volume Dial                                                                    |

| Sl. No. | Parameter         | Minimum Technical Requirement                                                                             |
|---------|-------------------|-----------------------------------------------------------------------------------------------------------|
| 27      | Power Control     | Power button with Wake-on-LAN, Auto Power-on and ECO mode                                                 |
| 28      | Cooling           | Fan-less operation                                                                                        |
| 29      | Extended Power    | Built-in extended power management                                                                        |
| 30      | Bus Connections   | 4 Bus Ports supporting branches/closed loops                                                              |
| 31      | LAN               | Dedicated LAN port for Control & AES67                                                                    |
| 32      | USB-C Ports       | 2 Lockable USB-C ports                                                                                    |
| 33      | USB Functions     | Flash drive interface, Hybrid Meeting Interface and Multi-channel Audio Interface                         |
| 34      | XLR Inputs        | 2 Balanced XLR Inputs                                                                                     |
| 35      | XLR Outputs       | 2 Balanced XLR Outputs                                                                                    |
| 36      | Front Audio Port  | 3.5 mm front-panel input/output supporting line or microphone level                                       |
| 37      | Network Speed     | 10/100 Mbps to 1 Gbps Ethernet                                                                            |
| 38      | Power Supply      | Included 48 VDC power supply                                                                              |
| 39      | Compatibility     | Fully compatible with supplied Chairman Units, Delegate Units and Conference Bus                          |
| 40      | Firmware          | Upgradeable firmware through OEM-supported method                                                         |
| 41      | Status Indication | Front-panel LED indicators for power, recording and communication status                                  |
| 42      | Installation      | Complete installation, configuration, testing and commissioning                                           |
| 43      | Documentation     | OEM Datasheet, Compliance Statement, Installation Manual, Warranty Certificate                            |
| 44      | Certification     | CE and BIS, wherever applicable                                                                           |
| 45      | GFR Compliance    | OEM, Product and Bidder shall comply with GFR 144(xi) regarding countries sharing land borders with India |
| 46      | Warranty          | Minimum 12 months from successful commissioning                                                           |

Note: - The controller shall:

- Operate both physical and hybrid meetings.
- Support Chairman and Delegate discussion units on the same conference bus.
- Allow browser-based configuration through an integrated web server.
- Support AES67, USB Audio, and analog XLR interfaces simultaneously.
- Record meetings internally, to USB storage and directly to a computer.
- Provide Dynamic Mix-Minus, Gain Sharing, and flexible DSP routing.
- Support future expansion to 250+ conference units using OEM-supported network extenders.

### DSP

| Sl. No. | Parameter        | Minimum Technical Requirement                                                                                              |
|---------|------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1       | Equipment        | Digital Signal Processor (DSP) with Fixed Analog I/O, Dante™, AEC, VoIP & Cloud Management                                 |
| 2       | Mounting         | Standard 19-inch Rack Mountable (1RU)                                                                                      |
| 3       | Analog Inputs    | Minimum 4 balanced analog inputs                                                                                           |
| 4       | Analog Outputs   | Minimum 4 balanced analog outputs                                                                                          |
| 5       | DSP Processing   | Fully software-configurable DSP with signal routing, mixing, EQ, filtering, dynamics, delay, matrix mixing and diagnostics |
| 6       | Dante™           | Integrated Dante™ digital audio networking                                                                                 |
| 7       | Dante Capacity   | Minimum 32 × 32 Dante channels                                                                                             |
| 8       | Dante Connector  | RJ-45 Ethernet connector                                                                                                   |
| 9       | Programming Port | Dedicated Ethernet RJ-45 for programming and control                                                                       |

| Sl. No. | Parameter                  | Minimum Technical Requirement                        |
|---------|----------------------------|------------------------------------------------------|
| 10      | Network Speed              | 10/100/1000 Mbps Ethernet                            |
| 11      | GPIO                       | Minimum 4 channels of programmable GPIO              |
| 12      | RS-232                     | Software-programmable RS-232 interface               |
| 13      | USB                        | USB Type-B interface                                 |
| 14      | USB Audio                  | Minimum 8-channel USB Class 1 Audio streaming        |
| 15      | USB Mode                   | Simultaneous USB input and output supported          |
| 16      | Port Authentication        | IEEE 802.1X support                                  |
| 17      | Acoustic Echo Cancellation | Built-in AEC hardware and firmware on input channels |
| 18      | AEC Configuration          | Fully software programmable                          |
| 19      | VoIP                       | Dual-line VoIP integration                           |
| 20      | VoIP Connector             | RJ-45                                                |
| 21      | VoIP Protocol              | SIP v2.0 or later                                    |
| 22      | PSTN Integration           | Single-line telephone interface                      |
| 23      | Telephone Connector        | RJ-11                                                |
| 24      | Front Display              | OLED display                                         |
| 25      | Front Indicators           | Power, Status, Alarm, Activity and System-wide Alarm |
| 26      | Frequency Response         | 20 Hz–20 kHz                                         |
| 27      | Output Accuracy            | +4 dBu: +0.25 dB / -0.5 dB                           |
| 28      | Dynamic Range              | >108 dB                                              |
| 29      | Input Impedance            | 8 k $\Omega$ balanced                                |
| 30      | Output Impedance           | 207 $\Omega$ balanced                                |
| 31      | Maximum Input Level        | +24 dBu                                              |
| 32      | Sampling Rate              | 48 kHz                                               |
| 33      | Converters                 | 24-bit A/D & D/A                                     |
| 34      | Input Gain                 | 0–66 dB in 6 dB steps                                |
| 35      | Signal Routing             | Matrix routing and mixer                             |
| 36      | Equalization               | Parametric equalization                              |
| 37      | Filtering                  | High-pass and low-pass filtering                     |
| 38      | Dynamics                   | Compressor, limiter, gate and AGC                    |
| 39      | Delay                      | Adjustable input/output delay                        |
| 40      | Monitoring                 | Real-time monitoring and diagnostics                 |
| 41      | Firmware                   | Upgradeable firmware                                 |
| 42      | Configuration              | Software-based programming                           |
| 43      | Device Management          | Cloud-based secure web management platform           |
| 44      | Remote Access              | Anytime, anywhere secure web access                  |
| 45      | Device Status              | Online, Offline/Missing status                       |
| 46      | Firmware Status            | Current version monitoring                           |
| 47      | Error Monitoring           | Active error reporting                               |
| 48      | CPU Monitoring             | Real-time CPU load                                   |
| 49      | Remote Settings            | Remote configuration                                 |
| 50      | Remote Commands            | Send control commands                                |
| 51      | Firmware Update            | Remote firmware updates                              |
| 52      | Remote Reboot              | Supported                                            |
| 53      | Device Identification      | Remote identify/locate function                      |
| 54      | Alert Notifications        | Email/dashboard/device alerts                        |
| 55      | Security                   | Secure authenticated web access                      |

| Sl. No. | Parameter      | Minimum Technical Requirement                                                 |
|---------|----------------|-------------------------------------------------------------------------------|
| 56      | Installation   | Complete installation, configuration, testing and commissioning               |
| 57      | Documentation  | OEM datasheet, compliance statement, warranty certificate, manuals            |
| 58      | Certifications | CE, UL Listed, RoHS Compliant                                                 |
| 59      | Warranty       | Minimum 12 months                                                             |
| 60      | OEM Compliance | OEM, Product and Bidder shall comply with applicable GFR 144(xi) requirements |

#### **Wall Mounted Speaker**

| Sl. No. | Parameter                | Minimum Requirement                                                         |
|---------|--------------------------|-----------------------------------------------------------------------------|
| 1       | Type                     | Surface-mounted wall speaker                                                |
| 2       | Speaker Configuration    | 2-way compact full-range loudspeaker                                        |
| 3       | Rated Power              | 30 W or higher                                                              |
| 4       | Impedance                | 8 $\Omega$ or lower                                                         |
| 5       | LF Enclosure             | Vented/Bass Reflex enclosure                                                |
| 6       | LF Driver                | Minimum 5 inch (125 mm) woofer                                              |
| 7       | HF Driver                | Titanium diaphragm or titanium-coated compression/tweeter driver            |
| 8       | Frequency Range (-10 dB) | 65 Hz – 20 kHz or better                                                    |
| 9       | Frequency Response       | Smooth response suitable for speech and music                               |
| 10      | Maximum SPL @1 m         | 100 dB or higher                                                            |
| 11      | Coverage Angle           | 90° × 90° or wider                                                          |
| 12      | Crossover                | Passive internal crossover                                                  |
| 13      | Protection               | Full-bandwidth overload protection for both LF & HF drivers                 |
| 14      | Enclosure Material       | Weather-resistant UV-stabilized ABS/HIPS enclosure                          |
| 15      | Grille                   | Powder-coated corrosion-resistant metal grille                              |
| 16      | Environmental Protection | Suitable for indoor/outdoor use; IPX4/IP54 or equivalent weather resistance |
| 17      | Mounting                 | Adjustable wall-mount bracket allowing horizontal and vertical tilt         |
| 18      | Operating Temperature    | Minimum -10°C to +50°C                                                      |
| 19      | Colour                   | Black or White as directed by Engineer-in-Charge                            |
| 20      | Accessories              | Mounting bracket, fasteners, connectors, cable termination accessories      |

#### **Channel Power Amplifier**

| Sl. No. | Parameter               | Minimum Requirement                    |
|---------|-------------------------|----------------------------------------|
| 1       | Type                    | Professional 2-channel Power Amplifier |
| 2       | Amplifier Class         | Class-D or better                      |
| 3       | Rated Output Power      | Minimum 250 W RMS per channel          |
| 4       | Speaker Load            | 4 $\Omega$ and 8 $\Omega$ operation    |
| 5       | Constant Voltage Output | 70 V / 100 V line output               |
| 6       | Bridged Mono Output     | Minimum 540 W RMS at 8 $\Omega$        |
| 7       | Frequency Response      | 80 Hz – 15 kHz or better               |
| 8       | Power Bandwidth         | 80 Hz – 15 kHz                         |

| Sl. No. | Parameter                 | Minimum Requirement                       |
|---------|---------------------------|-------------------------------------------|
| 9       | Total Harmonic Distortion | ≤1% at rated output                       |
| 10      | Signal-to-Noise Ratio     | ≥95 dB                                    |
| 11      | Damping Factor            | ≥100                                      |
| 12      | Input Sensitivity         | 0.775 V or 1.4 V selectable               |
| 13      | Input Impedance           | ≥10 kΩ (Balanced)                         |
| 14      | Crosstalk                 | Better than 55 dB                         |
| 15      | Cooling                   | Forced-air cooling, Front-to-Rear airflow |
| 16      | Rack Size                 | 19-inch, 2U rack mount                    |
| 17      | Construction              | Steel chassis with integrated rack ears   |
| 18      | Operating Voltage         | 120–230 V AC, 50/60 Hz                    |
| 19      | Power Connector           | IEC power inlet                           |

**ACCEPTABLE MAKES OF AUDIO & VISUAL SYSTEM**

| SL. NO. | ITEMS                                      | MAKES                                                                     |
|---------|--------------------------------------------|---------------------------------------------------------------------------|
| 1.      | Chairman Discussion Unit                   | Bosch / TOA / Televic / Shure / Taiden / Audio-Technica / DIS /Sennheiser |
| 2.      | Delegate Discussion Unit                   | Bosch / TOA / Televic / Shure / Taiden / Audio-Technica / DIS /Sennheiser |
| 3.      | Hybrid Ready Central Conference Controller | Bosch / Televic / Shure / Taiden / TOA / Audio-Technica / DIS /Sennheiser |
| 4.      | DSP                                        | Biamp / QSC / Symetrix / Yamaha /Crestron / Extron                        |
| 5.      | Speaker                                    | Bosch / TOA / Electro-Voice / Yamaha                                      |
| 6.      | 2 Channel Power Amplifier                  | Electrovoice / Dynacord / Crown / Bosch / TOA / Yamaha                    |
| 7.      | Speaker Cable                              | Polycab/Beldon/Krystal                                                    |

**MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN**

- 1] M/S [Name of the firm with full address]  
Enlistment Status  
Valid Upto:  
[Henceforth called the main contractor]  
And
- 2] M/S [Name of the firm with full address]  
Enlistment Status  
Valid Upto:  
[Henceforth, called Associated Contractor]

**Name of Work :- Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand..**  
**(SH –.....).**

[Electrical Component only] as per schedule, specifications, terms and conditions of the tender.

We state that M.O.U. between us will be treated as an agreement and has legality as per Indian Contract Act (amended upto date) and the department (CPWD) can enforce all the terms and conditions of the agreement for execution of the above work. Both of us shall be responsible for the execution of work as per the agreement to the extent of this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits.

We have agreed as under :

- 1- The associated contractor shall be liable for disciplinary action if he failed to discharge the action(s) and other legal action as per agreement besides forfeiture of the security deposit.
- 2- All the material, machinery and equipments, tools and tackles required for execution of the electrical works. As per agreement shall be the responsibility of the associated contractor.
- 3- The site staff required for the electrical work shall be arranged by the associated contractor as per terms and conditions of the agreement.

SIGNATURE OF MAIN CONTRACTOR

SIGNATURE OF ASSOCIATED  
CONTRACTOR

Date

Date

Place

Place

COUNTERSIGNED

EE(C)

## **WILLINGNESS CERTIFICATE**

**Name of Work :- Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.**

**(SH -.....).**

**I hereby give my willingness to work as associated contractor for the above mentioned work.**

**I will execute the work as per specifications and conditions for the agreement and as per direction of the Engineer-in-Charge. Also I will employ full time technically qualified supervisor for the works. I will attend inspection of officers of the department as and when required.**

**Date :**

**Signature of Contractor**

# **PART –D**

## **(Schedule of**

### **Quantity)**

## Schedule of Quantity (Civil component)

Name of work:- **Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.**

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty     | Rate    | Unit  | Amount     |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-------|------------|
| <b>1</b> | <b>Earth Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |       |            |
| 1.1      | Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30cm in depth, 1.5m in width as well as 10 sqm on plan) including getting out and disposal of excavated earth, lead up to 50m and for all lift, as directed by Engineer-in-Charge.                                                                                                                                                                           |         |         |       |            |
| 1.1.1    | All kinds of soil                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 7739.00 | 177.50  | Cum   | 1373673.00 |
| 1.2      | Earth work in excavation by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan) including dressing of sides and ramming of bottoms, for all lift, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.                                                                                                            |         |         |       |            |
| 1.2.1    | All kinds of soil.                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 372.00  | 260.30  | Cum   | 96832.00   |
| 1.3      | Excavating trenches by mechanical/manual means of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, for all depth , including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20 cm in depth, including consolidating each deposited layer by ramming, watering, etc. and disposing of surplus excavated soil as directed, within a lead of 50 m : |         |         |       |            |
| 1.3.1    | All kinds of soil                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |       |            |
| 1.3.1.1  | Pipes, cables etc. exceeding 80 mm dia. but not exceeding 300 mm dia                                                                                                                                                                                                                                                                                                                                                                                                 | 300.00  | 352.15  | Metre | 105645.00  |
| 1.3.1.2  | Pipes, cables etc. exceeding 300 mm dia but not exceeding 600 mm.                                                                                                                                                                                                                                                                                                                                                                                                    | 100.00  | 549.75  | Metre | 54975.00   |
| 1.4      | Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and for all lift.                                                                                                                                                                                                                               | 3000.00 | 196.00  | Cum   | 588000.00  |
| 1.5      | Supplying and filling in plinth with sand under floors, including watering, ramming, consolidating and dressing complete.                                                                                                                                                                                                                                                                                                                                            | 25.00   | 2123.75 | Cum   | 53094.00   |
| 1.6      | Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50m outside the periphery of the area cleared.                                                                                                                                                                                                          | 2100.00 | 17.60   | Sqm   | 36960.00   |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Qty    | Rate    | Unit  | Amount    |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-------|-----------|
| 1.7      | Diluting and injecting chemical emulsion for POST-CONSTRUCTIONAL anti-termite treatment (excluding the cost of chemical emulsion) :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |         |       |           |
| 1.7.1    | Treatment of soil under existing floors using chemical emulsion @ one litre per hole, 300 mm apart including drilling 12 mm diameter holes and plugging with cement mortar 1 :2 (1 cement : 2 Coarse sand) to match the existing floor :                                                                                                                                                                                                                                                                                                                                                                                                                        |        |         |       |           |
| 1.7.1.1  | With Chlorpyriphos/Lindane E.C. 20% with 1% concentration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 309.00 | 310.05  | Sqm   | 95805.00  |
| 1.7.2    | Treatment at points of contact of wood work by chemical emulsion Chlorpyriphos/ Lindane (in oil or kerosene based solution) @ 0.5 litres per hole by drilling 6 mm dia holes at downward angle of 45 degree at 150 mm centre to centre and sealing the same.                                                                                                                                                                                                                                                                                                                                                                                                    | 100.00 | 279.70  | Metre | 27970.00  |
| <b>2</b> | <b>Concrete Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |        |         |       |           |
| 2.1      | Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |         |       |           |
| 2.1.1    | 1:2:4 (1 cement : 2 coarse sand(zone-III) derived from natural sources : 4 graded stone aggregate 20 mm nominal size derived from natural sources)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 98.00  | 7878.50 | Cum   | 772093.00 |
| 2.1.2    | 1:3:6 (1 Cement : 3 coarse sand(zone-III) derived from natural sources : 6 graded stone aggregate 20 mm nominal size derived from natural sources).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 24.00  | 7294.70 | Cum   | 175073.00 |
| 2.2      | Making plinth protection 50mm thick of cement concrete 1:3:6 (1 cement : 3 coarse sand (zone-III) derived from natural sources : 6 graded stone aggregate 20 mm nominal size derived from natural sources) over 75mm thick bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including necessary excavation leveling & dressing & finishing the top smooth.                                                                                                                                                                                                                                                 | 261.00 | 749.30  | Sqm   | 195567.00 |
| 2.3      | Providing and laying in position ready mixed or site batched design mix cement concrete for plain cement concrete work; using coarse aggregate and fine aggregate derived from natural sources, Portland Pozzolana/Ordinary Portland/Portland Slag cement, admixtures in recommended proportions as per IS : 9103 to accelerate/ retard setting of concrete, to improve durability and workability without impairing strength; including pumping of concrete to site of laying, curing, carriage for all leads; but excluding the cost of centering, shuttering and finishing as per direction of the Engineer-in-charge; for the following grades of concrete. |        |         |       |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty     | Rate     | Unit  | Amount     |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|-------|------------|
|          | Note : Extra cement upto 10% of the minimum specified cement content in design mix shall be payable separately. In case the cement content in design mix is more than 110% of the minimum specified cement content, the contractor shall have discretion to either re-design the mix or bear the cost of extra cement.                                                                                                                                                               |         |          |       |            |
| 2.3.1    | All works up to plinth level:                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |          |       |            |
| 2.3.1.1  | Concrete of M-10 grade with minimum cement content of 220 kg/cum.                                                                                                                                                                                                                                                                                                                                                                                                                    | 590.00  | 8835.15  | Cum   | 5212739.00 |
| <b>3</b> | <b>Reinforced Cement Concrete</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |          |       |            |
| 3.1      | Reinforced cement concrete work in beams, suspended floors, roofs having slope up to 15° landings, balconies, shelves, chajjas, lintels, bands, plain window sills, staircases and spiral stair cases above plinth level up to floor five level, excluding the cost of centering, shuttering, finishing and reinforcement with 1:1.5:3 (1 cement : 1.5 coarse sand(zone-III)derived from natural sources : 3 graded stone aggregate 20 mm nominal sizederived from natural sources). | 175.00  | 11505.50 | Cum   | 2013463.00 |
| 3.2      | Centering and shuttering including strutting, propping etc. and removal of form for :                                                                                                                                                                                                                                                                                                                                                                                                |         |          |       |            |
| 3.2.1    | Foundations, footings, bases of columns, etc. for mass concrete                                                                                                                                                                                                                                                                                                                                                                                                                      | 1268.00 | 392.15   | Sqm   | 497246.00  |
| 3.2.2    | Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.                                                                                                                                                                                                                                                                                                                                                                                      | 2604.00 | 842.50   | Sqm   | 2193870.00 |
| 3.2.3    | Suspended floors, roofs, landings, balconies and access platform                                                                                                                                                                                                                                                                                                                                                                                                                     | 8026.00 | 927.25   | Sqm   | 7442109.00 |
| 3.2.4    | Lintels, beams, plinth beams, girders, bressumers and cantilevers                                                                                                                                                                                                                                                                                                                                                                                                                    | 4068.00 | 736.40   | Sqm   | 2995675.00 |
| 3.2.5    | Columns, Pillars, Piers, Abutments, Posts and Struts                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4022.00 | 961.30   | Sqm   | 3866349.00 |
| 3.2.6    | Stairs, (excluding landings) except spiral-staircases                                                                                                                                                                                                                                                                                                                                                                                                                                | 199.00  | 764.95   | Sqm   | 152225.00  |
| 3.2.7    | Small lintels not exceeding 1.5 m clear span, moulding as in cornices, window sills, string courses, bands, copings, bed plates, anchor blocks and the like                                                                                                                                                                                                                                                                                                                          | 1800.00 | 392.15   | Sqm   | 705870.00  |
| 3.2.8    | Edges of slabs and breaks in floors and walls                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |          |       |            |
| 3.2.8.1  | Under 20 cm wide                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 55.00   | 208.55   | Metre | 11470.00   |
| 3.2.9    | Weather shade, Chajjas, corbels etc., including edges                                                                                                                                                                                                                                                                                                                                                                                                                                | 289.00  | 951.10   | Sqm   | 274868.00  |
| 3.3      | Extra for additional height in centering, shuttering where ever required with adequate bracing, propping etc., including cost of de-shuttering and decentering at all levels, over a height of 3.5 m, for every additional height of 1 metre or part thereof (Plan area to be measured).                                                                                                                                                                                             |         |          |       |            |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Qty       | Rate     | Unit  | Amount      |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|-------|-------------|
| 3.3.1    | Suspended floors, roofs, landing, beams and balconies (Plan area to be measured)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5821.00   | 384.30   | Sqm   | 2237010.00  |
| 3.4      | Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |          |       |             |
| 3.4.1    | Thermo-Mechanically Treated bars of grade Fe-500D or more.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 390270.00 | 107.85   | Kg    | 42090620.00 |
| 3.5      | Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |          |       |             |
| 3.5.1    | Thermo-Mechanically Treated bars of grade Fe-500D or more.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 418860.00 | 107.85   | Kg    | 45174051.00 |
| 3.6      | Add for plaster drip course/ groove in plastered surface or moulding to R.C.C. projections                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 188.00    | 78.40    | Metre | 14739.00    |
| 3.7      | Providing and laying in position ready mixed or site batched design mix cement concrete for reinforced cement concrete work; using coarse aggregate and fine aggregate derived from natural sources, Portland Pozzolana / Ordinary Portland /Portland Slag cement, admixtures in recommended proportions as per IS: 9103 to accelerate / retard setting of concrete, to improve durability and workability without impairing strength; including pumping of concrete to site of laying, curing, carriage for all leads; but excluding the cost of centering, shuttering, finishing and reinforcement as per direction of the engineer-in-charge; for the following grades of concrete. |           |          |       |             |
|          | Note: Extra cement up to 10% of the minimum specified cement content in design mix shall be payable separately. In case the cement content in design mix is more than 110% of the specified minimum cement content, the contractor shall have discretion to either re-design the mix or bear the cost of extra cement                                                                                                                                                                                                                                                                                                                                                                  |           |          |       |             |
| 3.7.1    | All works upto plinth level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |          |       |             |
| 3.7.1.1  | Concrete of M30 grade with minimum cement content of 350 kg /cum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2983.00   | 9655.70  | Cum   | 28802953.00 |
| 3.7.2    | All works above plinth level upto floor V level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |          |       |             |
| 3.7.2.1  | Concrete of M30 grade with minimum cement content of 350 kg /cum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2152.00   | 10011.35 | Cum   | 21544425.00 |
| 3.8      | Add for using extra cement in the items of design mix over and above the specified cement content therein.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1797.00   | 733.50   | Qtl   | 1318100.00  |
| <b>4</b> | <b>Masonry Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |          |       |             |
| 4.1      | Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |          |       |             |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty     | Rate    | Unit  | Amount      |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-------|-------------|
| 4.1.1    | Cement mortar 1:4 (1 cement : 4 coarse sand)                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 82.00   | 7370.65 | Cum   | 604393.00   |
| 4.2      | Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in :                                                                                                                                                                                                                                                                                                                                              |         |         |       |             |
| 4.2.1    | Cement mortar 1:6 (1 cement : 6 coarse sand)                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 214.00  | 9105.95 | Cum   | 1948673.00  |
| 4.3      | Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundations and plinth in :                                                                                                                                                                                                                                                                                                                                                                                             |         |         |       |             |
| 4.3.1    | Cement mortar 1:3 (1 cement : 3 coarse sand)                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 76.00   | 931.75  | Sqm   | 70813.00    |
| 4.4      | Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level.                                                                                                                                                                                                                                                                                                                                                                  |         |         |       |             |
| 4.4.1    | Cement mortar 1:4 (1 cement : 4 coarse sand)                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 285.00  | 1123.80 | Sqm   | 320283.00   |
| 4.5      | Extra for providing and placing in position 2 Nos 8mm dia. M.S. bars at every forth course of half brick masonry.ird course of half brick masonry.                                                                                                                                                                                                                                                                                                                                                                        | 285.00  | 160.90  | Sqm   | 45857.00    |
| 4.6      | Providing and laying autoclaved aerated cement blocks masonry with 150mm/230mm/300 mm thick AAC blocks in super structure above plinth level up to floor V level with RCC band at sill level and lintel level with approved block laying polymer modified adhesive mortar all complete as per direction of Engineer-in-Charge. (The payment of RCC band and reinforcement shall be made for seperately).                                                                                                                  | 1325.48 | 8333.65 | Cum   | 11046086.00 |
| <b>5</b> | <b>Cladding Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |         |       |             |
| 5.1      | Providing and fixing 18 mm thick gang saw cut, mirror polished, premoulded and prepolished, machine cut for kitchen platforms, vanity counters, window sills, facias and similar locations of required size,approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. complete at all levels. |         |         |       |             |
| 5.1.1    | Granite stone slab all colour and texture except black, Cherry/ Ruby red                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |         |       |             |
| 5.1.1.1  | Area of slab upto 0.50 sqm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 90.00   | 4170.70 | Sqm   | 375363.00   |
| 5.1.1.2  | Area of slab over 0.50 sqm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 16.00   | 3848.70 | Sqm   | 61579.00    |
| 5.2      | Providing edge moulding to 18 mm thick marble stone counters, Vanities etc., including machine polishing to edge to give high gloss finish etc. complete as per design approved by Engineer-in-Charge.                                                                                                                                                                                                                                                                                                                    |         |         |       |             |
| 5.2.1    | Granite work                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2456.00 | 510.95  | Metre | 1254893.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty    | Rate    | Unit  | Amount     |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-------|------------|
| 5.3      | Extra for fixing marble /granite stone, over and above corresponding basic item, in facia and drops of width upto 150 mm with epoxy resin based adhesive, including cleaning etc. complete.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 356.00 | 568.55  | Metre | 202404.00  |
| 5.4      | Extra for providing opening of required size & shape for wash basin/kitchen sink in kitchen platform, vanity counter and similar location in marble/ Granite/ stone work, including necessary holes for pillar taps etc. including moulding, rubbing and polishing of cut edges etc. complete                                                                                                                                                                                                                                                                                                                                                                           | 36.00  | 978.70  | Each  | 35233.00   |
| 5.5      | Providing and fixing Ist quality ceramic glazed wall tiles conforming to IS: 15622 (thickness to be specified by the manufacturer), of approved make, in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge, in skirting, risers of steps and dados, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm, including pointing in white cement mixed with pigment of matching shade complete.                                                                                                                                                   | 861.00 | 1267.95 | Sqm   | 1091705.00 |
| 5.6      | Fabricating, testing, installing and fixing in position Curtain Wall with Aluminium Composite Panel Cladding, with open grooves for linear as well as curvilinear portions of the building , for all heights and all levels etc. including:                                                                                                                                                                                                                                                                                                                                                                                                                             | 47.00  | 4857.35 | Sqm   | 228295.00  |
|          | (a) Providing, fabricating and supplying and fixing panels of aluminium composite panel cladding in pan shape in metallic colour of approved shades made out of 4mm thick aluminium composite panel material consisting of 3mm thick FR grade mineral core sandwiched between two Aluminium sheets (each 0.5mm thick). The aluminium composite panel cladding sheet shall be coil coated, with Kynar 500 based PVDF / Lumiflon based fluoropolymer resin coating of approved colour and shade on face # 1 and polymer (Service) coating on face # 2 as specified using stainless steel screws, nuts, bolts, washers, cleats, weather silicone sealant, backer rods etc. |        |         |       |            |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty    | Rate      | Unit         | Amount    |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|--------------|-----------|
|          | (b) The fastening brackets of Aluminium alloy 6005 T5 / MS with Hot Dip Galvanised with serrations and serrated washers to arrest the wind load movement, fasteners, SS 316 Pins and anchor bolts of approved make in SS 316, Nylon separators to prevent bi-metallic contacts all complete required to perform as per specification and drawing. The item includes cost of all material & labour component, the cost of all mock ups at site, cost of all samples of the individual components for testing in an approved laboratory, field tests on the assembled working curtain wall with aluminium composite panel cladding, cleaning and protection of the curtain wall with aluminium composite panel cladding till the handing over of the building for occupation. Base frame work for ACP cladding is payable under the relevant aluminium items. |        |           |              |           |
|          | The Contractor shall provide curtain wall with aluminium composite panel cladding, having all the performance characteristics all complete , as per the Architectural drawings, as per item description, as specified, as per the approvedshop drawings and as directed by the Engineer-in-Charge. However, for the purpose of payment, only the actual area on the external face of the curtain wall with Aluminum Composite Panel Cladding (including width of groove) shall be measured in sqm. up to two decimal places.                                                                                                                                                                                                                                                                                                                                |        |           |              |           |
| <b>6</b> | <b>Wood and P.V.C. Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |           |              |           |
| 6.1      | Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length (hold fast lugs or dash fastener shall be paid for separately).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |           |              |           |
| 6.1.1    | Second class teak wood                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.70   | 142949.70 | Cum          | 528914.00 |
| 6.2      | Providing and fixing ISI marked flush door shutters conforming to IS : 2202 (Part I) decorative type, core of block board construction with frame of 1st class hard wood and well matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |           |              |           |
| 6.2.1    | 35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 113.00 | 3473.85   | Sqm          | 392545.00 |
| 6.3      | Extra for providing lipping with 2nd class teak wood battens 25 mm minimum depth on all edges of flush door shutters (over all area of door shutter to be measured).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 149.00 | 462.35    | Sqm          | 68890.00  |
| AE(C)    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | AE(E)  |           | EE(C)Page281 |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty    | Rate    | Unit | Amount    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|-----------|
| 6.4      | Providing and fixing M.S. grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |        |         |      |           |
| 6.4.1    | Fixed to openings /wooden frames with rawl plugs screws etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 423.00 | 238.35  | Kg   | 100822.00 |
| 6.5      | Providing and fixing aluminium die cast body tubular type universal hydraulic door closer (having brand logo with ISI, IS : 3564, embossed on the body, door weight upto 35 kg and door width upto 700 mm), with necessary accessories and screws etc. complete.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 62.00  | 1124.85 | Each | 69741.00  |
| 6.6      | Providing and fixing factory made uPVC glazed/wire mesh windows/doors comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler (where ever required) extruded profiles having minimum wall thickness of 1.70 mm for Series R1 and R2 profiles and 2.10 mm for Series R3 and R4 profiles conforming to EN: 12608 in any shape, colour and design duly reinforced with galvanized mild steel section made of required shape & size as per CPWD Specification, uPVC extruded glazing beads, interlocks and Inline sash adaptor (where ever required) of appropriate dimension, EPDM gasket, hardware, SS 304 grade fasteners of minimum 8 mm dia with countersunk head, comprising of matching polyamide PA6 grade sleeve for fixing frame to finished wall as per IS 1367 : Part 1 to 14, plastic packers, plastic caps and necessary stainless steel screws etc. Profile of frame, sash & mullion (if required) shall be mitred cut and fusion welded/mechanically jointed duly sealed at all corners, including drilling of holes for fixing hardware and drainage of water etc. |        |         |      |           |
|          | After fixing frame the gap between frame and adjacent finished wall shall be filled with weather proof silicon sealant over backer rod pf approved size and quality, all complete as per approved drawing conforming to CPWD specification & direction of Engineer-in-Charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |         |      |           |
|          | Section of steel reinforcement and cross sections of uPVC profiles to be as per design approved by Engineer-in-Charge. Wire mesh / Glazing of plain/ toughened/ laminated/ double glass unit with / without high performance coatings as per design requirements and conforming to IS: 3548 & IS:16231 shall be paid separately.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |         |      |           |
|          | Note:- Structural design proof checked from a Government Engineering Institute, to be provided by the manufacturer for:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |         |      |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Qty    | Rate    | Unit  | Amount     |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-------|------------|
|          | (i) Sites with basic wind speed > 45 m/sec as per IS 875 - Part 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |         |       |            |
|          | (ii) Sites with structure height more than 20m for all wind speeds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |         |       |            |
| 6.6.1    | Two track two panels sliding window with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |         |       |            |
| 6.6.1.1  | Using R3 series with frame (55 mm & above) x (40 mm & above) & sash (30 mm & above) x (55 mm & above) with zinc alloy (zamak) powder coated handle on every panel along with multi-point locking system (Height upto 1.8m).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 200.00 | 8799.25 | Sqm   | 1759850.00 |
| 6.7      | Fixed window / ventilator with mullion / transom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |         |       |            |
| 6.7.1    | Using R3 series with frame (55 mm & above ) x (45 mm & above) & mullion (55 mm & above) x (65 mm & above). (Height upto 2.5 metre)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 200.00 | 7827.75 | Sqm   | 1565550.00 |
| 6.8      | Providing and fixing fire resistant door frame of section 50 x 60 mm on horizontal side & 35 x 60 mm on vertical sides having built in rebate made out of 1.6 mm thick GI sheet (Zinc coating not less than 120 gm/sqm) suitable for mounting 120 minutes Fire Rated Glazed Door Shutters. The frame shall be filled with mineral wood Insulation having density minimum 96Kg/sqm. The frame will have a provision of G.I. anchor fastners 14 nos (5 each on vertical style & 4 on horizontal style of size M10 x 80) suitable for fixing in the opening along with factory made template for SS ball bearing hinges of size 100x89x3 mm for fixing of fire rated glazed shutter. The fram shall be finished with an approved fire resistant primer or powder coating of not less than 30 micron in desired shade as per the directions of Engineer -in-Charge. (Cost of SS ball bearing hinges is excluded). | 57.00  | 2202.90 | Metre | 125565.00  |
| 6.9      | Providing and fixing 60 mm thick glazed fire resistant door shutters of 120 min Fire rating confirming to IS:3614 (Part II) or EN1634-1:1999, tested and certified as per laboratory approved by Engineer-in-charge, with suitable mounting on door frame, consisting of vertical styles, top rail & side rail 60 mm x 60 mm wide and bottom rail of 110 mm x 60 mm made out of 1.6mm thick G.I. sheet (zinc coating not less than 120gm/sqm) duly filled mineral wool insulation having density min 96 kg/ cum and fixing with necessary stainless steel ball bearing hinges of size 100x89x3mm of approved make, including applying a coat of approved fire resistant primer or powder coating not less than 30 micron etc all complete as per direction of Engineer-in-charge (panelling to be paid for seperately).                                                                                       | 32.00  | 12017.9 | sqm   | 384573.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty      | Rate    | Unit | Amount     |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|------|------------|
| 6.10     | Providing and fixing ready made 304 grade stainless steel Modular kitchen basket and accessories such as right angle basket (Plain Cup & Saucer, plant, Partition, Bottle rack, Thali, Cutlery) kitchen utensil basket, Dinner set basket, kitchen grain basket, Multipurpose basket as per site requirement including finishing (wherever required) and fittings. The same shall be fixed with necessary stainless steel nuts & bolst, Stainless Steel screws & telescopic channel etc. as per direction of Engineer-in-charge. (For payment purpose only weight of Stainless steel basket shall be considered excluding weight of all fixing accessories such as nuts, bolts, fasteners telescopic basket channels etc. Payment of providing and fixing telescopic channel shall be paid separately). | 50.00    | 533.25  | Kg   | 26663.00   |
| <b>7</b> | <b>Steel Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |          |         |      |            |
| 7.1      | Structural steel work in single section, fixed with or without connecting plate,including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1000.00  | 117.35  | Kg   | 117350.00  |
| 7.2      | Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 11500.00 | 133.70  | Kg   | 1537550.00 |
| 7.3      | Providing and fixing 1mm thick M.S. sheet door with frame of 40x40x6 mm angle iron and 3 mm M.S. gusset plates at the junctions and corners, all necessary fittings complete, including applying a priming coat of approved steel primer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |          |         |      |            |
| 7.3.1    | Using M.S. angels 40x40x6 mm for diagonal braces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 31.00    | 5804.35 | Sqm  | 179935.00  |
| 7.4      | Supplying and fixing rolling shutters of approved make, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 - part 1 and M.S. top cover of required thickness for rolling shutters.                                                                                                                                                                                                        |          |         |      |            |
| 7.4.1    | 80x1.25 mm M.S. laths with 1.25 mm thick top cover.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 85.00    | 3653.20 | Sqm  | 310522.00  |
| 7.5      | Providing and fixing ball bearing for rolling shutters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 18.00    | 492.35  | Each | 8862.00    |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty     | Rate    | Unit | Amount     |
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| 7.6      | Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete.                                                                                                                                                                                                                                                                                                                                                                                                         |         |         |      |            |
| 7.6.1    | Hot finished welded type tubes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 9940.00 | 194.40  | Kg   | 1932336.00 |
| 7.7      | Steel work welded in built up sections/ framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |         |      |            |
| 7.7.1    | In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2000.00 | 172.60  | Kg   | 345200.00  |
| 7.8      | Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners , stainless steel bolts etc., of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-incharge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.). | 4136.00 | 772.40  | Kg   | 3194646.00 |
| <b>8</b> | <b>Flooring</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |         |      |            |
| 8.1      | 52 mm thick cement concrete flooring with concrete hardener topping, under layer 40 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12 mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6 mm nominal size) by volume, hardening compound mixed @ 2 litre per 50 kg of cement or as per manufacturer's specifications. This includes cost of cement slurry, but excluding the cost of nosing of steps etc. complete.                                                                                                                                           | 2500.00 | 978.45  | Sqm  | 2446125.00 |
| 8.2      | Chequerred precast cement concrete tiles 22 mm thick in footpath & courtyard, jointed with neat cement slurry mixed with pigment to match the shade of tiles, including rubbing and cleaning etc. complete, on 20mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand).                                                                                                                                                                                                                                                                                                                                                                                                       |         |         |      |            |
| 8.2.1    | Light shade pigment using white cement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 100.00  | 1402.00 | Sqm  | 140200.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty    | Rate    | Unit | Amount     |
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| 8.3      | Granite work in skirting, risers of steps and dado up to 2 m height over 12 mm thick bed of cement mortar 1:3 (1 cement :3 coarse sand) and jointed with grey cement slurry @ 3.3 kg/sqm including pointing in white cement mixed with pigment of matching shade complete.                                                                                                                                                                                                                                                                                                                                                                                                          |        |         |      |            |
| 8.3.1    | 18 mm thick Granite stone slab of all colour and texture except Black, Cherry/Ruby Red                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 463.00 | 2799.65 | sqm  | 1296238.00 |
| 8.4      | Kota stone slab flooring over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including rubbing and polishing complete with base of cement mortar 1 : 4 (1 cement : 4 coarse sand) :                                                                                                                                                                                                                                                                                                                                                                                                                     |        |         |      |            |
| 8.4.1    | 25 mm thick.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 301.00 | 1948.25 | Sqm  | 586423.00  |
| 8.5      | Kota stone slabs 20 mm thick in risers of steps, skirting, dado and pillars laid on 12 mm (average) thick cement mortar 1:3 (1 cement 3 coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and polishing complete.                                                                                                                                                                                                                                                                                                                                                                                              | 50.00  | 2354.70 | Sqm  | 117735.00  |
| 8.6      | Providing and laying Vitrified tiles in floor in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.3 kg/sqm including grouting the joints with white cement and matching pigments etc. The tiles must be cut with the zero chipping diamond cutter only . Laying of tiles will be done with the notch trowel, plier, wedge, clips of required thickness, leveling system and rubber mallet for placing the tiles gently and easily. |        |         |      |            |
| 8.6.1    | Glazed vitrified floor tiles polished finish of size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |         |      |            |
| 8.6.1.1  | Size of Tile 600x600 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 622.00 | 1502.75 | Sqm  | 934711.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty    | Rate    | Unit | Amount    |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|-----------|
| 8.7      | Providing and laying Vitrified tiles in floor in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.3 kg/sqm including grouting the joints with white cement and matching pigments etc. The tiles must be cut with the zero chipping diamond cutter only . Laying of tiles will be done with the notch trowel, plier, wedge, clips of required thickness, leveling system and rubber mallet for placing the tiles gently and easily. |        |         |      |           |
| 8.7.1    | Glazed Vitrified tiles Matt/Antiskid finish of size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |         |      |           |
| 8.7.1.1  | Size of Tile 600x600 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 321.00 | 1464.85 | Sqm  | 470217.00 |
| 8.8      | Providing and laying Vitrified tiles in different sizes (thickness to be specified by manufacturer) with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make in all colours & shade in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1cement: 3 coarse sand), jointing with grey cement slurry @ 3.3kg/sqm including grouting the joint with white cement & matching pigments etc. complete.                                                                                                                                                                                                                                    |        |         |      |           |
| 8.8.1    | Glazed vitrified floor tiles polished finish of size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |         |      |           |
| 8.8.1.1  | Size of Tile 600x600 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 62.00  | 1567.65 | Sqm  | 97194.00  |
| 8.9      | Providing and laying full body homogenous vitrified tile in different sizes (thickness to be specified by manufacturer) with water absorption less than 0.06 % and conforming to I.S. 15622, of approved make in all colours & shade in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1cement: 3 coarse sand), jointing with grey cement slurry @ 3.3kg/sqm including grouting the joint with white cement & matching pigments etc. complete.                                                                                                                                                                                                                |        |         |      |           |
| 8.9.1    | Size of tile 800x800 mm of all colours and shades                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 196.00 | 2547.55 | Sqm  | 499320.00 |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty     | Rate    | Unit  | Amount     |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-------|------------|
| 8.10     | Providing and laying full body homogenous vitrified tile in floor of minimum thickness 10 mm with water absorption less than 0.06% and conforming to IS: 15622, of approved make, brand and manufacturer, laid on 20 mm thick base cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.30 kg / sqm including grouting the joints with white cement and matching pigments etc. The slab must be cut with the zero chipping diamond cutter only. Laying of slab will be done with the help of notch trowel, wedge, clips of required thickness, vacuum cups for lifting, leveling system and rubber mallet for placing the slab gently and easily. |         |         |       |            |
| 8.10.1   | Size of tile 800x800 mm of all colours and shades                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1964.00 | 2279.55 | Sqm   | 4477036.00 |
| 8.11     | Providing and laying Polished Granite stone flooring in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing , curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.                                                                                                                               |         |         |       |            |
| 8.11.1   | Polished Granite stone slab of all colour and texture except Black, Cherry/Ruby Red                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1856.00 | 3071.05 | Sqm   | 5699869.00 |
| <b>9</b> | <b>Roofing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |       |            |
| 9.1      | Making khurras 45x45 cm with average minimum thickness of 5 cm cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) over P.V.C. sheet 1 m x 1 m x 400 micron, finished with 12 mm cement plaster 1:3 (1 cement : 3 coarse sand) and a coat of neat cement, rounding the edges and making and finishing the outlet complete.                                                                                                                                                                                                                                                                                                     | 8.00    | 298.25  | Each  | 2386.00    |
| 9.2      | Providing and fixing on wall face unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion, (i) Single socketed pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |         |       |            |
|          | (i)Single socketed pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |       |            |
| 9.2.1    | 110 mm diameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 182.00  | 377.40  | Metre | 68687.00   |
| 9.3      | Providing and fixing on wall face unplasticised - PVC moulded fittings/accessories for unplasticised Rigid PVC rain water pipes conforming to IS 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion.                                                                                                                                                                                                                                                                                                                                                                                                           |         |         |       |            |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Qty    | Rate   | Unit | Amount    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|------|-----------|
| 9.3.1    | Coupler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |        |      |           |
| 9.3.1.1  | 110mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 40.00  | 136.15 | Each | 5446.00   |
| 9.3.2    | Single tee with door                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |        |      |           |
| 9.3.2.1  | 110x110x110 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 32.00  | 234.15 | Each | 7493.00   |
| 9.3.3    | Bend 87.5°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |        |      |           |
| 9.3.3.1  | 110 mm bend                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 20.00  | 150.35 | Each | 3007.00   |
| 9.3.4    | Shoe (Plain)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |        |      |           |
| 9.3.4.1  | 110 mm Shoe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 20.00  | 131.85 | Each | 2637.00   |
| 9.4      | Providing and fixing unplasticised -PVC pipe clips of approved design to unplasticised - PVC rain water pipes by means of 50x50x50 mm hard wood plugs, screwed with M.S. screws of required length, including cutting brick work and fixing in cement mortar 1:4 (1 cement : 4 coarse sand) and making good the wall etc. complete.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |        |      |           |
| 9.4.1    | 110 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 483.00 | 371.30 | Each | 179338.00 |
| 9.5      | Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37 mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50 mm long with 6 mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, |        |        |      |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Qty    | Rate    | Unit | Amount    |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|-----------|
|          | shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with : |        |         |      |           |
| 9.5.1    | 12.5 mm thick tapered edge gypsum plain board conforming to IS: 2095- (Part I) : 2011 (Board with BIS certification marks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 560.00 | 1355.80 | sqm  | 759248.00 |
| 9.6      | Providing and fixing GI Clip in Metal Ceiling System of 600x600 mm module which includes providing and fixing 'C' wall angle of size 20x30x20mm made of 0.5mm thick pre painted steel along the perimeter of the room with help of nylon sleeves and wooden screws at 300 mm center to centre, suspending the main C carrier of size 10x38x10mm made of G.I steel 0.7 mm thick from the soffit with help of soffit cleat 37x27x25x1.6 mm, rawl plugs of size 38x12 mm and C carrier suspension clip and main carrier bracket at 1000 mm c/c. Inverted triangle shaped Spring Tee having height of 24 mm and width of 34 mm made of GI steel 0.45 mm thick is then fixed to the main C carrier and in direction perpendicular to it at 600 mm centers with help of suspension brackets. Wherever the main C carrier and spring T have to join, C carrier and spring T connectors have to be used. All sections to be galvanized @ 120 gms/sqm (both side inclusive), fixing with clip intiles into spring 'T' with :                                                                                                                                                                   |        |         |      |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Qty    | Rate    | Unit    | Amount    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|---------|-----------|
| 9.6.1    | GI Metal Ceiling Clip in plain Beveled edge global white color tiles of size 600x600 and 0.5mm thick with 25 mm height, made of G I sheet having galvanizing of 100 gms/sqm (both sides inclusive) and 20% perforation area with 1.8mm dia holes and having NRC of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 300.00 | 2354.65 | Sqm     | 706395.00 |
| 9.7      | Designing, providing and fixing multiwall three or more layered polycarbonate sheet panel co-extruded Ultra Violet (UV) protective coating on external surface with standing seam on both the running ends, sheet shall be connected using polycarbonate connectors having grip lock double tooth locking mechanism and provided with endcap at the ends to ensure water and air tightness. The light transmission from transparent or translucent or opaque or in combination polycarbonate sheet, varies from 15 to 85%, shall be decided by engineer in charge as per requirement. The polycarbonate sheet shall have Dart drop impact value more than 60 Joules as per IS14434 2023 and confirm either flame retardancy of class UI-9411B/94V-0 category as per IS14434:2023 or category V0 & HB as per ASTM D635-18 or BSID0 classification as per EN13501 for fire safety The yellowness index tested as per ASTM E313 (D1925) or ASTM E313 (D1925) shall be equal to or more than 10 unit or 6 units respectively on a sample after 5000 Hours of exposure of UV/sun light. The cross section ends of poly carbonate sheet shall be provided with self-adhesive aluminium impermeable tape at top and aluminium ventilated tape at bottom of the sheet and covered with polycarbonate / aluminium u-shaped protective profile. The poly carbonate sheet shall be held in position by using stainless steel (SS304 grade) trapezoidal cleat of 1 mm thick having minimum bottom width 35mm and top width 50mm or any other shape and size as per design requirement and manufacturer specification, cleat fixed with 2 or more stainless steel screws of 5 mm diameter with 25mm long with structural steel framework. The cleat shall be tested to withstand pull out force equal to wind speed of 50m/s as per IS 875 and design test report shall be submitted to Engineer-in-charge for approval before use. The cost of ridge and gutters of pre-coated galvanized iron sheet of approved specifications and structural steel framework of shall be paid in respective item for separately. |        |         |         |           |
| 9.7.1    | 12 mm thick. 1000 (±10%) wide panel with U value not more than 2.50 W/m <sup>2</sup> K and weight not less than 2.25 kg/sqm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 280.00 | sqm     | 3108.15 | 870282.00 |

| Item No.  | Description of Item                                                                                                                                                                                                                                                        | Qty      | Rate   | Unit    | Amount     |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|---------|------------|
| 9.7.2     | 18 mm thick. 1000 (±10%) wide panel with U value not more than 2.00 W/m <sup>2</sup> K and weight not less than 3.10 kg/sqm                                                                                                                                                | 220.00   | sqm    | 4106.50 | 903430.00  |
| <b>10</b> | <b>Finishing</b>                                                                                                                                                                                                                                                           |          |        |         |            |
| 10.1      | 12 mm cement plaster of mix :                                                                                                                                                                                                                                              |          |        |         |            |
| 10.1.1    | 1:6 (1 cement: 6 coarse sand)                                                                                                                                                                                                                                              | 19088.00 | 343.65 | Sqm     | 6559591.00 |
| 10.2      | 15 mm cement plaster on rough side of single or half brick wall of mix :                                                                                                                                                                                                   |          |        |         |            |
| 10.2.1    | 1:4 (1 cement: 4 coarse sand)                                                                                                                                                                                                                                              | 285.00   | 411.75 | Sqm     | 117349.00  |
| 10.3      | 12 mm cement plaster finished with a floating coat of neat cement of mix :                                                                                                                                                                                                 |          |        |         |            |
| 10.3.1    | 1:3 (1 cement: 3 fine sand)                                                                                                                                                                                                                                                | 672.00   | 439.25 | Sqm     | 295176.00  |
| 10.4      | 6 mm cement plaster of mix :                                                                                                                                                                                                                                               |          |        |         |            |
| 10.4.1    | 1:3 (1 cement: 3 fine sand)                                                                                                                                                                                                                                                | 5131.00  | 300.45 | Sqm     | 1541609.00 |
| 10.5      | Finishing walls with textured exterior paint of required shade :                                                                                                                                                                                                           |          |        |         |            |
| 10.5.1    | New work (Two or more coats applied @ 3.28 ltr/10 sqm) over and including priming coat of exterior primer applied @2.20kg/10 sqm.                                                                                                                                          | 158.00   | 223.60 | Sqm     | 35329.00   |
| 10.6      | Painting with synthetic enamel paint of approved brand and manufacture to give an even shade :                                                                                                                                                                             |          |        |         |            |
| 10.6.1    | Two or more coats on new work.                                                                                                                                                                                                                                             | 390.00   | 155.90 | Sqm     | 60801.00   |
| 10.7      | Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete.                                                                            | 19020.00 | 156.05 | Sqm     | 2968071.00 |
| 10.8      | Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile Organic Compound ) content less than 50 grams/ litre. of approved brand and manufacture, including applying additional coats wherever required to achieve even shade and colour. |          |        |         |            |
| 10.8.1    | Two coats.                                                                                                                                                                                                                                                                 | 19020.00 | 142.80 | Sqm     | 2716056.00 |
| 10.9      | Applying priming coats with primer of approved brand and manufacture, having low VOC (Volatile Organic Compound ) content.                                                                                                                                                 |          |        |         |            |
| 10.9.1    | With water thinnable cement primer on wall surface having VOC content less than 50 grams/litre.                                                                                                                                                                            | 19020.00 | 73.95  | Sqm     | 1406529.00 |
| 10.10     | Painting (one or more coats) on rain water, soil, waste and vent pipes and fittings with synthetic enamel paint of approved brand and manufacture and required colour on old work :                                                                                        |          |        |         |            |
| 10.10.1   | 100 mm diameter pipes .                                                                                                                                                                                                                                                    | 182.00   | 36.25  | Metre   | 6598.00    |
| 10.11     | Finishing walls with Acrylic Smooth exterior paint of required shade:                                                                                                                                                                                                      |          |        |         |            |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Qty     | Rate    | Unit | Amount    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|------|-----------|
| 10.11.1   | Old work (Two or more coat applied @ 1.67 ltr/ 10 sqm) on existing cement paint surface).                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2400.00 | 120.75  | sqm  | 289800.00 |
| 10.12     | Polishing in high gloss/matt finish melamine clear polish on wood work in required color/wooden shade texture with following process in the sequence as detailed below:                                                                                                                                                                                                                                                                                                                                                                                        | 112.00  | 3049.85 | Sqm  | 341583.00 |
|           | 1. The surface to be polished is rubbed with sand paper 80/120 no. and then with sand paper of 160/180 nos.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |      |           |
|           | 2. Applying two coats of sealer with spray gun and allowing sufficient drying time for 1st coat and 2nd coat is allowed to dry for 8 to 12 hrs.                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |      |           |
|           | 3. On drying of sealer coat, wet rubbing with emery cloth of finer grading with water to remove excess sealer layer and make the surface further smooth after this wet rubbing, then surface is applied with special grade melamine fillers to fill all the small and big holes/grooves etc. Filler coat to be allowed to dry for 4 to 6 hrs on which again a light wet rubbing is done this surface is further allowed to dry for 12 hrs.                                                                                                                     |         |         |      |           |
|           | 4. On this, 1st coat of melamine polish is applied with spray gun using melamine clear polish and melamine thinner in required proportion. This 1st coat is allowed to dry for 24 hrs then this dry surface is again fine wet rubbed smooth, which is further allowed to dry for 12 hrs. The final melamine polish is applied with compressor pressure spray gun using melamine clear polish and melamine thinner mixed in required proportion complete as per direction of Engineer-in-Charge. (Finalo coat to be done in 1 or 2 layers without gap of time.) |         |         |      |           |
| <b>11</b> | <b>Road Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |      |           |
| 11.1      | Preparation and consolidation of sub grade with power road roller of 8 to 12 tonne capacity after excavating earth to an average of 22.5 cm depth, dressing to camber and consolidating with road roller including making good the undulations etc. and re-olling the sub grade and disposal of surplus earthwith lead upto 50 metres.                                                                                                                                                                                                                         | 2000.00 | 218.90  | Sqm  | 437800.00 |
| 11.2      | Providing and filling in position rubberized bitumen hot sealing compound for sealing of expansion joints in roads / pavements all complete as per direction of the Engineer-in-Charge.                                                                                                                                                                                                                                                                                                                                                                        |         |         |      |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty     | Rate    | Unit                                         | Amount    |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|----------------------------------------------|-----------|
| 11.2.1   | Using grade 'A' sealing compound conforming to IS: 1834.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3000.00 | 8.65    | Per cm depth<br>per cm width<br>per m length | 25950.00  |
| 11.3     | Manufacturing, supplying and fixing retro reflective sign boards made up of 2 mm thick aluminium sheet, face to be fully covered with high intensity encapsulated type heat activated retro reflective sheeting conforming to type - IV of ASTM-D 4956-01 in blue and silver white or other colour combination including subject matter, message (bi-lingual), symbols and borders etc. as per IRC ; 67:2001, pasted on substrate by an adhesive backing which shall be activated by applying heat and pressure conforming to class -2 of ASTM-D-4956-01 and fixing the same with suitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S. angle iron of size 25x25x3 mm along with theft resistant measures, mounted and fixed with 2 Nos. M.S. angles of size 35x35x5 mm to a vertical post made up to M.S. Tee section ISMT 50x50x6 mm welded with base plate of size 100x100x5 mm at the bottom end and including making holes in pipes, angles flats, providing & fixing M.S. message plate of required size, steel work to be painted with two or more coats of synthetic enamel paint of required shade and of approved brand & manufacture over priming coat of zinc chromate yellow primer (vertical MS-Tee support to be painted in black and white colours). Backside of aluminium sheet to be painted with two or more coats of epoxy paint over and including appropriate priming coat including all leads and lifts etc. complete as per drawing, specification and direction of Engineer-in-charge. |         |         |                                              |           |
| 11.3.1   | Mandatory/ Regulatory sign boards of 900 mm diameter with support length of 3750 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2.00    | 7183.35 | Each                                         | 14367.00  |
| 11.3.2   | Cautionary /warning sign boards of equilateral triangular shape having each side of 900 mm with support length of 3650 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 10.00   | 5559.75 | Each                                         | 55598.00  |
| 11.4     | Providing and laying 60mm thick factory made cement concrete interlocking paver block of M - 30 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand, filling the joints with fine sand etc. all complete as per the direction of Engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 608.00  | 972.00  | Sqm                                          | 590976.00 |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty    | Rate     | Unit | Amount    |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|------|-----------|
| 11.5      | Providing and laying at or near ground level factory made kerb stone of M-25 grade cement concrete in position to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement: 3 coarse sand), including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge (length of finished kerb edging shall be measured for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-charge). | 30.00  | 10117.60 | Cum  | 303528.00 |
| 11.6      | Construction of granular sub-base by providing close graded Material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge.                                                                                                                         |        |          |      |           |
| 11.6.1    | With material conforming to Grade-I (size range 75 mm to 0.075 mm) having CBR Value-30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 300.00 | 2784.00  | Cum  | 835200.00 |
| 11.7      | Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x14.8mm (9.8mm base thickness + 5 mm raising) having water absorption less than 0.5% and conforming to IS: 15622, of approved make in all colours and shades in outdoor floors such as footpath, court yard, multi modals location etc., laid on 20mm thick base of cement mortar 1:4 (1 cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as per direction of Engineer-in-Charge.            | 184.00 | 1963.20  | Sqm  | 361229.00 |
| <b>12</b> | <b>Sanitary Installations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |          |      |           |
| 12.1      | Providing and fixing water closet squatting pan (Indian type W.C.pan ) with 100 mm sand cast Iron P or S trap, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever) conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required:                                                                                                                                                                                                       |        |          |      |           |
| 12.1.1    | White Vitreous china Orissa pattern W.C. pan of size 580x440 mm with integral type foot rests                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.00   | 6767.40  | Each | 13535.00  |

| Item No. | Description of Item                                                                                                                                                                                                                      | Qty    | Rate    | Unit  | Amount    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-------|-----------|
| 12.2     | Providing and fixing Stainless Steel A ISI 304 (18/8) kitchen sink as per IS:13983 with C.I. brackets and stainless steel plug 40 mm, including painting of fittings and brackets, cutting and making good the walls wherever required : |        |         |       |           |
| 12.2.1   | Kitchen sink with drain board                                                                                                                                                                                                            |        |         |       |           |
| 12.2.1.1 | 510x1040 mm bowl depth 250 mm.                                                                                                                                                                                                           | 2.00   | 6945.60 | Each  | 13891.00  |
| 12.3     | Providing and fixing 8 mm dia C.P. / S.S. Jet with flexible tube upto 1 metre long with S.S. triangular plate to European type W.C. of quality and make as approved by Engineer - in - charge.                                           | 17.00  | 349.15  | Each  | 5936.00   |
| 12.4     | Providing and fixing P.V.C. waste pipe for sink or wash basin including P.V.C. waste fittings complete.                                                                                                                                  |        |         |       |           |
| 12.4.1   | Flexible pipe                                                                                                                                                                                                                            |        |         |       |           |
| 12.4.1.1 | 32 mm dia                                                                                                                                                                                                                                | 47.00  | 119.55  | Each  | 5619.00   |
| 12.5     | Providing and fixing mirror of superior glass (of approved quality) and of required shape and size with plastic moulded frame of approved make and shade with 6 mm thick hard board backing :                                            |        |         |       |           |
| 12.5.1   | Rectangular shape 1500x450 mm                                                                                                                                                                                                            | 10.00  | 2093.00 | Each  | 20930.00  |
| 12.6     | Providing and fixing soil, waste and vent pipes :                                                                                                                                                                                        |        |         |       |           |
| 12.6.1   | 100 mm dia.                                                                                                                                                                                                                              |        |         |       |           |
| 12.6.1.1 | Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside IS:15905                                                                                                                                                      | 483.00 | 1169.30 | Metre | 564772.00 |
| 12.7     | Providing and fixing bend of required degree with access door, insertion rubber washer 3 mm thick, bolts and nuts complete.                                                                                                              |        |         |       |           |
| 12.7.1   | 100 mm dia                                                                                                                                                                                                                               |        |         |       |           |
| 12.7.1.1 | Hubless centrifugally cast (spun) iron epoxy coated inside & outside as per IS:15905                                                                                                                                                     | 42.00  | 567.20  | Each  | 23822.00  |
| 12.8     | Providing and fixing plain bend of required degree.                                                                                                                                                                                      |        |         |       |           |
| 12.8.1   | 100 mm dia                                                                                                                                                                                                                               |        |         |       |           |
| 12.8.1.1 | Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside as per IS:15905                                                                                                                                               | 61.00  | 368.00  | Each  | 22448.00  |
| 12.9     | Providing and fixing double equal plain junction of required degree.                                                                                                                                                                     |        |         |       |           |
| 12.9.1   | 100x100x100x100 mm                                                                                                                                                                                                                       |        |         |       |           |
| 12.9.1.1 | Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside as per IS:15905                                                                                                                                               | 42.00  | 760.70  | Each  | 31949.00  |
| 12.10    | Providing and fixing single equal plain junction of required degree :                                                                                                                                                                    |        |         |       |           |
| 12.10.1  | 100x100x100 mm                                                                                                                                                                                                                           |        |         |       |           |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty    | Rate     | Unit  | Amount    |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|-------|-----------|
| 12.10.1.1 | Hubless centrifugally cast (spun) iron epoxy coated inside & outside as per IS:15905                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 87.00  | 581.45   | Each  | 50586.00  |
| 12.11     | Providing and fixing terminal guard:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |          |       |           |
| 12.11.1   | 100 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |          |       |           |
| 12.11.1.1 | Hubless centrifugally cast (spun) iron epoxy coated inside & outside as per IS:15905                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 16.00  | 427.80   | Each  | 6845.00   |
| 12.12     | Providing and fixing shielded coupling for Hubless centrifugally cast iron pipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |          |       |           |
| 12.12.1   | 100 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |       |           |
| 12.12.1.1 | SS 304 grade coupling with EPDM rubber gasket                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 402.00 | 432.05   | Each  | 173684.00 |
| 12.13     | Providing and fixing trap of self cleansing design with screwed down or hinged grating with or without vent arm complete, including cost of cutting and making good the walls and floors :                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |       |           |
| 12.13.1   | 100 mm inlet and 100 mm outlet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |        |          |       |           |
| 12.13.1.1 | Hubless centrifugally cast (spun) iron epoxy coated inside & outside as per IS:15905                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 61.00  | 854.55   | Each  | 52128.00  |
| 12.14     | Painting sand cast iron/ centrifugally cast (spun) iron soil, waste vent pipes and fittings with two coats of synthetic enamel paint of any colour such as chocolate grey, or buff etc. over a coat of primer (of approved quality) for new work :                                                                                                                                                                                                                                                                                                                                                                                                        |        |          |       |           |
| 12.14.1   | 100 mm diameter pipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 483.00 | 82.80    | Metre | 39992.00  |
| 12.15     | Providing and fixing M.S. holder bat clamp of approved design to sand cast iron/ cast iron (spun) pipes comprising of M.S. flat brackets made of 50x5 mm flat of specified shape, projecting 75 mm outside the wall surface and fixed on wall with 4nos, 6mm dia expansion hold fasteners, including drilling necessary holes in brick wall/ CC/RCC surface and the cost of bolts etc. The pipes shall be fixed to the already fixed brackets with the help of 30 mm x1.6 mm galvanised M.S. flats of specified shape and of total length 420 mm and shall be fixed with M.S. nuts, bolts, & washers of size 25x6 mm, one bolts on each side of the pipe. |        |          |       |           |
| 12.15.1   | Total bracket length 580 mm of approved shape and design (for single 100 mm dia pipe).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 166.00 | 304.05   | Each  | 50472.00  |
| 12.16     | Providing and fixing white vitreous china extended wall mounting water closet of size 780x370x690 mm of approved shape including providing & fixing white vitreous china cistern with dual flush fitting, of flushing capacity 3 litre/ 6 litre (adjustable to 4 litre/ 8 litres), including seat cover, and cistern fittings, nuts, bolts and gasket etc complete.                                                                                                                                                                                                                                                                                       | 35.00  | 14999.15 | Each  | 524970.00 |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty    | Rate    | Unit         | Amount    |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|--------------|-----------|
| <b>13</b> | <b>Water Supply</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |         |              |           |
| 13.1      | Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, i/c fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. :Concealed work, including cutting chases and making good the walls etc. |        |         |              |           |
| 13.1.1    | 15 mm nominal outer dia .Pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 58.00  | 497.80  | Metre        | 28872.00  |
| 13.1.2    | 20 mm nominal outer dia .Pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 128.00 | 537.60  | Metre        | 68813.00  |
| 13.1.3    | 25 mm nominal outer dia .Pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 15.00  | 627.25  | Metre        | 9409.00   |
| 13.2      | Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching, refilling & testing of joints complete as per direction of Engineer in Charge : External work                                                                                                                                                         |        |         |              |           |
| 13.2.1    | 32 mm nominal outer dia .Pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 75.00  | 438.60  | Metre        | 32895.00  |
| 13.2.2    | 40 mm nominal outer dia .Pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 705.00 | 563.05  | Metre        | 396950.00 |
| 13.2.3    | 50 mm nominal outer dia .Pipes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 819.00 | 794.25  | Metre        | 650491.00 |
| 13.3      | Providing and fixing G.I. pipes complete with G.I. fittings and clamps, i/c cutting and making good the walls etc. : Internal work - Exposed on wall.                                                                                                                                                                                                                                                                                                                                                                     |        |         |              |           |
| 13.3.1    | 50 mm dia. nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 100.00 | 1048.35 | Metre        | 104835.00 |
| 13.4      | Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc. : External work                                                                                                                                                                                                                                                                                                                                                                                                        |        |         |              |           |
| 13.4.1    | 50 mm dia. nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 200.00 | 762.15  | Metre        | 152430.00 |
| 13.5      | Making connection of G.I. distribution branch with G.I. main of following sizes by providing and fixing tee, including cutting and threading the pipe etc. complete :                                                                                                                                                                                                                                                                                                                                                     |        |         |              |           |
| 13.5.1    | 25 to 40 mm nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 24.00  | 911.90  | Each         | 21886.00  |
| 13.6      | Providing and fixing gun metal gate valve with C.I. wheel of approved quality (screwed end) :                                                                                                                                                                                                                                                                                                                                                                                                                             |        |         |              |           |
| 13.6.1    | 32 mm nominal bore.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.00   | 689.60  | Each         | 2758.00   |
| 13.6.2    | 40 mm nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 32.00  | 826.10  | Each         | 26435.00  |
| 13.6.3    | 50 mm nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 16.00  | 1026.65 | Each         | 16426.00  |
| 13.7      | Providing and fixing C.P. brass shower rose with 15 or 20 mm inlet :                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |         |              |           |
| 13.7.1    | 150 mm diameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 14.00  | 222.35  | Each         | 3113.00   |
| AE(C)     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | AE(E)  |         | EE(C)Page298 |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty      | Rate     | Unit      | Amount     |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|-----------|------------|
| 13.8     | Constructing masonry Chamber 90x90x100 cm inside, in brick work in cement mortar 1:4 (1 cement : 4 coarse sand) for sluice valve, with C.I. surface box 100mm top diameter, 160 mm bottom diameter and 180 mm deep (inside) with chained lid and RCC top slab 1:1.5:3 mix (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20mm nominal size ), i/c necessary excavation, foundation concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm nominal size) and inside plastering with cement mortar 1:3 (1 cement : 3 coarse sand) 12 mm thick, finished with a floating coat of neat cement complete as per standard design:   |          |          |           |            |
| 13.8.1   | With common burnt clay F.P.S.(non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 60.00    | 18896.70 | Each      | 1133802.00 |
| 13.9     | Constructing masonry Chamber 120x120x100 cm inside, in brick work in cement mortar 1:4 (1 cement : 4 coarse sand) for sluice valve, with C.I. surface box 100mm top diameter, 160 mm bottom diameter and 180 mm deep (inside) with chained lid and RCC top slab 1:1.5:3 mix (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20mm nominal size ), i/c necessary excavation, foundation concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm nominal size) and inside plastering with cement mortar 1:3 (1 cement : 3 coarse sand) 12 mm thick, finished with a floating coat of neat cement complete as per standard design: |          |          |           |            |
| 13.9.1   | With common burnt clay F.P.S.(non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 20.00    | 26163.40 | Each      | 523268.00  |
| 13.10    | Painting G.I. pipes and fittings with two coats of anti-corrosive bitumastic paint of approved quality :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |          |           |            |
| 13.10.1  | 50 mm diameter pipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 200.00   | 30.50    | Metre     | 6100.00    |
| 13.11    | Providing and fixing G.I. Union in G.I. pipe including cutting and threading the pipe and making long screws etc. complete (New work)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |          |           |            |
| 13.11.1  | 50mm nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8.00     | 823.80   | Each      | 6590.00    |
| 13.12    | Providing and placing on terrace (at all floor levels) polyethylene water storage tank, IS : 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank.                                                                                                                                                                                                                                                                                                                                                                              | 45000.00 | 11.00    | Per Litre | 495000.00  |
| 13.13    | Providing and fixing C.P. brass bib cock of approved quality conforming to IS:8931:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |          |           |            |
| 13.13.1  | 15 mm nominal bore.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7.00     | 506.80   | Each      | 3548.00    |
| 13.14    | Providing and fixing C.P. brass long nose bib cock of approved quality conforming to IS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |          |           |            |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty    | Rate    | Unit  | Amount    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-------|-----------|
|           | standards and weighing not less than 810 gms.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |         |       |           |
| 13.14.1   | 15 mm nominal bore.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3.00   | 820.70  | Each  | 2462.00   |
| 13.15     | Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |         |       |           |
| 13.15.1   | 15 mm nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 3.00   | 798.95  | Each  | 2397.00   |
| 13.16     | Providing and fixing C.P. brass stop cock (concealed) of standard design and of approved make conforming to IS:8931.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |         |       |           |
| 13.16.1   | 15 mm nominal bore.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 97.00  | 670.45  | Each  | 65034.00  |
| 13.17     | Providing and fixing C.P. brass angle valve for basin mixer and geyser points of approved quality conforming to IS:8931 :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |        |         |       |           |
| 13.17.1   | 15mm nominal bore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 89.00  | 574.30  | Each  | 51113.00  |
| 13.18     | Providing and fixing C.P. Brass extension nipple (size 15mmx50mm) of approved make and quality as per direction of Engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 47.00  | 74.80   | Each  | 3516.00   |
| <b>14</b> | <b>Drainage</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |         |       |           |
| 14.1      | Providing and fixing square-mouth S.W. gully trap class SP-1 complete with C.I. grating brick masonry chamber with water tight C.I. cover with frame of 300 x300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70 kg as per standard design:                                                                                                                                                                                                                                                                                                                                                                      |        |         |       |           |
| 14.1.1    | 100x100 mm size P type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |         |       |           |
| 14.1.1.1  | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 6.00   | 2707.65 | Each  | 16246.00  |
| 14.2      | Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete :                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |         |       |           |
| 14.2.1    | 150 mm dia. R.C.C. pipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 75.00  | 556.45  | Metre | 41734.00  |
| 14.2.2    | 250 mm dia. R.C.C. pipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 25.00  | 899.80  | Metre | 22495.00  |
| 14.2.3    | 300 mm dia. R.C.C. pipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 150.00 | 994.30  | Metre | 149145.00 |
| 14.3      | Constructing brick masonry manhole in cement mortar 1:4 ( 1 cement : 4 coarse sand ) with R.C.C. top slab with 1:1.5:3 mix (1 cement : 1.5 coarse sand (zone-III) : 3 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand (zone-III) : 8 graded stone aggregate 40 mm nominal size), inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete as per standard design : |        |         |       |           |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty   | Rate     | Unit  | Amount     |
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| 14.3.1   | Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg) :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |          |       |            |
| 14.3.1.1 | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 40.00 | 12770.55 | Each  | 510822.00  |
| 14.4     | Inside size 120x90 cm and 90 cm deep including C.I. cover with frame (medium duty) 500 mm internal diameter, total weight of cover and frame to be not less than 16 kg (weight of cover 58 kg and weight of frame 58 kg) :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |          |       |            |
| 14.4.1   | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 40.00 | 26405.50 | Each  | 1056220.00 |
| 14.5     | Extra for depth for manholes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |          |       |            |
| 14.5.1   | Size 90x80 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |          |       |            |
| 14.5.1.1 | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 16.00 | 8825.40  | Metre | 141206.00  |
| 14.5.2   | Size 120x90 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |          |       |            |
| 14.5.2.1 | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 18.00 | 10585.50 | Metre | 190539.00  |
| 14.6     | Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS : 10910, on 12 mm dia steel bar conforming to IS: 1786, having minimum cross section as 23 mmx25 mm and over all minimum length 263 mm and width as 165 mm with minimum 12 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufacture's permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) complete as per design. | 62.00 | 553.70   | Each  | 34329.00   |
| 14.7     | Constructing brick masonry road gully chamber 50x45x60 cm with bricks in cement mortar 1:4 (1 cement : 4 coarse sand) including 500x450 mm pre-cast R.C.C. horizontal grating with frame complete as per standard design :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |          |       |            |
| 14.7.1   | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 60.00 | 5957.90  | Each  | 357474.00  |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty    | Rate    | Unit | Amount    |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|-----------|
| <b>15</b> | <b>Aluminium Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |         |      |           |
| 15.1      | Providing and fixing glazing in uPVC/aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge . :                                                                                                                                                                                                                                                                       |        |         |      |           |
| 15.1.1    | With float glass panes of 5 mm thickness (weight not less than 12.50 kg/sqm)                                                                                                                                                                                                                                                                                                                                                                                                                               | 336.00 | 1505.25 | sqm  | 505764.00 |
| 15.2      | Providing and fixing 12 mm thick frameless toughened glass door shutter of approved brand and manufacture, including providing and fixing top & bottom pivot & double acting hydraulic floor spring type fixing arrangement and making necessary holes etc. for fixing required door fittings, all complete as per direction of Engineer-in-charge (Door handle, lock and stopper etc. to be paid separately).                                                                                             | 92.00  | 5325.90 | Sqm  | 489983.00 |
| <b>16</b> | <b>Water Proofing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |         |      |           |
| 16.1      | Providing and laying integral cement based treatment for water proofing on horizontal surface at all depth below ground level for under ground structures as directed by Engineer-in-Charge and consisting of :                                                                                                                                                                                                                                                                                            |        |         |      |           |
|           | (i) Ist layer of 22 mm to 25 mm thick approved and specified rough stone slab over a 25 mm thick base of cement mortar 1:3 (1 cement : 3 coarse sand) including applying of twice ( at base and top of mortar ) cement slurry @ 2.2kg/m <sup>2</sup> (each time) mixed with water proofing compound conforming to IS:2645 in the recommended proportion over the leveling course (leveling course to be paid separately). Joints sealed and grouted with cement slurry mixed with water proofing compound. |        |         |      |           |
|           | (ii) 2nd layer of 25 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) mixed with water proofing compound in recommended proportions.                                                                                                                                                                                                                                                                                                                                                                   |        |         |      |           |
|           | (iii) Finishing top with stone aggregate of 10 mm to 12 mm nominal size spreading @ 8 cum/sqm thoroughly embedded in the 2nd layer.                                                                                                                                                                                                                                                                                                                                                                        |        |         |      |           |
| 16.1.1    | Using rough kota stone.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 50.00  | 1515.60 | Sqm  | 75780.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty    | Rate    | Unit | Amount     |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|------------|
| 16.2     | Providing and laying integral cement based treatment for water proofing on the vertical surface by fixing specified stone slab 22 mm to 25 mm thick with cement slurry mixed with water proofing compound conforming to IS:2645 in recommended proportions with a gap of 20 mm (minimum) between stone slabs and the receiving surfaces and filling the gaps with neat cement slurry mixed with water proofing compound and finishing the exterior of stone slab with cement mortar 1:3 (1 cement : 3 coarse sand) 20 mm thick with neat cement punning mixed with water proofing compound in recommended proportion complete at all levels and as directed by Engineer-in-charge :                                        |        |         |      |            |
| 16.2.1   | Using rough Kota stone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 519.00 | 2024.70 | Sqm  | 1050819.00 |
| 16.3     | Providing and laying water proofing treatment in sunken portion of WCs, bathroom etc., by applying cement slurry mixed with water proofing cement compound consisting of applying :<br>(a) First layer of slurry of cement @ 0.488 kg/sqm mixed with water proofing cement compound @ 0.253 kg/ sqm. This layer will be allowed to air cure for 4 hours.<br>(b) Second layer of slurry of cement @ 0.242 kg/sqm mixed with water proofing cement compound @ 0.126 kg/sqm. This layer will be allowed to air cure for 4 hours followed with water curing for 48 hours.<br>The rate includes preparation of surface, treatment and sealing of all joints, corners, junctions of pipes and masonry with polymer mixed slurry. | 235.00 | 617.05  | Sqm  | 145007.00  |
| 16.4     | Grading roof for water proofing treatment with                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |         |      |            |
| 16.4.1   | Cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 55.00  | 8042.30 | Cum  | 442327.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty     | Rate   | Unit | Amount     |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------|------|------------|
| 16.5     | Providing and mixing integral crystalline admixture for waterproofing treatment to RCC structures like basement raft, retaining walls, reservoir, sewage & water treatment plant, tunnels / subway and bridge deck etc.. at the time of transporting of concrete into the drum of the ready-mix truck , using integral crystalline admixture @0.80% (minimum) to the weight of cement content per cubic meter of concrete) or higher as recommended by the manufacturer's specification in reinforced cement concrete at site of work. The material shall meet the requirements as specified in ACI-212-3R- 2010 i.e. by reducing permeability of concrete by more than 90%, compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure. The crystalline admixture shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the Engineer-in-charge. The product performance shall carry guarantee for 10 years against any leakage. | 5516.00 | 388.00 | Kg   | 2140208.00 |
| 16.6     | Providing and applying fibre reinforced elastomeric liquid water proofing membrane with resilient acrylic polymers having Sun Reflectivity Index (SRI) of 105 on top of concrete roof in three coats @10.76 litre/ 10 sqm. One coat of self-priming of elastomeric waterproofing liquid (dilution with water in the ratio of 3:1) and two coats of undiluted elastomeric waterproofing liquid (dry film thickness of complete application/system not less than 500 microns). The operation shall be carried out after scrapping and properly cleaning the surface to remove loose particles with wire brushes, complete in all respect as per the direction of Engineer-in-Charge.                                                                                                                                                                                                                                                                                                                                                                                   | 1091.00 | 563.10 | Sqm  | 614342.00  |
| 16.7     | Providing & Applying high quality acrylic modified resin based texture of Dholpur/Red sand stone Pattern with anti algae and UV resistance properties to be applied as intermediate finish in desired pattern @ 43.04 kgs/10 sqm to form film of 1- 1.5 mm thickness after scrapping and properly cleaning the surface to remove loose particles from the plaster surface, followed by top coating with Premium Acrylic Smooth exterior paint with Silicone additives of required shade by two or more coats @ 1.43 litres/10 sqm, complete as the direction of Engineer -in-Charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2000.00 | 597.00 | Sqm  | 1194000.00 |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                               | Qty    | Rate    | Unit  | Amount    |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-------|-----------|
| <b>17</b> | <b>Rain Water Harvesting and Tube Well</b>                                                                                                                                                                                                                                                                                                                                                                                        |        |         |       |           |
| 17.1      | Boring/drilling bore well of required dia for casing/ strainer pipe, by suitable method prescribed in IS: 2800 (part I), including collecting samples from different strata, preparing and submitting strata chart/ bore log, including hire & running charges of all equipments, tools, plants & machineries required for the job, all complete as per direction of Engineer -in-charge, upto 90 metre depth below ground level. |        |         |       |           |
| 17.1.1    | All types of soil                                                                                                                                                                                                                                                                                                                                                                                                                 |        |         |       |           |
| 17.1.1.1  | 300 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                        | 490.00 | 707.75  | Metre | 346798.00 |
| 17.2      | Supplying, assembling, lowering and fixing in vertical position in bore well, unplasticized PVC medium well casing (CM) pipe of required dia, conforming to IS: 12818, including required hire and labour charges, fittings& accessories etc. all complete, for all depths, as per direction of Engineer-in-charge.                                                                                                               |        |         |       |           |
| 17.2.1    | 200 mm nominal size dia                                                                                                                                                                                                                                                                                                                                                                                                           | 45.00  | 1113.35 | Metre | 50101.00  |
| 17.3      | Supplying, assembling, lowering and fixing in vertical position in bore well unplasticized PVC medium well screen (RMS) pipes with ribs, conforming to IS: 12818, including hire & labour charges, fittings & accessories etc. all complete, for all depths, as per direction of Engineer-in-charge.                                                                                                                              |        |         |       |           |
| 17.3.1    | 200 mm nominal size dia                                                                                                                                                                                                                                                                                                                                                                                                           | 45.00  | 1255.70 | Metre | 56507.00  |
| 17.4      | Supplying, filling, spreading & leveling stone boulders of size range 5 cm to 20 cm, in recharge pit, in the required thickness, for all leads & lifts, all complete as per direction of Engineer-in-charge.                                                                                                                                                                                                                      | 23.00  | 1509.80 | Cum   | 34725.00  |
| 17.5      | Supplying, filling, spreading & leveling gravels of size range 5 mm to 10 mm, in the recharge pit, over the existing layer of boulders, in required thickness, for all leads & lifts, all complete as per direction of Engineer-in-charge.                                                                                                                                                                                        | 8.00   | 1538.25 | Cum   | 12306.00  |
| 17.6      | Supplying, filling, spreading & leveling coarse sand of size range 1.5 mm to 2 mm in recharge pit, in required thickness over gravel layer, for all leads & lifts, all complete as per direction of Engineer -in-charge.                                                                                                                                                                                                          | 8.00   | 1538.25 | Cum   | 12306.00  |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty      | Rate    | Unit | Amount     |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|------|------------|
| 17.7      | Providing and fixing factory made precast RCC perforated drain covers, having concrete of strength not less than M-25, of size 1000 x 450x50 mm, reinforced with 8 mm dia four nos longitudinal & 9 nos cross sectional T.M.T. hoop bars, including providing 50 mm dia perforations @ 100 to 125 mm c/c, including providing edge binding with M.S. flats of size 50 mm x 1.6 mm complete, all as per direction of Engineer-in-charge.                                                                                                                                                                                                                             | 227.00   | 1399.95 | Each | 317789.00  |
| 17.8      | Providing and fixing suitable size threaded mild steel cap or spot welded plate to the top of bore well housing/ casing pipe, removable as per requirement, all complete for bore well of:                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |         |      |            |
| 17.8.1    | 200 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3.00     | 321.15  | Each | 963.00     |
| <b>18</b> | <b>Structural Glazing and Aluminium Composite Panels</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |         |      |            |
| 18.1      | Providing and supplying aluminium extruded tubular and other aluminium sections as per the architectural drawings and approved shop drawings, the aluminium quality as per grade 6063 T5 or T6 as per BS 1474, including super durable powder coating of 60-80 microns conforming to AAMA 2604 of required colour and shade as approved by the Engineer-in-Charge. (The item includes cost of material such as cleats, sleeves, screws etc. necessary for fabrication of extruded aluminium frame work. Nothing extra shall be paid on this account). The weight of aluminium extruded section shall be taken for purpose of payment.                               | 16564.00 | 414.30  | Kg   | 6862465.00 |
| 18.2      | Designing, fabricating, testing, protection, installing and fixing in position semi (grid) unitized system of structural glazing (with open joints) for linear as well as curvilinear portions of the building for all heights and all levels including:                                                                                                                                                                                                                                                                                                                                                                                                            |          |         |      |            |
|           | a) Structural analysis & design and preparation of shop drawings for the specified design loads conforming to IS 875 part III (the system must passed the proof test at 1.5 times design wind pressure without any failure), including functional design of the aluminum sections for fixing glazing panels of various thicknesses, aluminium cleats, sleeves and splice plates etc. gaskets, screws, toggles, nuts, bolts, clamps etc., structural and weather silicone sealants, flashings, fire stop (barrier)-cum-smoke seals, microwave cured EPDM gaskets for water tightness, pressure equalisation & drainage and protection against fire hazard including: |          |         |      |            |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty | Rate | Unit | Amount |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
|          | b) Fabricating and supplying serrated M.S. hot dip galvanised / Aluminium alloy of 6005 T5 brackets of required sizes, sections and profiles etc. to accommodate 3 Dimensional movement for achieving perfect verticality and fixing structural glazing system rigidly to the RCC/ masonry/structural steel framework of building structure using stainless steel anchor fasteners/ bolts, nylon separator to prevent bimetallic contacts with nuts and washers etc. of stainless steel grade 316, of the required capacity and in required numbers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |      |        |
|          | c) Providing and filling, two part pump filled, structural silicone sealant and one part weather silicone sealant compatible with the structural silicone sealant of required bite size in a clean and controlled factory / work shop environment , including double sided spacer tape, setting blocks and backer rod, all of approved grade, brand and manufacture, as per the approved sealant design, within and all around the perimeter for holding glass.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |      |        |
|          | d) Providing and fixing in position flashings of solid aluminium sheet 1 mm thick and of sizes, shapes and profiles, as required as per the site conditions, to seal the gap between the building structure and all its interfaces with curtain glazing to make it watertight.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |      |        |
|          | e) Making provision for drainage of moisture/ water that enters the curtain glazing system to make it watertight, by incorporating principles of pressure equalization, providing suitable gutter profiles at bottom (if required), making necessary holes of required sizes and of required numbers etc. complete. This item includes cost of all inputs of designing, labour for fabricating and installation of aluminium grid, installation of glazed units, T&P, scaffolding and other incidental charges including wastages etc., enabling temporary structures and services, cranes or cradles etc. as described above and as specified. The item includes the cost of getting all the structural and functional design including shop drawings checked by a structural designer, dully approved by Engineer-in-charge. The item also includes the cost of all mock ups at site, cost of all samples of the individual components for testing in an approved laboratory, field tests on the assembled working structural glazing as specified, cleaning and protection till the handing over of the building for occupation. |     |      |      |        |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Qty | Rate | Unit | Amount |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
|          | In the end, the Contractor shall provide a water tight structural glazing having all the performance characteristics etc. all complete as required, as per the Architectural drawings, as per item description, as specified, as per the approved shop drawings and as directed by the Engineer-in-Charge.                                                                                                                                                                                                                                                                                                                                                                                                                        |     |      |      |        |
|          | Note:- 1. The cost of providing extruded aluminium frames, shadow boxes, extruded aluminium section capping for fixing in the grooves of the curtain glazing and vermin proof stainless steel wire mesh shall be paid for separately under relevant items under this sub-head. However, for the purpose of payment, only the actual area of structural glazing (including width of grooves ) on the external face shall be measured in sqm. up to two decimal places.                                                                                                                                                                                                                                                             |     |      |      |        |
|          | Note:- 2. The following performance test are to be conducted on structural glazing system if area of structural glazing exceeds 2500 Sqm from the certified laboratories accredited by NABL (National Accreditation Board for Testing and Calibration Laboratories), Department of Science & Technologies, India. Cost of testing is payable separately. The NIT approving authority will decide the necessity of testing on the basis of cost of the work, cost of the test and importance of the work. Performance Testing of Structural glazing system Tests to be conducted in the NBL accredited lab or any other accreditation body which operates in accordance with ISO/IEC 17011 and accredits labs as per ISO/IEC 17025 |     |      |      |        |
|          | (1) Performance Laboratory Test for Air Leakage Test (-50pa to - 300pa) & (+50pa to +300pa) as per ASTM E-283-04 testing method for a range of testing limit 1 to 200 mVhr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |      |      |        |
|          | (2) Static Water Penetration Test. (50pa to 1500pa) as per ASTM E- 331-09 testing method for a range up to 2000 ml.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
|          | (3) Dynamic Water Penetration (50pa to 1500pa) as per AAMA 501.01- 05 testing method for a range upto 2000 ml                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |      |        |
|          | (4) Structural Performance Deflection and deformation by static air pressure test (1.5 times design wind pressure without any failure) as per ASTM E-330-10 testing method for a range upto 50 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |      |        |
|          | (5) Seismic Movement Test (upto 30 mm) as per AAMA 501.4-09 testing method for Qualitative test. Tests to be conducted on site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |      |      |        |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Qty     | Rate    | Unit | Amount     |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|------|------------|
|          | (6) Onsite Test for Water Leakage for a pressure range 50 kpa to 240 kpa (35psi) upto 2000 ml                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1426.00 | 3510.50 | Sqm  | 5005973.00 |
| 18.3     | Providing, assembling and supplying vision glass panels (IGUs) comprising of hermetically-sealed 6-12- 6 mm insulated glass (double glazed) vision panel units of size and shape as required and specified, comprising of an outer heat strengthened float glass 6mm thick, of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade, an inner Heat strengthened clear float glass 6mm thick, spacer tube 12mm wide, desiccants, including primary seal and secondary seal (structural silicone sealant) etc., all complete for the required performances, as per the Architectural drawings, as per the approved shop drawings, as specified and as directed by the Engineer-in-Charge. The IGUs shall be assembled in the factory/ workshop of the glass processor. (Payment for fixing of IGU Panels in the curtain glazing is included in cost of item No.25.2) For payment, only the actual area of glass on face # 1 of the glass panels (excluding the areas of the grooves and weather silicone sealant) provided and fixed in position, shall be measured in sqm. (i) Coloured tinted float glass 6mm thick substrate with reflective soft coating on face # 2, + 12mm Air gap + 6mm Heat Strengthened clear Glass of approved make having properties as visible Light transmittance (VLT) of 25 to 35 %, Light reflection internal 10 to 15%, light reflection external 10 to 20%, shading coefficient (0.25-0.28) and U value of 3.0 to 3.3 W/m2 degree K etc. The properties of performance glass shall be decided by the technical sanctioning authority as per the site requirement. | 1283.00 | 3718.70 | Sqm  | 4771092.00 |
| 18.4     | Extra for openable side / top hung vision glass panels (IGUs) including providing and supplying at site all accessories and hardwares for the openable panels as specified and of the approved make such as heavy duty stainless steel friction hinges, min 4 -point cremone locking sets with stainless steel plates, handles, buffers etc. including necessary stainless steel screws/ fasteners, nuts, bolts, washers etc., all complete as per the Architectural drawings, as per the approved shop drawings, as specified and as directed by the Engineer-in- Charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 143.00  | 3671.50 | Sqm  | 525025.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty   | Rate    | Unit  | Amount    |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|-------|-----------|
| 19       | <b>New Technologies and Materials</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |         |       |           |
| 19.1     | Providing and fixing factory made solid Foam uPVC profile for kitchen cabinet frame (45 x 20 mm) of approved shade, quality and make. The profile shall be laminated on both sides, made from rigid foam sheets (Single extruded) having density 600 Kg/cum and the exposed edges sealed with PVC edge beading of same shade and colour. The frame shall be fire retardent with necessary screw holding capacity. Frame shall be fixed to wall using Expendable Fastner with necessary stainless steel screws, all complete as per direction of Engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 69.00 | 450.95  | Metre | 31116.00  |
| 19.2     | Providing and fixing factory made Kitchen Cabinet Shutter /Partition 20 mm nominal thickness of approved shade, quality and make, made from rigid foam sheets (Single extruded) having density 600 Kg/cum and laminated on both side by laminate Sheet/ PVC foil lamination. The exposed edges shall be sealed with PVC edge beading of same shade and colour. The shutter shall be fire retardent having necessary screw holding capacity. Shutter shall be fixed to frame using approved hinges with necessary stainless steel screws, all complete as per direction of Engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 76.00 | 5350.55 | Sqm   | 406642.00 |
| 19.3     | Providing and fixing false ceiling at all heights with integral densified calcium silicate reinforced with fibre and natural filler false ceiling tiles of Size 595x595 mm of approved texture, design and patterns having NRC (Noise Reduction coefficient) of 0.50 (minimum) as per IS 8225:1987, Light reflectance of 85% (minimum). Non combustible as per BS:476 (part-4), fire performance as per BS:476 (part 6 &7), humidity resistance of 100%, thermal conductivity < 0.043 W/m K as per ASTM 518:1991, in true horizontal level suspended on interlocking metal powder coated T-Grid of hot dipped galvanised iron section of 0.40 mm thick on Silhouette profile, rotary stiched double webbed white with 6mm reveal profile (white/black), comprising of main-T runners of size 15x42mm of length 3000 mm, cross - T of size 15x42 mm of length 1200 mm and secondary intermediate cross- T of size 15x42 mm of length 600mm to form grid module of size 600 x 600 mm, suspended from ceiling using galvanised mild steel items (galvanizing @ 80 grams per sqm) i.e. 50 mm long, 8 mm outer diameter M-6 dash fasteners, 6 mm dia fully threaded hanger rod upto 1000 mm length and L-shape level adjuster of size 85x25x2 mm. |       |         |       |           |

| Item No.  | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qty     | Rate    | Unit | Amount     |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|------|------------|
|           | Galvanised iron perimeter wall angle of size 22x19x0.40 mm of length 3000 mm to be fixed on periphery wall / partition with the help of plastic rawl plugs at 450 mm center to center and 40mm long dry wall S.S screws. The work shall be carried out as per specifications, drawing and as per directions of the Engineer-in-Charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |         |      |            |
| 19.3.1    | With 15 mm thick integral densified micro edge light weight calcium silicate false ceiling tiles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2238.00 | 2630.40 | Sqm  | 5886835.00 |
| 19.4      | Providing & fixing false ceiling at all heights with GRG (Glass Fibre Reinforced Gypsum) false ceiling tiles of Size 595x595 mm of approved texture, design and patterns having moisture content less than 2%, humidity resistance of 99%, NRC0.50 to 0.75 as per IS 8225:1987, Non combustible as per BS 476 (part 4)-1970 and light reflectance of 85% (minimum) to be laid in true horizontal level suspended on inter-locking metal T-Grid of hot dipped galvanised iron section of 0.33mm thick (galvanized @ 120 grams per sqm including both sides) comprising of main-T runners of size 15x32 mm of length 3000 mm, cross - T of size 15x32 mm of length 1200 mm and secondary intermediate cross-T of size 15x32 mm of length 600mm to form grid module of size 600 x 600 mm, suspended from ceiling using galvanised mild steel items (galvanizing @ 80 grams per sqm) i.e. 50 mm long, 8 mm outer diameter M-6 dash fasteners, 6 mm dia fully threaded hanger rod upto 1000 mm length and L-shape level adjuster of size 85x25x2 mm. Galvanised iron perimeter wall angle of size 24x24x0.40 mm of length 3000 mm to be fixed on periphery wall / partition with the help of plastic rawl plugs at 450 mm center to center and 40 mm long dry wall wood screws. The work shall be carried out as per specifications, drawing and as per directions of the Engineer-in-Charge. |         |         |      |            |
| 19.4.1    | With semi perforated 12 mm thick micro tegular edged GRG false ceiling tiles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1494.00 | 1852.05 | Sqm  | 2766963.00 |
| <b>20</b> | <b>NS ITEMS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |         |      |            |
| 20.1      | Providing and fixing Mortise Door Handle Lock (make of Godrej NEH 19-1 CK or equivalent) Satin Steel (SS) Finish 8 Inches Handle, with Lock & 3 Keys of approved quality with necessary screws etc. complete as per direction of Engineer in- chrage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 62      | 3575.15 | Each | 221659.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                              | Qty  | Rate    | Unit | Amount     |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|------|------------|
| 20.2     | Providing and fixing stainless steel (Grade:304 ) tower bolt of approved make with nuts and screw etc. complete. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                                                     |      |         |      |            |
| 20.2.1   | 450 x 10 mm                                                                                                                                                                                                                                                                                                                                                      | 22   | 510.00  | Each | 11220.00   |
| 20.2.2   | 300 x 10 mm                                                                                                                                                                                                                                                                                                                                                      | 42   | 392.10  | Each | 16468.00   |
| 20.2.3   | 250 x 10 mm                                                                                                                                                                                                                                                                                                                                                      | 62   | 311.85  | Each | 19335.00   |
| 20.2.4   | 150 x 10 mm                                                                                                                                                                                                                                                                                                                                                      | 20   | 191.75  | Each | 3835.00    |
| 20.3     | Providing and fixing solid stainless steel (Grade-304) D type - handle of minimum 19 mm dia of approved make with nuts and screw etc. complete. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                      |      |         |      |            |
| 20.3.1   | 200 mm                                                                                                                                                                                                                                                                                                                                                           | 244  | 786.6   | Each | 191930.00  |
| 20.4     | Providing and fixing solid stainless steel (Grade-304) pull handle with plate of 12 mm dia of approved make with nuts and screw etc. complete. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                       |      |         |      |            |
| 20.4.1   | 150 mm                                                                                                                                                                                                                                                                                                                                                           | 98   | 274.7   | Each | 26921.00   |
| 20.5     | Providing and fixing stainless steel (Grade-304) hanging floor door stopper of approved make with nuts and screw etc. complete. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                                      |      |         |      |            |
| 20.5.1   | Single rubber stopper.                                                                                                                                                                                                                                                                                                                                           | 97   | 343.5   | Each | 33320.00   |
| 20.6     | Providing and fixing door mounted PVC door buffer of 50 mm dia, 50-70 mm long of approved make with SS nuts and screw etc. complete. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                                 | 97   | 56.7    | Each | 5500.00    |
| 20.7     | Providing and fixing decorative type roller blinds in approved transparency class of approved make all complete including all fittings, fixtures, Labour etc, all complete and design / pattern approved by Engineer-in-charge.                                                                                                                                  | 429  | 2530.15 | Sqm  | 1085434.00 |
| 20.8     | Providing and fixing chicken wire mesh having 0.40 mm to 0.50 mm dia wire and mesh size 25 to 50 mm at junction of dissimilar surfaces of brick/block masonry wall and RCC column/beams and the like including necessary "U" nails for fixing, overlapping etc. complete all as per specification and as directed by the Engineer for all floors and all height. | 2914 | 103.8   | Sqm  | 302473.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Qty | Rate     | Unit | Amount    |
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| 20.9     | Providing and fixing White or approved colour Vitreous china wall mounting European type water closet of Kohler/Jaquar/Cera or equivalent make (Kohler - Cat No. 17647IN-S-0/Cera-S1043118 /Jaquar - OPS-WHT-15951UF) with matching colour soft fall solid seat , lid, alongwith frameless concealed cistern 3/6L of Kohler/Jaquar/Cera or equivalent make (Kohler - Cat No. K-315381IN-CP/ Cera-S1043118/ Jaquar: JCS-WHT-2400) and soft press faceplate of Kohler/Jaquar/Cera or equivalent make (Kohler Cat No. K-4177IN-M-C / Cera-B1120104/ Jaquar: JCP-CHR-152415) with all fittings and fixtures complete (16 mm steel rack bolt of Jaquar/Cera) including cutting and making good the walls and floors wherever required. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge. | 9   | 23231.75 | Each | 209086.00 |
| 20.10    | Providing and fixing white vitreous china urinal of size 370x315x620 mm (Jaquar model URS-WHT-13253N) / (Kohler model 16321IN-SS-O) with Urinal flush valve (Cat No. PRS-CHR-073) of Jaquar including cutting and making good the wall and floor wherever required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |          |      |           |
| 20.10.1  | Single half stall urinal with Urinal flush valve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 20  | 18154.10 | Each | 363082.00 |
| 20.11    | Providing & fixing Glass Urinal Partition Plate (Jaquar (JSE-CHR-810UC450X) or equivalent make, 08 mm thick, fixed with suitable SS fixing arrangement complete including cutting and making good the walls and floors where required. (The gap between fixture and wall to be filled up with approved type poly sulphide sealant and size of each partition unit shall not be less than 3 Sqft measured in minimum regular rectangle).                                                                                                                                                                                                                                                                                                                                                                                                       | 15  | 5,419.00 | Each | 81285.00  |
| 20.12    | Providing and fixing white or approved colour Vitreous china 420 x 420 x 155 mm table top wash basin of Jaquar (Cat No. CNS-WHT-905) / Kohler (cat no. 1253181IN-O) make, single lever basin mixer without popup waste system with 450mm long braded house (Cat No.ALI-CHR-85011B) make with 32 mm C.P. brass waste coupling of Jaquar (Cat No. ALD-CHR-705L130) make, with connection pipes including cutting and making good the walls wherever required. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                                                                                                                                                                                       | 10  | 11647.55 | Each | 116476.00 |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty | Rate     | Unit | Amount    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|------|-----------|
| 20.13    | Providing and fixing white or approved colour Vitreous china self -rimming rectangular shape counter wash basin of minimum size 570x420x195 mm (Cera-S2030114; Jaquar- FLS-WHT-5601 ; Kohler-K2241IN-1-0) with 32 mm dia full threaded Waste coupling (Jaquar - ALD-CHR-705L130, Cera -F8050101) , C.P. brass bottle trap of 32 mm dia with 190 mm long wall connection pipes of Jaquar/Cera/Kohler (Cera- F8060401; Jaquar- ALD-CHR-769L ; Kohler-16407IN-CP) or equivalent make including cutting and making good the walls wherever required. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge. | 40  | 10483.65 | Each | 419346.00 |
| 20.14    | Providing and fixing C.P. brass 15 mm C.P. Brass 2 way bib cock of Jaquar (ARI-CHR-39041) / Kohler (33972IN-CP) make with CP brass threaded wall flange complete including cutting & making good the walls wherever required etc complete as per direction of Engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                            | 46  | 2,183.25 | Each | 100430.00 |
| 20.15    | Providing and fixing C.P. brass hand spary with lever control (Health faucet) and flexible hose 1.0 m long connection with CP holder for hand spary complete in all respects of Jaquar(ALD-CHR-579) / Kohler (98100IN-CP) make etc complete as per direction of Engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                          | 46  | 1,295.20 | Each | 59579.00  |
| 20.16    | Providing and fixing C.P. brass wall mixer 2-in-1 system with 115 mm long bend pipe on upper side alongwith with provision of overhead shower complete of approved quality of Jaquar/Kohler or equivalent (Cat no.: FUP-29273PM/K-98755IN-4-CP) as approved by Engineer in charge.                                                                                                                                                                                                                                                                                                                                                                           | 6   | 7226.10  | Each | 43357.00  |
| 20.17    | Providing and fixing Overhead Shower 180mm Round Shape Single Flow with Air Effect (ABS Body & Face Plate Chrome Plated) with Rubit Cleaning System of of approved quality of Jaquar/Kohler or equivalent (Cat no.: OHS - 1759) as approved by Engineer in charge. The piping system should run to ceiling at suitable location of bathing area and by dropping down below metal false ceiling. The shower of 180 mm size as per design shall be fixed. The height of shower should be minimum 2 mtr. including cutting & making good the walls wherever required. etc complete as per direction of Engineer-in-charge.                                      | 14  | 2769.45  | Each | 38772.00  |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                   | Qty | Rate     | Unit | Amount   |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|------|----------|
| 20.18    | Providing and fixing 600 mm glass shelf of Jaquar (AKP-CHR-35771P) / Kohler (5636IN-CP) make to wall complete fixed with 50 mm long screw rawl plug etc complete as per direction of Engineer-in-charge.                                                                                                                              | 22  | 1814.30  | Each | 39915.00 |
| 20.19    | Providing & fixing C.P.brass Towel Ring Square with round flange of Jaquar (ACN-CHR-1121N) / Kohler (5631IN-CP) make fixed to wall with plastic rawl plugs and C.P.brass screws of minimum length 50 mm including cutting and making good the walls and floors wherever required etc complete as per direction of Engineer-in-charge. | 32  | 1668.95  | Each | 53406.00 |
| 20.20    | Providing & fixing C.P.brass Towel Rail 600 mm long of Jaquar (AKP-CHR-35711PS)/ Kohler (25065IN-CP) make fixed to wall with plastic rawl plugs and C.P.brass screws of minimum length 50 mm including cutting and making good the walls and floors wherever required etc complete as per direction of Engineer-in-charge.            | 13  | 2515.45  | Each | 32701.00 |
| 20.21    | Providing and fixing liquid soap dispenser with glass bottle of make Jaquar (ACN-CHR-1135N) / Kohler (10712D-CP) at a suitable distance from wall of standard shape and fixing in position with necessary screws of minimum 50 mm length etc. complete as per direction of Engineer in charge.                                        | 32  | 1,536.10 | Each | 49155.00 |
| 20.22    | Providing & fixing SS Paper holder with flap recessed type of Jaquar (ACN 1153S) /Kohler (5632IN-CP) make fixed to wall with plastic rawl plugs and C.P.brass screws minimum 50 mm length including cutting and making good the walls and floors wherever required etc complete as per direction of Engineer-in-charge.               | 46  | 1331.90  | Each | 61267.00 |
| 20.23    | Providing and fixing 100 mm dia Stainless steel grating with/without waste hole for floor trap including making good the floor after fixing the same in portion. etc complete as per direction of Engineer-in-charge.                                                                                                                 | 47  | 103.4    | Each | 4860.00  |
| 20.24    | Providing & fixing European type W.C. pan, wash basin with all accessories Hindware Mat Code : 70002 EWC (P-18) matrix set or equivalent make for vision impaired persons as per standards manufacturers specification Architechtrual drawings and as per direction of Engineer-in-Charge.                                            | 5   | 47753.00 | Each | 238765   |
| 20.25    | Providing and fixing C.P. brass Sink Mixer with regular swinging spout with connection legs and wall flanges of standard design and of Jaquar (QQP-CHR-7309PM)/ Kohler (20591IN-4-CP) make including cutting & making good the walls wherever required. etc complete as per direction of Engineer-in-charge.                          | 2   | 6,415.70 | Each | 12831.00 |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qty    | Rate    | Unit  | Amount    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-------|-----------|
| 20.26    | Providing and fixing in position SN-8, UPVC structured wall /foam core pipe as per IS: 16098 for underground drainage system (UDS) including jointing with chemical of reputed make (Supreme,Prince or equivalent). The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                                                                                                                          |        |         |       |           |
| 20.26.1  | 160 mm dia pipe of 4.3 mm minimum composite wall thickness.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 90.00  | 1091.69 | Metre | 98252.00  |
| 20.26.2  | 210 mm dia pipe of 5.5 mm minimum composite wall thickness.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 100.00 | 1251.68 | Metre | 125168.00 |
| 20.27    | Supply & fixing Fresh Color Restroom(Toilet) Cubicle made out of Thickness of Compact Laminate minimum 12 mm. Minimum Size of Cubicle : 1000mm (W) X 1700mm (D) X 2100mm (H),Door Size : 1995mm (H) x 610mm (W),Overall Height of Cubicle : 2100 mm (Including bottom Gap of 100mm) all Including Stainless Steel - 304/nylon. aluminium ndoor stopper channel, aluminium top rail, Grade accessories,Occupancy Indicator , Rubber Lining for Groove. all complete as per direction of Engineer-in-charge. (using series floor mounted). | 107.00 | 5605.35 | Sqm   | 599772.00 |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty    | Rate    | Unit | Amount     |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|------------|
| 20.28    | <p>Providing and fixing Glass Fibre Reinforced Concrete (GFRC) Architectural SCREENS/JALI in approved size, pattern, design shade &amp; internal design thickness between 25 - 30mm and border thickness between 40 - 50mm or 35mm overall, as per approved architectural drawings. GFRC SCREENS shall be manufactured by simultaneously sprayed method. The GFRC material shall have spray mix design with white cement, silica sand, alkali resistant glass fibre, polymers, Super Plasticizers or equivalent and water, pigmentation with exterior grade synthetic inorganic pigments of M/s Phenochem or equivalent so as to achieve a Modulus of Rupture (MOR) not less than 18 MPa and Limit of Proportionality (LOP) not less than 7.0 MPa, with glass Fiber content not less than 3.5 - 4%. The glass fiber shall be alkali resistant (AR) with minimum Zirconium Dioxide (ZrO2) content of 16% and shall be manufactured by approved manufacturer as per specification. The GFRC material shall not have water absorption of more than 11% by weight. The GRC SCREENS should be fixed, as per the architectural drawings with dry fixing method onto structural support members i.e., R.C.C, Brick work or Red Oxide Primer-paint or Epoxy primer-paint treated mild steel (To be paid separately). The fixing of Panels should be done using 'Dry fixing' method onto structural support members i.e., R.C.C, Brick work MS Framework. MS Galvanized CLAMPS &amp; PINS also if required fasteners to be used of Steel Grip/ HP/ Wurth/ Hilti/ Fischer/ Klimas or equivalent. All cast in socket to be Epoxy Primer Coated. ELECTRODES to be used of Advani, Mangalam, Esab or Victor brand or equivalent. If there will be a requirement of Joint filling, then Elastomeric exterior grade paintable Hybrid Silicon Sealant will be used. For final finishing of GRC elements one weather shield exterior grade water based diluted paint coat will be done if required. Vendors shall submit shop drawings of the same, the drawings to be duly approved by the Engineer in charge at site.</p> | 443.00 | 9242.80 | Sqm  | 4094560.00 |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qty    | Rate    | Unit | Amount     |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|------------|
| 20.29    | Providing and fixing Glass Fibre Reinforced Concrete (GFRC) Architectural PANELS in approved size, pattern, design & shade of wall thickness between 15 - 20mm and border thickness between 40 - 50mm, as per approved architectural drawings. GFRC CORNICE / PANELS shall be manufactured by simultaneously sprayed method. The GFRC material shall have spray mix design with white cement of M/s JK Cement, Birla white or equivalent, silica sand, alkali resistant glass fibre of M/s Owens Corning, N.E.G or equivalent, polymers of M/s Nova Polychem or equivalent, Super Plasticizers of M/s Karochem or equivalent and water, pigmentation with exterior grade synthetic inorganic pigments of M/s Phenochem or equivalent so as to achieve a Modulus of Rupture (MOR) not less than 18 MPa and Limit of Proportionality (LOP) not less than 7.0 MPa, with glass Fiber content not less than 3.5%. The glass fiber shall be alkali resistant (AR) with minimum Zirconium Dioxide (ZrO2) content of 16% and shall be manufactured by approved manufacturer as per specification. The GFRC material shall not have water absorption of more than 11% by weight. The GRC CORNICE / PANELS should be fixed, as per the architectural drawings with dry fixing method onto structural support members i.e., R.C.C, Brick work or Red Oxide Primer-paint or Epoxy primer-paint treated mild steel (To be paid separately). The fixing of Panels should be done using 'Dry fixing' method onto structural support members i.e., R.C.C, Brick work MS Framework. MS Galvanized CLAMPS & PINS also if required fasteners to be used of Steel Grip/ HP/ Wurth/ Hilti/ Fischer/ Klimas or equivalent. All cast in socket to be Epoxy Primer Coated. ELECTRODES to be used of Advani, Mangalam, Esab or Victor brand or equivalent. If there will be a requirement of Joint filling, then Elastomeric exterior grade paintable PU Sealant will be used. For final finishing of GRC elements one weather shield exterior grade water based diluted paint coat will be done if required. Vendors shall submit shop drawings of the same, the drawings to be duly approved by the Engineer in charge at site. | 708.00 | 9378.45 | Sqm  | 6639943.00 |
| 20.3     | Providing and fixing 12 mm thick toughened clear float glass panes in any geometrical shape as per pattern approved in railing / partition frame work including providing necessary holes of required diameter, edge polishing etc. as specified as per the drawing and design approved complete i/c necessary patch fittings to hold glass (if required) & as per the directions of Engineer - in- charge. For payment purpose, minimum possible rectangular shape out of which required pattern is possible to be taken out shall be considered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 495.00 | 3545.45 | Sqm  | 1754998.00 |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty    | Rate    | Unit | Amount    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|------|-----------|
| 20.31    | <p>Providing &amp; Fixing Wooden Finished Suspended Ceiling System with Woodworks Microlook edge tiles and 15mm Suprafine 43 exposed grid. The 18mm thick Tile in RG3003 (RG3) perforation shall be made of Medium Density Fibre of density 700+ Kgs/m<sup>3</sup> having perforation of hole diameter 3mm and open area 3% with linear pitch of 16mm with a border of 26.5mm. The tile shall have melamine laminate finish of approved shade (Portland Maple, Sea Beech, Siam Wood &amp; Mystique Walnut) on visible side and backing laminate (same shade) on the reverse with 0.8mm matching PVC edge banding in module size of 600mm x 600mm. The edges of the tile shall be Square Tegular/Microlook 90° having 8mm drop using 3mm thick compact board spline. Back side of the tile shall have Soundtex fleece hot pressed to achieve NRC of 0.4 (Average value of Absorption Co-efficient readings taken at 250 Hz, 500 Hz, 1000 Hz and 2000 Hz) as per ASTM C423 and Humidity Resistance (RH) of 70%, with sag limited to 1/300mm. The tile shall have a Fire Performance of class 1 according to BS 476 part 7. The tile shall be laid on Sillhoute 38 with 15 mm wide T - section flanges having double stroke rotary stitching on all T - sections i.e., the Main Runner, 1200 mm &amp; 600 mm Cross Tees with a web height of 38mm (all sections). The deflection loading of the system shall be 15.6 kg/m<sup>2</sup> (as per standard installation layout mentioned below) and main beam tested as per ASTM C635 (Deflection limit less than L/360 within suspension points) with deflection loading of 18.6kg/m. The end details of the main beam and cross tee shall be made of pre hardened steel clip fixed to the ends. The cross tee to provide double locking between "cross tee to cross tee" and "cross tee to main beam". All main beam to main beam and cross tee to cross tee connection shall have a pull out strength of more than 100kg. The T - Sections shall be made of hot dipped galvanized steel of 100 gsm as per IS 277 (2003) and pre-painted steel with baked polyester paint with OT bending capability.</p> | 121.00 | 6842.25 | Sqm  | 827912.00 |
| 20.32    | <p>Providing and laying Stone Plastic Composite (SPC) flooring of minimum thickness 7 mm with water absorption less than 0.06% and conforming to IS: 15622, of approved make, brand and manufacturer, laid as per manufacturer specifications complete and size as per directions of E-in-C</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 121.00 | 4077.45 | Sqm  | 493371.00 |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Qty       | Rate     | Unit | Amount     |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|------|------------|
| 20.33    | Preparation of all MEP drawings on the basis of the detailed Architectural drawings, Soil Investigation reports and Structural Drawing provided by Engineer-in-charge. BIM modeling with minimum LOD 350 with clash management & will also available in IFC format for interoperability and availability of building information to all planners and field Engineer of the project and approval of the same from Engineer-in-charge. This item has to be completed within 30 days from date of start.                                                                                                                                                                                                                                                                                                                                                                 | 1.00      | 800000   | job  | 800000.00  |
| 20.34    | Extra for using low alloy steel/ corrosion resistant steel ( CRS) in place of TMT bar as mentioned in item no 3.4 and 3.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 809130.00 | 3.00     | Kg   | 2427390.00 |
| 20.35    | Providing and laying cement concrete (M30 grade) tactile tile such as directional, warning or hazardous (for vision impaired persons as per standards) of size 300x300x60 mm {60 mm base + (5mm ± 0.5mm) thick raised portion} having water absorption ≤ 6% and conforming to IS: 13801, of approved make in all colours (preferably yellow) and shades for footpath laid on 20mm thick base of cement mortar 1:4 (1cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. (The thickness of wearing layer should not be less than 8mm) and as per harmonized guidelines and space standards for barrier free built environments for persons with disability and elderly persons issued by Ministry of Urban Development, Govt. of India complete as per direction of Engineer-in-Charge. | 91.00     | 1,328.35 | Sqm  | 120880.00  |
| 20.36    | Providing and fixing 50 mm wide Yellow colour, self adhesive 'EDGE STRIPS' of approved make on risers of staircase to help persons with visual disabilities and elderly including cutting and pasting complete in all respect as per direction of Engineer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 300.00    | 253.55   | Mtr  | 76065.00   |
| 20.37    | Providing and fixing 25 mm wide high intensity Anti-Skid reflective tape of approved make on edges of treads of staircase including cutting, pasting etc. complete in all respect and as per direction of Engineer-in-charge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 100.00    | 452.30   | Mtr  | 45230.00   |
| 20.38    | Providing and fixing Stainless Steel (Grade 304) Braille Labels of size 170mm x 35mm X 0.5 mm having Braille dots raised 0.5mm above base plate with one SS rivet of same grade and adhesive of approved make on handrails, complete as per the directions of the engineer in charge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 20.00     | 555.10   | Each | 11102.00   |

| Item No. | Description of Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty   | Rate     | Unit          | Amount           |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|---------------|------------------|
| 20.39    | Providing and fixing coloured, preferably yellow PU - Tactile strips (Guiding) with 3 stems having stem dia of 6.0 mm & stem length between 20 - 25 mm, as ground surface indicators for the visually impaired persons on the pedestrian pathway as per manufacturers design / specification and as per harmonised guidelines complete in all respect and as per direction of Engineer-in-charge.                                                                                            | 15.00 | 4,728.75 | sqm           | 70931.00         |
| 20.40    | Providing and fixing coloured, preferably yellow PU - Tactile Studs (Warning/Positional) with 1 stem having stem dia of 6.0 mm & stem length between 20 - 25 mm, as ground surface indicators for the visually impaired persons, on the pedestrian pathway as per manufacturers design / specification and as per harmonised guidelines complete in all respect and as per direction of Engineer-in-charge.                                                                                  | 30.00 | 4,644.05 | sqm           | 139322.00        |
| 20.41    | Providing and fixing 6mm thick mirror of superior glass (of approved quality ) and of required shape and size with PVC moulded decorative frame of approved make and shade with 6 mm thick solid PVC/WPC board backing. The work shall be carried out as per manufacturer specification and as per direction of Engineer-in-charge.                                                                                                                                                          | 20.00 | 3161.60  | sqm           | 63232.00         |
| 20.42    | Providing and fixing stainless steel English & Hindi (Capital) letter in standard pattern hollow type made with 1.20mm thick stainless steel (ASI Grade - 304) Jindal or equivalent. Depth of letter shall be decided by Engineer-in-charge and rate includes reflective sheets welding /soldering of joints polishing , buffing and fixing on the wall beam surface at any height with necessary nut and bolts/faster wherever is required complete as per direction of Engineer-in-charge. | 400   | 72.00    | per cm height | 28800            |
| 20.43    | Providing/fixing/designing & manufacture of 1.2 mm thick aluminum sheet on self glowing photo luminescent safety signage of various matter as briefed by the Engineer-in-Charge such as passengers, fire safety measures etc. having single side printing/computerized setting letter on the photo luminescent as base chemical covered with stabilizer coating complete as required and approved by Engineer-in-charge at site.                                                             | 3000  | 5.55     | Sqcm          | 16650            |
|          | <b>Sub Total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |          |               | <b>303246871</b> |
|          | Correction factor on DSR 2023 on account of GST @ 0.973 except NS item                                                                                                                                                                                                                                                                                                                                                                                                                       |       |          |               | 295660657        |
|          | Add cost index @12% except NS item                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |          |               | 32806161         |
|          | <b>Total of Civil Component</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |          |               | <b>328466818</b> |

## Schedule of Quantity (Electrical component)

Name of  
Work :

Construction of Office Building for NABARD at HEC Area Murma,  
Pundag Ranchi, Jharkhand.

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                        | Qty  | Unit  | Rate | Amount  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|---------|
| 1       | <b>Sub-Head-I (Wiring)</b>                                                                                                                                                                                                                                                                                                                                         |      |       |      |         |
| 1.1     | Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS/HFFR PVC insulated copper conductor single core cable in surface/ recessed steel conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS/HFFR PVC insulated copper conductor single core cable etc. as required          |      |       |      |         |
| a)      | Group C                                                                                                                                                                                                                                                                                                                                                            | 785  | Point | 2101 | 1649285 |
| 1.2     | Wiring for group controlled (looped) light point/fan point/exhaust fan point/ call bell point (without independent switch etc.) with 1.5 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable in surface/ recessed steel conduit, and earthing the point with 1.5 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable etc. as required. |      |       |      |         |
| a)      | Group C                                                                                                                                                                                                                                                                                                                                                            | 391  | Point | 1246 | 487186  |
| 1.3     | Wiring for light/ power plug with 2X4 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable in surface/ recessed steel conduit alongwith 1 No. 4 sq. mm FRLS PVC insulated copper conductor single core cable for loop earthing as required.                                                                                                           | 2500 | Metre | 480  | 1200000 |
| 1.4     | Wiring for light/ power plug with 4X4 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable in surface/ recessed steel conduit alongwith 2 Nos. 4 sq. mm FRLS/HFFR PVC insulated copper conductor single core cable for loop earthing as required.                                                                                                     | 1700 | Metre | 724  | 1230800 |
| 1.5     | Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS/HFFR PVC insulated copper conductor, single core cable in surface/ recessed steel conduit as required.                                                                                                                                                                    |      |       |      |         |
| a)      | 2 X 1.5 sq. mm + 1 X 1.5 sq. mm earth wire                                                                                                                                                                                                                                                                                                                         | 900  | Metre | 370  | 333000  |
| b)      | 4 X 6 sq. mm + 2 X 6 sq. mm earth wire                                                                                                                                                                                                                                                                                                                             | 500  | Metre | 1001 | 500500  |
| c)      | 4 X 10 sq. mm + 2 X 6 sq. mm earth wire                                                                                                                                                                                                                                                                                                                            | 500  | Metre | 1253 | 626500  |
| d)      | 4 X 16 sq. mm + 2 X 6 sq. mm earth wire                                                                                                                                                                                                                                                                                                                            | 350  | Metre | 1760 | 616000  |
| 1.6     | Supplying and drawing following pair 0.5 mm dia FRLS/HFFR PVC insulated annealed copper conductor, unarmored <b>telephone cable</b> in the existing surface/ recessed steel/ PVC conduit as required.                                                                                                                                                              |      |       |      |         |
| a)      | 2 Pair                                                                                                                                                                                                                                                                                                                                                             | 1000 | Metre | 39   | 39000   |
| 1.7     | Supplying and drawing co-axial <b>TV cable RG-6 grade, 0.7 mm solid copper conductor</b> PE insulated, shielded with fine tinned copper braid and protected with PVC                                                                                                                                                                                               | 500  | Metre | 54   | 27000   |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                        | Qty  | Unit  | Rate | Amount |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|--------|
|         | sheath in the existing surface/ recessed steel/ PVC conduit as required                                                                                                                                                                                                                                            |      |       |      |        |
| 1.8     | Supplying and fixing of following sizes of steel conduit along with accessories in surface/recess including painting in case of surface conduit, or cutting the wall and making good the same in case of recessed conduit as required.                                                                             |      |       |      |        |
| a)      | 20 mm                                                                                                                                                                                                                                                                                                              | 3000 | Metre | 254  | 762000 |
| b)      | 25 mm                                                                                                                                                                                                                                                                                                              | 800  | Metre | 289  | 231200 |
| 1.8     | Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.                                                                                                                                               |      |       |      |        |
| a)      | 20-25A Starter                                                                                                                                                                                                                                                                                                     | 31   | Each  | 693  | 21483  |
| b)      | 6 pin 15/16 A socket outlet                                                                                                                                                                                                                                                                                        | 31   | Each  | 219  | 6789   |
| c)      | Telephone socket outlet                                                                                                                                                                                                                                                                                            | 138  | Each  | 168  | 23184  |
| d)      | TV antenna socket outlet                                                                                                                                                                                                                                                                                           | 35   | Each  | 168  | 5880   |
| e)      | Bell Push                                                                                                                                                                                                                                                                                                          | 17   | Each  | 159  | 2703   |
| 1.9     | Supplying and fixing modular <b>blanking plate</b> on the existing modular plate & switch box excluding modular plate as required.                                                                                                                                                                                 | 50   | Each  | 47   | 2350   |
| 1.10    | Supplying and fixing two module stepped type electronic <b>fan regulator</b> on the existing modular plate switch box including connections but excluding modular plate etc. as required                                                                                                                           | 106  | Each  | 402  | 42612  |
| 1.11    | Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing <b>3 pin 5/6 A modular socket outlet and 5/6 A modular switch</b> , connections etc. as required                                                                           | 172  | Each  | 545  | 93740  |
| 1.12    | Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing <b>6 pin 5/6 &amp; 15/16 A modular socket outlet and 15/16 A modular switch</b> , connections etc. as required                                                             | 162  | Each  | 659  | 106758 |
| 1.13    | Supplying and fixing call bell/ buzzer suitable for single phase, 230 V, complete as required                                                                                                                                                                                                                      | 5    | Each  | 112  | 560    |
| 1.14    | Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing <b>2 nos. 3 pin 5/6 A modular socket outlet and 2 nos. 5/6 A modular switch</b> , connections etc. as required. (For light plugs to be used in non residential buildings). | 166  | Each  | 757  | 125662 |
| 1.15    | Supplying and fixing following size/ modules, GI box alongwith modular base & cover plate for modular switches in recess etc. as required.                                                                                                                                                                         |      |       |      |        |
| a)      | 1 or 2 Module (75mmX75mm)                                                                                                                                                                                                                                                                                          | 346  | Nos   | 354  | 122484 |

| Sl. No.  | Description                                                                                                                                                                                                                                                                                                                                                                                                   | Qty | Unit | Rate | Amount |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
| 1.16     | Supplying, Installation, Testing and commissioning of Passive Infrared (PIR) technology based occupancy sensor having high performance, non regulating programmable type, suitable for connected load upto 10Amp , for mounting height up to 3 meter and for 5 m diameter coverage area along with necessary fixing arrangements i/c programming at site etc. complete as required.                           | 50  | Nos  | 4896 | 244800 |
| 1.17     | Providing and fixing plain 16/0.20mm (0.50sqmm) twin circular flexible FRLS/HFFR PVC insulated, PVC sheathed copper conductor cable direct on the wall with PVC clips etc. as required.                                                                                                                                                                                                                       | 50  | Mtrs | 40   | 2000   |
| <b>2</b> | <b>Sub-Head-II (MCCB, MCB &amp; DB'S)</b>                                                                                                                                                                                                                                                                                                                                                                     |     |      |      |        |
| 2.1      | Supplying and fixing Following amps rating, 415 volts, "C" curve,miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.                                                                                                                                                                       |     |      |      |        |
| a)       | 32 A , TP                                                                                                                                                                                                                                                                                                                                                                                                     | 20  | Each | 1070 | 21400  |
| b)       | 32 A , TPN                                                                                                                                                                                                                                                                                                                                                                                                    | 14  | Each | 1301 | 18214  |
| c)       | 40 A, TP                                                                                                                                                                                                                                                                                                                                                                                                      | 22  | Each | 2230 | 49060  |
| d)       | 40 A, FP                                                                                                                                                                                                                                                                                                                                                                                                      | 20  | Each | 2843 | 56860  |
| e)       | 63 A , FP                                                                                                                                                                                                                                                                                                                                                                                                     | 20  | Each | 2843 | 56860  |
| f)       | 63 A , TP                                                                                                                                                                                                                                                                                                                                                                                                     | 20  | Each | 2230 | 44600  |
| 2.2      | Supplying and fixing following way, horizontal type three pole and neutral, sheet steel, MCB distribution board, 415 V, on surface/ recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/ Isolator)                                                                                  |     |      |      |        |
| a)       | 4 way (4 + 12), Double door                                                                                                                                                                                                                                                                                                                                                                                   | 38  | Each | 4377 | 166326 |
| b)       | 6 way (4 + 18), Double door                                                                                                                                                                                                                                                                                                                                                                                   | 4   | Each | 5299 | 21196  |
| c)       | 8 way (4 + 24), Double door                                                                                                                                                                                                                                                                                                                                                                                   | 12  | Each | 6337 | 76044  |
| 2.3      | Supplying and fixing of following ways surface/ recess mounting, vertical type, 415 V, TPN MCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 200 A tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCBs (but without MCBs and incomer ) as required . (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.) |     |      |      |        |
| a)       | 4 way (4 + 12), Double door                                                                                                                                                                                                                                                                                                                                                                                   | 15  | Each | 7951 | 119265 |
| 2.4      | Supplying and fixing 5 A to 32 A rating, 240/415 V, 10 kA, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.                                                                                                                                                                  |     |      |      |        |
| a)       | Single pole                                                                                                                                                                                                                                                                                                                                                                                                   | 816 | Each | 285  | 232560 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate  | Amount  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|---------|
| 2.5     | Supplying and fixing single pole blanking plate in the existing MCB DB complete etc. as required.                                                                                                                                                                                                                                               | 50  | Each | 14    | 700     |
| 2.6     | Supplying and fixing Cable End Box (Loose Wire Box) suitable for following triple pole and neutral, sheet steel, MCB distribution board, 415 Volts, on surface/ recess, complete with testing and commissioning etc.as required.                                                                                                                |     |      |       |         |
| a)      | For 4 way, Double door TPN MCBDB                                                                                                                                                                                                                                                                                                                | 38  | Each | 1177  | 44726   |
| b)      | For 6 way, Double door TPN MCBDB                                                                                                                                                                                                                                                                                                                | 4   | Each | 1223  | 4892    |
| c)      | For 8 way, Double door TPN MCBDB                                                                                                                                                                                                                                                                                                                | 12  | Each | 1448  | 17376   |
| 2.7     | Supplying and fixing Cable End Box (Loose Wire Box) suitable for triple pole and neutral, sheet steel, Vertical MCB distribution board, 415 Volts, on surface/ recess, complete with testing and commissioning etc. as required.                                                                                                                | 15  | Each | 1271  | 19065   |
| 2.8     | Providing and fixing following rating and breaking capacity and pole MCCB with thermomagnetic release and terminal spreaders in existing cubicle panel board including drilling holes in cubicle panel, making connections, Ics=100% Icu and Operational Voltage 690V etc. as required                                                          |     |      |       |         |
| a)      | 63A, 16KA FPMCCB                                                                                                                                                                                                                                                                                                                                | 5   | Each | 8424  | 42120   |
| b)      | 100 Amp, 30KA, FPMCCB                                                                                                                                                                                                                                                                                                                           | 5   | Each | 8127  | 40635   |
| c)      | 125 Amp, 36KA, FPMCCB                                                                                                                                                                                                                                                                                                                           | 5   | Each | 8644  | 43220   |
| d)      | 125 Amp, 16 KA, TPMCCB                                                                                                                                                                                                                                                                                                                          | 15  | Each | 5103  | 76545   |
| e)      | 200 Amp, 25 KA, TPMCCB                                                                                                                                                                                                                                                                                                                          | 3   | Each | 11586 | 34758   |
| d)      | 400 Amp, 35 KA, TPMCCB                                                                                                                                                                                                                                                                                                                          | 2   | Each | 22644 | 45288   |
| 2.9     | Supplying and fixing 20 amps, 240 volts, SPN industrial type, socket outlet, with 2 pole and earth, metal enclosed plug top alongwith 20 amps "C" curve, SP, MCB, in sheet steel enclosure, on surface or in recess, with chained metal cover for the socket out let and complete with connections, testing and commissioning etc. as required. | 6   | Each | 1806  | 10836   |
| 2.10    | Supplying and Fixing of GI raceway (225 mm X 25 mm) with all accessories, Brackets, Clamps etc on floor/ Wall complete etc as required.                                                                                                                                                                                                         | 200 | Mtrs | 6334  | 1266800 |
| 2.11    | Supplying and Fixing of Vertical Riser of size 225 mm (width) of GI with all accessories, Clamps etc on floor/ Wall complete etc as required.                                                                                                                                                                                                   | 15  | Nos. | 2240  | 33600   |
| 2.12    | Supplying and Fixing of adjustable Junction Box of size 225 mm x 225 mm x 65 mm and adjustable upto 90 mm with cover complete etc as required.                                                                                                                                                                                                  | 30  | Nos. | 2968  | 89040   |
| 2.13    | Supplying and Fixing of Floor Boxes with support plates for screed floor comprising backbox for screed floor Lid & Trim (flxble exit) cable outlet- Galvanised steel with paint complete etc as required.                                                                                                                                       | 25  | Nos. | 5672  | 141800  |

| Sl. No.  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Qty | Unit | Rate  | Amount |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 2.14     | Supplying, installing on wall, testing and commissioning of following capacity Air Insulated Compact Type Rising Mains for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with enclosure made of 1.6mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos aluminium bus bars, necessary joints & expansion joints, fire barrier at each floor, provision of tapping at every metre, continuous earthing with 2 Nos aluminium strip of suitable size (one on each side) including, G.I. clamping brackets, angle iron bracket, steel fasteners, connecting to earthing system etc. as required                                                                                                                                                                         |     |      |       |        |
| a)       | 500 amps 35KA SC for 1 sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60  | Mtrs | 11779 | 706740 |
| 2.15     | Supplying, installing, connecting to existing Air Insulated Compact Type bus trunking/ rising mains, testing and commissioning of following capacity End Feed Unit for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply made with 1.6mm thick steel sheet enclosure duly powder coated with provision of MCCB/ACB (but without MCCB/ACB) complete with necessary joints including clamping brackets, angle iron bracket, steel fasteners, connecting to earthing system etc. as required                                                                                                                                                                                                                                                                                                             |     |      |       |        |
| a)       | 400 amps 30KA SC for 1 sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2   | Nos  | 11888 | 23776  |
| 2.16     | Supplying, installing, connecting to existing Air Insulated Compact Type bus trunking/ rising mains, testing and commissioning of following capacity Plug In/ Tap Off Box for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with 1.6mm thick steel sheet enclosure duly powder coated with provision of MCCB (but without MCCB) complete etc. as required                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |      |       |        |
| a)       | 125 amps 15KA SC for 1 sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15  | Nos  | 9104  | 136560 |
| b)       | 200 amps 25KA SC for 1 sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3   | Nos  | 9104  | 27312  |
| <b>3</b> | <b>SH-III ( Fittings &amp; Accessories)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |       |        |
| 3.1      | Supply, Installation, Testing and Commissioning of ceiling fan with Brush Less Direct Current ( <b>BLDC</b> ) <b>Motor</b> , class of insulation: B, 3 nos. metal( Aluminum alloy) blades, 30 cm long down rod, 2 nos. canopies, shackle kit, safety rope, copper winding, steel/Al bodyPower Factor not less than 0.9, Service Value (CM/M/W) minimum as below, 350 RPM (tolerance as per IS : 374-2019), THD (Total Harmonic Distortion) less than 10%, suitable for operation with regulator for speed control and all remaining accessories including safety pin, nut bolts, washers, temperature rise=75 degree C (max.), insulation resistance more than 2 mega ohm, suitable for 230 V, 50 Hz, single phase AC Ceiling Fan compliant to IS 374:2019 fan Supply, earthing etc. complete as req. |     |      |       |        |
| a)       | 1200mm, service value $\geq 6.0$ CM/Min/Watt, air delivery 210                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 106 | Each | 2695  | 285670 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
| 3.2     | <p>Supplying, installation, Testing &amp; Commissioning of <b>LED Recessed/ surface Down lighter</b> (Round/ square/ Rectangular) COB Type of following body material and construction as per IS : 10322 with driver as per the requirement with Driver efficiency &gt;85%, Operating voltage AC 140-270 Volt, frequency 50/60 hz, Operating temp range -5 deg to 40 deg centigrade, internal surge protection of 2.5 KV with Short &amp; Open circuit protection ,THD &lt; 10% , P. F.≥0.95, IP20, CRI &gt;80 , UGR (Unified Glare Rating) &lt; 19, Flicker free (flicker should be below 5%), life time (LED,Driver &amp; electrical circuitary), of minimum 50000 Burning Hours with 70% of initial Lumen maintained till life ends , CCT 3000°K / 4000°K / 5700°K / 6500°K (As per ANSI Bin), SDCM (Standard Deviation Color Matching) &lt;3, Maximum power consumption should not more than the specified rating and Fixture shall be confirming to relevant BIS standards and trade mark certificate (T.C.). Manufactures Word Mark/ Name Engraved/ Embossing/ Screen printing on housing Complete in all respect i/c external connections with 1.5 sq mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. <b>System lumen efficacy ≥105 and &lt;120 lm/Watt output</b> . LM79 &amp; LM80 Test report and all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C) Powder coated die cast /Extruded aluminium Body including trim with Aluminium Reflector</p> |     |      |      |        |
| a)      | 18 watt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 173 | Each | 920  | 159160 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty | Unit | Rate | Amount |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
| 3.3     | Supplying, installation, Testing & Commissioning of <b>Panel light 2x2 ft.</b> , of following body material and construction as per IS : 10322 with driver as per the requirement with Driver efficiency >85%, Operating voltage AC 140-270 Volt, freq 50/60 hz, operating temp range -5 deg to 40 deg centigrade, internal surge protection of 2.5 KV with Short & Open circuit protection, THD < 10% , P. F.≥0.95, IP20, CRI >80, UGR (Unified Glare Rating) < 19, Flicker free, (flicker should be below 5 %), life time (LED,Driver & electrical circuitary), of minimum 50000 Burning Hours with, 70% of initial Lumen maintained till life ends as per LM80 extrapolation IES TM-21-11 report, CCT 3000°K / 4000°K/ 5700°K /6500°K (As per ANSI Bin), SDCM(Standard Deviation Color Matching) <3, Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard and trade mark certificate ( T.C.). Manufactures Word Mark/ Name Engraved/ Embossing/ Screen printing on housing. complete in all respect i/c external connections with 1.5 sq mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy ≥105 <120 lm/Watt output . LM79 & LM80 Test report and all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C). Powder coated die cast /Extruded aluminium Body (Thickness > 1.20 mm) |     |      |      |        |
| a)      | 36 watt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 252 | Each | 2508 | 632016 |
| b)      | 18watt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 206 | Each | 2060 | 424360 |
| 3.4     | Supplying,Installation, testing and commissioning of surface mounted LED batten (length 2') fitting having System Lumen output ≥ 1000 lm, Metal housing , Power factor ≥ 0.9 having suitable diffuser and CCT in between 4000K to 6500 K (i/c both Limits) complete with all accessories etc. directly on ceiling/wall including connection with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required. <b>(Mirror Light)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 44  | Each | 678  | 29832  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Qty | Unit | Rate | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
| 3.5     | LED Batten light (System lumen efficacy $\geq 105 < 120$ lm/Watt) Supplying, installation, Testing & Commissioning of LED surface mounted Batten light of following body material and construction as per IS : 10322 with driver (Replaceable) as per the requirement with Driver efficiency $> 85\%$ ,Operating voltage AC 140-270 Volt, freq 50/60 hz, Operating temp range -5 deg to 40 deg centigrade, internal surge protection of 2.5 KV with Short & Open circuit protection ,THD $< 10\%$ , P. F. $\geq 0.95$ , IP20, CRI $> 80$ , Flicker free, (flicker should be below 5 %), life time (LED,Driver & electrical circuitary), of minimum 50000 Burning Hours with , 70% of initial Lumen maintained till life ends, CCT 3000°K / 4000°K / 5700°K /6500°K (As per ANSI Bin), SDCM(Standard Deviation Color Matching) $< 3$ , Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard and trade mark certificate (T.C.). Manufactures Word Mark/ Name Engraved/ Embossing/ Screen printing on housing.complete in all respect i/c external connections with 1.5 sq mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy $\geq 105 < 120$ lm/Watt output . LM79 & LM80 Test report and all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C). Powder coated die cast /Extruded aluminium Body (Thickness $> 1.20$ mm) | 112 | Each | 681  | 76272  |
| 3.6     | Supplying, Installation ,Testing and Commisioing of fresh air fan with louver having sweep not less than 250 mm ,plastic body with all accessories suitable for operation on 230 volt ,50 Hz AC supply in existing opening, including connection with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 47  | Each | 2191 | 102977 |
| 3.7     | Supplying, Installation ,Testing and Commisioing of Metal body light duty exhaust fan having sweep not less than 300 mm and RPM not less than 900 with all accessories suitable for operation on 230 volt ,50 Hz AC supply, in existing opening, including connection with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 19  | Each | 3237 | 61503  |
| 3.8     | Supply, Installation, Testing and commissioning of 400mm sweep Wall fan including connection and interconnections etc, and suitable to work on 230Volts single phase, 50Hz, AC supply etc. complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 97  | Each | 3458 | 335426 |

| Sl. No. | Description                                                                                                                                                                                                                                         | Qty | Unit | Rate  | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 3.9     | Supplying and fixing of Wireless call bell receiver with one battery-operated transmitter, range up to 20 m in open air suitable for 12V battery and having facility to control Volume , complete as required                                       | 10  | Each | 874   | 8740   |
| 4       | <b>SH-IV ( Earthing &amp; Lightning Conductor )</b>                                                                                                                                                                                                 |     |      |       |        |
| 4.1     | Earthing with G.I. earth pipe 4.5 metre long, 40 mm dia including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. with charcoal/ coke and salt as required.                         | 10  | Each | 7658  | 76580  |
| 4.2     | Providing and laying earth connection from earth electrode with 6 SWG dia G.I. Wire in 15 mm dia G.I. pipe from earth electrode including connection with G.I. thimble excavation and re-filling as required.                                       | 100 | mtr  | 313   | 31300  |
| 4.3     | Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.                                                                                                                                                     | 50  | mtr  | 84    | 4200   |
| 4.4     | Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.   | 14  | Set  | 8351  | 116914 |
| 4.5     | Providing and fixing 25 mm X 5 mm G.I. strip in 40 mm dia G.I. pipe from earth electrode including connection with G.I. nut, bolt, spring, washer excavation and re-filling etc. as required                                                        | 50  | Mtrs | 755   | 37750  |
| 4.6     | Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required                                                                                                                                               | 60  | Mtrs | 287   | 17220  |
| 4.7     | Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 Meter long etc. with charcoal/ coke and salt as required. | 6   | Set  | 15004 | 90024  |
| 4.8     | Providing and fixing 25 mm X 5 mm copper strip in 40 mm dia G.I. pipe from earth electrode including connection with brass nut, bolt, spring, washer excavation and re-filling etc. as required.                                                    | 50  | Mtrs | 1638  | 81900  |
| 4.9     | Providing and fixing 25 mm X 5 mm copper strip on surface or in recess for connections etc. as required.                                                                                                                                            | 60  | Mtrs | 1246  | 74760  |
| 4.10    | Providing and fixing of lightning conductor finial, made of 25 mm dia 300 mm long, G.I. tube, having single prong at top, with 85 mm dia 6 mm thick G.I. base plate including holes etc. complete as required.                                      | 6   | Nos. | 609   | 3654   |
| 4.11    | Jointing copper / G.I. tape (with another copper/ G I tape, base of the finial or any other metallic object) by riveting / nut bolting/ sweating and soldering etc as required                                                                      | 200 | Nos. | 139   | 27800  |
| 4.12    | Providing and fixing G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as required.(For horizontal run)                                                                                                   | 500 | Mtrs | 148   | 74000  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Qty | Unit | Rate  | Amount |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 4.13    | Providing and fixing G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as required.(For vertical run)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 300 | Mtrs | 238   | 71400  |
| 4.14    | Providing and fixing testing joint, made of 20 mm X 3 mm thick G.I. strip, 125 mm long, with 4 nos. of G.I. bolts, nuts, chuck nuts and spring washers etc. complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6   | Nos. | 3614  | 21684  |
| 4.15    | Providing and laying G.I. tape 32 mm X 6 mm from earth electrode directly in ground as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30  | Mtrs | 221   | 6630   |
| 5       | <b>SH-V ( Street Lights, Bollard, Post-top)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |       |        |
| 5.1     | LED <b>Street light fixture</b> , powder coated pressure die cast aluminium body (System lumen efficacy $\geq 105 < 120$ lm/Watt) Supplying, installation, Testing & Commissioning of Street light LED fixture powder coated pressure die cast aluminium body with driver as per the requirement with Driver efficiency $> 85\%$ , Input voltage: 140-270 Volt AC, freq 50/60 hz, Operating temp range -5 deg to 50 deg centigrade, internal surge protection of 5 KV L,N,E as per IEC 61000-4-5, Driver efficiency $> 85\%$ , THD $< 10\%$ as per IEC 61000-3-2 , P. F. $\geq 0.95$ , IP-66, IK-10, CRI $> 70$ , under voltage and over voltage protection, EMI-EMC As per CISPR -15, lenses for beam angle as per IESNA type I/II/III as per the width of the road and the project requirement., suitable to fit in up to 65mm dia pipe, life time (LED, Driver & electrical circuitary) of minimum 50000 Burning Hours with 70% of initial Lumen maintained till life ends as per LM80 extrapolation IES TM- 21-11 report, CCT 000°K/4000°K/5700°K/6500°K(As per ANS Bin), SDCM(Standard Deviation Color Matching) $< 5$ , Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard complete in all respect i/c external connections with 1.5 sq mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy $\geq 105 < 120$ lm/Watt output .LM79 & LM80 Test report and all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C). |     |      |       |        |
| a)      | 50 watt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 35  | Nos. | 1782  | 62370  |
| 5.2     | Supplying, installation, testing and commissioning of outdoor type IP 54 rating <b>street light panel</b> made out of CRCA Sheet Steel duly phosphatized and power coated with switching of street lights repeatedly every day as per the set time through Programmable 24 Hours Time Switch / Programmable Astronomical Time Switch capable of 12 KW load having a incomm of 63 Amp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2   | Nos  | 46960 | 93920  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty | Unit | Rate  | Amount  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|---------|
|         | TPN 'C' series MCB with 65Amp TP Contractor and 5-32 Amp 'C' curve TPN MCB as outgoing with in-built Short-Circuit Protection confirming to IS/IEC 60947-4-1 having provision for outgoing of 3x10 sq. mm Al. Conductor on a suitable size MS angle Stand grouted in the earth etc. as reqd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |       |         |
| 5.3     | Supplying of pre-fabricated and pre-painted Octagonal section made of 3 mm thick sheet hot dip galvanised pole of 6 Mtrs. height with single arm 1 Mtr. bracket suitable for 130 mm Bottom, 70 mm Top, welded steel base plate of size 200 mm x 200 mm x 12 mm thick having 4 Nos. mounting holes on 200 mm PCD. Including providing & fixing 4 Nos. 16 mm dia. 600 mm long foundation bolt and Erection of metallic pole of 6mtr length in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as required. and pre-fabricated Bakelite sheet with 1 No. 6 A, 10 KA, SP 'C' series MCB and suitable size stud type connector in the inner side of the existing pole respectively. Supplying and drawing 3 x 1.5 sq.mm FRLS PVC insulated copper conductor from existing connector to fittings, connection earthing complete etc. as required. | 40  | Nos. | 28748 | 1149920 |
| 5.4     | Supplying, Installation, Testing & Commissioning of 3 Mtrs. height Decorative GI pole with PU painted surface finish having opening window for terminal connections 1 No. 6 A, 10 KA, SP 'C' series MCB & mounting accessories, base plate dia 200 mm & 3 mm thick having 4 Nos. mounting holes on 200 mm PCD suitable for M16 bolts i/c supply of 4 Nos. M16 Bolts in cement concrete (1 cement : 3 coarse sand : 6 stone aggregate 20mm nominal size) foundation including excavation and refilling, cement plaster i/c Supplying and drawing 3 x 1.5 sq.mm FRLS PVC insulated copper conductor from existing connector to fittings, connection earthing complete etc. as required. (The design & drwaing should be approved by Engineer-in - charge)                                                                                                                                                                                      | 20  | Nos. | 25195 | 503900  |
| 5.5     | Supplying, installation, testing and commissioning of LED Post Top Luminaries 35-40 watt. having die cast aluminum housing and polycarbonate diffuser , having IP:65/66 protection and shall be fitted on the existing suitable dia GI pole with or without reducer, connection with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable including earthing etc complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 20  | Nos. | 10614 | 212280  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty  | Unit  | Rate   | Amount  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|--------|---------|
| 5.6     | Supplying, Installation, Testing and Commissioning of Outdoor Type LED Bollard luminaire suitable for 8-10 Watts, 230 volts, 50 Hz, AC supply including electronic driver, 4 KV Surge protection, IP- 65/66 protection, extruded aluminium body with diffuser and foundation in cement concrete (1 cement : 3 coarse sand : 6 stone aggregate 20mm nominal size) (The design & drawing should be approved by Engineer-in -charge) including excavation and refilling complete etc. as required.                                                                                                                                                              | 40   | Nos.  | 8000   | 320000  |
| 5.7     | Supplying, Installations, Testing & Commissioning of All In One Hybrid Type LED Solar Street Light with System lumen output >= 9600 lumens, system luminous efficacy >= 160 Lm/W, Mono Crystalline Solar Panel of capacity not less than 100 Wp, Efficiency >= 90%, Lithium Ferro Phosphate battery, MPPT Solar charge controller, Automatic Power Management. Should have flexible angle of mounting LED's Load & backup upto 16 Hrs with Intelligent Dimming on fully charged battery. System should have Smart self-diagnostic feature for indicating battery charging, cut off & fault if any i/c all accessories connection, complete etc. as required. | 10   | Nos.  | 117124 | 1171240 |
|         | <b>SH-VI (MV CABLE LAYING)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |       |        |         |
| 6.1     | Supplying of Aluminium Armoured conductor one number PVC insulated and PVC sheathed / XLPE power cable of 11 KV grade of following size as required. The Cable should be confirming to IS 7098 (Part II) amended upto date.                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |       |        |         |
| (a)     | 3 x 240 Sq mm 'E'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60   | Mtrs  | 3464   | 207840  |
| 6.2     | Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 11 KV grade of following size in the existing masonry open duct as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |       |        |         |
| (a)     | Above 120 sq. mm and upto 400 sq. mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 40   | Mtrs  | 146    | 5840    |
| 6.3     | Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 11 KV grade of following size in the existing RCC/ HUME/ METAL pipe as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |       |        |         |
| (a)     | Above 120 sq. mm and upto 400 sq. mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 20   | Mtrs  | 170    | 3400    |
| 6.4     | Supplying and making outdoor cable end termination with heat shrinkable jointing kit complete with all accessories including lugs suitable for following size of 3 core, XLPE aluminium conductor cable of 11 KV grade as required :                                                                                                                                                                                                                                                                                                                                                                                                                         |      |       |        |         |
| a)      | 240 sq. mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2    | Nos   | 24255  | 48510   |
| 6.5     | Supplying, of following size ISI marked XLPE insulated and PVC sheathed aluminium conductor armoured U.G. cable of 1.1 KV grade IS: 7098 (Part-I) 1988 as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |        |         |
| a)      | 3x10 sq mm for street & compound lights                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1800 | Metre | 200    | 360000  |

| Sl. No. | Description                                                                                                                                                                                                                     | Qty  | Unit  | Rate | Amount  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|---------|
| b)      | 4x25 sq mm for Pump, UPS VTPN                                                                                                                                                                                                   | 300  | Metre | 408  | 122400  |
| c)      | 3.5x35 sq mm for Street Light Panel and Fountains                                                                                                                                                                               | 300  | Metre | 465  | 139500  |
| d)      | 3.5x50 sq mm for 3phase VTPN at 2nd Floor                                                                                                                                                                                       | 200  | Metre | 622  | 124400  |
| e)      | 3.5x120 sq mm                                                                                                                                                                                                                   | 200  | Metre | 1388 | 277600  |
| f)      | 3.5x240 sq mm                                                                                                                                                                                                                   | 500  | Metre | 2587 | 1293500 |
| g)      | 3.5x300 sq mm                                                                                                                                                                                                                   | 150  | Metre | 3198 | 479700  |
| h)      | 3.5x400 sq mm                                                                                                                                                                                                                   | 250  | Metre | 4152 | 1038000 |
| 6.6     | Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 kV grade of following size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc. as required. |      |       |      |         |
| a)      | Upto 35 sq. mm                                                                                                                                                                                                                  | 1600 | Metre | 453  | 724800  |
| b)      | Above 35 sq. mm and upto 95 sq. mm                                                                                                                                                                                              | 150  | Metre | 475  | 71250   |
| c)      | Above 95 sq. mm and upto 185 sq. mm                                                                                                                                                                                             | 150  | Metre | 497  | 74550   |
| d)      | Above 185 sq. mm and upto 400 sq. mm                                                                                                                                                                                            | 800  | Metre | 564  | 451200  |
| 6.7     | Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing RCC/ HUME/ METAL pipe as required.                                                                     |      |       |      |         |
| a)      | Upto 35 sq. mm                                                                                                                                                                                                                  | 500  | Metre | 47   | 23500   |
| b)      | Above 35 sq. mm and upto 95 sq. mm                                                                                                                                                                                              | 20   | Metre | 72   | 1440    |
| c)      | Above 95 sq. mm and upto 185 sq. mm                                                                                                                                                                                             | 20   | Metre | 97   | 1940    |
| d)      | Above 185 sq. mm and upto 400 sq. mm                                                                                                                                                                                            | 200  | Metre | 170  | 34000   |
| 6.8     | Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 kV grade of following size in the existing masonry open duct as required.                                                                         |      |       |      |         |
| a)      | Upto 35 sq. mm                                                                                                                                                                                                                  | 300  | Metre | 36   | 10800   |
| b)      | Above 35 sq. mm and upto 95 sq. mm                                                                                                                                                                                              | 30   | Metre | 58   | 1740    |
| c)      | Above 95 sq. mm and upto 185 sq. mm                                                                                                                                                                                             | 30   | Metre | 80   | 2400    |
| d)      | Above 185 sq. mm and upto 400 sq. mm                                                                                                                                                                                            | 100  | Metre | 146  | 14600   |
| 6.9     | Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 kV grade as required.                         |      |       |      |         |
| a)      | 3 X 10 sq. mm (22mm)                                                                                                                                                                                                            | 100  | Nos   | 312  | 31200   |
| b)      | 4 X 25 sq. mm (28mm)                                                                                                                                                                                                            | 6    | Nos   | 373  | 2238    |
| c)      | 3½ X 50 sq. mm (35mm)                                                                                                                                                                                                           | 4    | Nos   | 484  | 1936    |
| d)      | 3½ X 120 sq. mm (45mm)                                                                                                                                                                                                          | 2    | Nos   | 710  | 1420    |
| e)      | 3½ X 240 sq. mm (62mm)                                                                                                                                                                                                          | 6    | Nos   | 1160 | 6960    |
| f)      | 3½ X 300 sq. mm (70mm)                                                                                                                                                                                                          | 6    | Nos   | 1336 | 8016    |
| g)      | 3½ X 400 sq. mm (82mm)                                                                                                                                                                                                          | 4    | Nos   | 1713 | 6852    |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty  | Unit  | Rate    | Amount  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|---------|---------|
| 6.10    | Supplying and laying of following size DWC HDPE pipe ISI marked along with all accessories like socket, bend, couplers etc. conforming to IS 14930, Part II complete with fitting and cutting, jointing etc. in the existing trench, complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |       |         |         |
| a)      | 63 mm dia (OD-63 mm & ID-51 mm nominal)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2000 | Metre | 136     | 272000  |
| b)      | 90 mm dia (OD-90 mm & ID-76 mm nominal)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 500  | Metre | 183     | 91500   |
| c)      | 120 mm dia (OD-120 mm & ID-103 mm nominal)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 500  | Metre | 264     | 132000  |
| 6.11    | Supplying and embedding following dia G.I. pipe (medium class) in pole collar/ foundation (during casting) for cable entry including bending the pipe to the required shape complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |       |         |         |
| a)      | 40 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 50   | Metre | 626     | 31300   |
|         | <b>SH:- VII (Substation and LT Panel)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |       |         |         |
| 7.1     | Supply, Installation Testing and Commissioning of indoor type, floor mounted, metal clad, 11 KV, VCB panel with 3 Nos. VCBs, totally enclosed & fully interlocked, horizontal drawout, horizontal isolation type breaker as per IS 13118, as amended upto date and additional specifications, having capacities as mentioned below, single break, trip free mechanism, manually charged and auto / manually closing breaker suitable for use on 11 KV, 3 Phase, 50 Hz, A.C supply with short circuit fault level of 350 MVA, complete with self contained fully interlocked, rack in and rack out mechanism, air insulated but encapsulated copper bus bars of 630 Amps capacity, breaker featured with mechanical ON/ OFF indicator with hand trip device, spring release coil, shunt trip coil and auxiliary switch of 4 NO + 4 NC and equipped with following switchgears & accessories i/c POWER PACK connections suitable for 3 Core "E" HT XLPE insulated, 11 KV cable (cable entry from bottom side), end termination with heat shrinkable jointing material etc as required. |      |       |         |         |
|         | (Note-Cost of end termination not included in this item)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |       |         |         |
| (a)     | <b>Incoming - 1 No. 630 Amp. VCB</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |       |         |         |
| (b)     | 1 No. - 11 KV/110 Volts PT Class 0.5 accuracy and 100 VA burden with 1 No. digital voltmeter (0-15KV), selector switch for voltmeter and protection fuses / MCB for HT metering upto 12 KV on incomer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |       |         |         |
| (c)     | 1 No. (0 - 300 A) Ammeter, digital type, with selector switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |       |         |         |
| (d)     | 1 No. - Microprocessor based numerical relay with O/L, E/F and S/C protections.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |       |         |         |
| (e)     | 1 No. - set of dual core dual ratio 3 CTs 300/150/5/5 A of 15 VA burden and accuracy Class - 0.5 for metering and class 5P10 for protection.(Suitable for above metering set)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |       |         |         |
|         | <b>(a) Outgoing 2 Nos. 630 A VCB</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |       |         |         |
|         | (b) 2 Nos. (0 - 100 A) Ammeter, digital type, with                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1    | Job   | 2396379 | 2396379 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate  | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
|         | selector switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |      |       |        |
|         | (c) 2 Nos. - Microprocessor based numerical relays with O/L, E/F and S/C protections.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |       |        |
|         | (d) 2 Sets of dual core dual ratio 3 CTs 100/50/5/5 A of 15 VA burden and accuracy Class - 1.0 for metering and class 5P10 for protection.(Suitable for above metering set)                                                                                                                                                                                                                                                                                                                                                                                     |     |      |       |        |
| 7.2     | Providing of Insulated Electrical Matting Class - 1 PV tested upto 10 KV of 1 mtr.x 10 mtr & 2 mm thick as per IEC 61111 complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                  | 10  | Nos  | 12957 | 129570 |
| 7.3     | Providing and fixing M.V. danger notice plate of 200 mm X 150 mm, made of mild steel, at least 2 mm thick, and vitreous enameled white on both sides, and with inscription in single red colour on front side as required.                                                                                                                                                                                                                                                                                                                                      | 2   | Nos  | 315   | 630    |
| 7.4     | Providing and fixing H.T. danger notice plate of 250 mm X 200 mm, made of mild steel, at least 2 mm thick, and vitreous enameled white on both sides, and with inscription in single red colour on front side as required.                                                                                                                                                                                                                                                                                                                                      | 2   | Nos  | 340   | 680    |
| 7.5     | Supplying, installation, including suspension, testing and commissioning of following capacity bus trunking with aluminium bus bars having current density of 130 A/ sq cm at nominal current rating in 1.6mm thick IP 42 sheet steel enclosure in convenient sections for use on, 3 phase, 4 wire, 415 volts, 50 Hz, A.C. supply including jointing of sections, flexible joints, expansion joints, bends and earthing with 2 runs of galvanised iron strips, suspenders, angle iron bracket, steel fasteners, connecting to earthing system etc. as required. |     |      |       |        |
| a)      | 1000 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 40  | Mtrs | 17350 | 694000 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Qty | Unit | Rate | Amount |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
| 7.6     | Supply, installation, testing and commissioning of following capacity (continuous loading) 11/0.433 KV Delta/Star, step down, 3 Phase, 50 Hz, Dyn 11 vector group, Cast Resin / VPI (vacuum pressure impregnated) Dry Type, copper wound transformer (Electrolytic grade 99.9% pure copper, Core made of first grade Cold Rolled Grain Oriented (CRGO) Core grade MOH or better) AN (air natural) cooled transformer suitable for indoor applications with Offload Tap Changer/ On Load Tap Changer (OLTC) ( below 500 KVA offload and above 500 KVA On Load Tap Changer) on HV side having AVR relay and Remote Tap Changer Control (RTCC) for automatic sensing of incoming voltage, automatic operation of OLTC and facility for remote and manual operation of OLTC HV side in range of +5% to -15% in steps of 2.5%, insulation class F (minimum), suitable for environment conditions class E4, suitable for fire behaviour class F1, climate class-C1, having cable end boxes on HV side suitable for 3x300 sqmm XLPE cable of 11 KV grade with necessary hardware, clamps, lugs etc. for termination on HV/MV etc. for all transformers, bus trunking arrangement on LV side complete with all accessories and safety provisions as per relevant IS Code, The transformer shall be provided with standard fittings/accessories as per relevant IS and mentioned below, protection alarm/trip protection, 3 nos. of Polymeric Zinc Oxide surge Arrestors on HV Side. Winding Temperature scanner (Digital) with alarm/Trip contacts with RTD Sensors per LV winding and space for mounting differential protection CT's in LV chamber with neutral brought out separately including supplying and laying of copper conductor multicore control cable from transformer to HT breaker/HT Panel for safety tripping, complete as confirming to IS-2026 Part-11, i/c supplying and grouting of suitable M.S. Channel with all accessories, complete in all respects as required at site as per CPWD specifications. |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty   | Unit | Rate         | Amount  |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|---------|
|         | Design ambient condition : a) air temperature 50 deg C, b) Relative Humidity 90 % Max, c) Seismic Zone as per location of site, d) Altitude as per location/site. The transformer should have QR code which should contain drawing, test report OEM - Tag of manufacturing location, rating plate as per relevant IS Code etc. All testing shall as per relevant IS Code. Noise level Shall not exceed limits as per NEMA TR-1 with all accessories running measured as per IEC 551 / NEMA standard.<br>Fitting and Accessories : The following fittings shall be provided:- a) Two earthing terminals with the earthing symbol) Rating and terminal marking plates; c) Thermometer pocket with cap; d) Lifting lugs for the complete transformer as well as for core and winding assembly; e) Bi-directional flat rollers (for transformers above 200 kVA); f) HV side neutral grounding strip (where one of the HV bushing terminal is connected to earth); g) Arcing horns or suitable rating lightning arrestors for HT side - 3 Nos. for transformers up to 200 kVA; h) Bird guard; i) Jacking pads (for transformer above 1 600 kVA); j) Name Rating & Diagram Plate. k) Monogram Plate. i) Additional neutral separately brought out on bushing for earthing. Level 3 |       |      |              |         |
| a)      | 315 KVA (losses at 50% loading < 955watt, losses at 100% loading < 2750watt)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2     | Nos  | 952100       | 1904200 |
| 7.7     | Supplying, Installation, Testing & Commissioning of Indoor fully bolted type, sectionalized Low Voltage Panel suitable for 415 V, 3 Phase, 4 wire 50 Hz AC supply system as per standard IEC 61439-1&2 as Total Type Tested Assembly of suitable size fabricated in compartmentalized design with CRCA sheet steel of 2mm thick for load bearing member, 3mm thick for gland plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade, having 1000 Amp capacity extensible type 4 strip aluminium alloy bus bars of high conductivity, bus bar supports, bottom base channel of MS section not less than 100 mm x 50 mm x 5 mm thick fabrication shall be done in trasportable sections, entire panel shall have a common copper earth bar of size 25 mm x 5 mm at the rear with 2 Nos. earth stud, solid connections from main bus bar to switch gears with required size of bus bars/Copper Cables and control wiring with 2.5 Sq.mm. PVC insulated copper FRLS conductor S/C cable, cable alleys, cable gland plates i/c providing following switch gears - (Main Non Essential LT Panel At Substation )                                                                                                                         |       |      |              |         |
|         | Each Incomer shall have Surge Protection Device of Type - I + II category of minimum 50 KA rating with suitable capacity fuse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |      |              |         |
| A       | <b>Incomer</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |      |              |         |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | AE(E) |      | EE(C)Page338 |         |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty | Unit | Rate | Amount |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
|         | Horizontal type four pole EDO air circuit breakers of <b>800 Amps with Microprocessor based protection release (S/C, O/C, E/F) 50KA</b> fault breaking capacity (Ics=Icu upto 433V manually operated, fitted with interlocked door, automatic safety shutters, mechanical ON/OFF and service/test/isolated position indicators and frame earthing contact, conforming to IS-1397-2 1993 as amended up-to-date complete with following accessories for each complete with following accessories for each ACB - 2 Nos. |     |      |      |        |
|         | (a) Independent manual spring closing mechanism for each ACB - 2 Nos.                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |      |        |
|         | (b) Microprocessor release (EMI & EMC certified) for over current, earth fault & short circuit protection for each ACB - 2 Sets.                                                                                                                                                                                                                                                                                                                                                                                     |     |      |      |        |
|         | © Multifunctional meter with mode selection button and push button type switches with CTs - 2 Sets.                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |      |        |
|         | (d) 3 Nos. Phase indication LED lamps with 2 Amps back up MCBs, breaker 'ON' indication light with 2 A MCB, test terminal block set, circuits as per-standard practice, auxiliary contacts for positive interlocking of the breakers as required. - 2 Sets                                                                                                                                                                                                                                                           |     |      |      |        |
|         | (e) Shunt trip coil 220V A.C. - 2 Sets                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
|         | <b>BUS Coupler (Comprises of the following)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |      |        |
|         | Horizontal type four pole EDO air circuit breakers of <b>800 Amps with Microprocessor based protection release (S/C, O/C, E/F) 50KA</b> fault breaking capacity (Ics=Icu upto 433V manually operated, fitted with interlocked door, automatic safety shutters, mechanical ON/OFF and service/test/isolated position indicators and frame earthing contact, conforming to IS-1397-2 1993 as amended up-to-date complete with following accessories for each complete with following accessories for each ACB - 1 No.  |     |      |      |        |
|         | (a) Independent manual spring closing mechanism- 1 No.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
|         | (b) Breaker 'ON' indicating light with back up 2A MCB fuse test terminal block, etc. as required.- 1 Set.                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |      |        |
|         | <b>BUS BARS :</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |      |      |        |
|         | 4 Strip aluminium bus bars of minimum <b>1000 Amps</b> capacity of suitable cross section for achieving required current density with heat shrinkable coloured sleeves and i/c suitable size supports & their spacing etc.                                                                                                                                                                                                                                                                                           |     |      |      |        |
|         | <b>Interlocking Features</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |      |      |        |
|         | Electrical through advance contacts in ACB's (IN-Comers and Bus-Couplers) and Mechanical (castel key) interlocking should be provided to ensure that only one supply is available at a time on each section of bus and to eliminate any possibility of accidentally approaching two supplies at one bus section                                                                                                                                                                                                      |     |      |      |        |
| B       | <b>Out Goings - Panel - I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                               | Qty | Unit | Rate    | Amount  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------|---------|
| (i)     | <b>400 Amps, 4 Pole, 50 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (For DG Set AMF Panel)</b>                                              |     |      |         |         |
| (ii)    | <b>400 Amps, 4 Pole, 50 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (Spare)</b>                                                             |     |      |         |         |
| (iii)   | <b>250 Amps, 4 Pole, 50 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 3 Nos. [1 No. for VRV/VRF (NE Outdoor) FP + 1 No. for APFC + 1 No. Spare]</b> |     |      |         |         |
| (iv)    | <b>200 Amps, 4 Pole, 50 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (Spare)</b>                                                                        |     |      |         |         |
| (v)     | <b>100 Amps, 4 Pole, 36 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (Spare)</b>                                                                        |     |      |         |         |
| (vi)    | <b>63 Amps, 4 Pole, 36 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (Spare)</b>                                                                         |     |      |         |         |
| C       | <b>Out Goings - Panel - II</b>                                                                                                                                                            |     |      |         |         |
| (i)     | <b>400 Amps, 4 Pole, 50 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 2 No. [For RM - Power &amp; VRV/VRF (NE Indoor) + 1 No. Spare]</b>            |     |      |         |         |
| (ii)    | <b>400 Amps, 4 Pole, 50 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (For FFS Pump Room)</b>                                                 |     |      |         |         |
| (iii)   | <b>250 Amps, 4 Pole, 50 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 2 Nos. [1 No. for APFC + 1 No. Spare]</b>                                     |     |      |         |         |
| (iv)    | <b>200 Amps, 4 Pole, 50 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (Spare)</b>                                                                        |     |      |         |         |
| (v)     | <b>100 Amps, 4 Pole, 36 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (Spare)</b>                                                                        |     |      |         |         |
| (vi)    | <b>63 Amps, 4 Pole, 36 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (Spare)</b>                                                                         |     |      |         |         |
| -       | <b>A to C</b>                                                                                                                                                                             | 1   | Job  | 2528944 | 2528944 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qty | Unit | Rate   | Amount |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|--------|
| 7.8     | Supplying, Installation, Testing & Commissioning of Indoor fully bolted type, sectionalized Low Voltage Panel suitable for 415 V, 3 Phase, 4 wire 50 Hz AC supply system as per standard IEC 61439-1&2 as Total Type Tested Assembly of suitable size fabricated in compartmentalized design with CRCA sheet steel of 2mm thick for load bearing member, 3mm thick for gland plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade, having <b>600 Amp capacity</b> 4 strip aluminium alloy bus bars of high conductivity, bus bar supports, bottom base channel of MS section not less than 100 mm x 50 mm x 5 mm thick fabrication shall be done in trasportable sections, entire panel shall have a common copper earth bar of size 25 mm x 5 mm at the rear with 2 Nos. earth stud, solid connections from main bus bar to switch gears with required size of bus bars/Copper Cables and control wiring with 2.5 Sq.mm. PVC insulated copper FRLS conductor S/C cable, cable alleys, cable gland plates i/c providing following switch gears -<br><b>(Main Essential LT Panel At Substation )</b> |     |      |        |        |
|         | Each Incomer shall have Surge Protection Device of Type - I + II category of minimum 50 KA rating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |        |        |
| A       | <b>600 Amp capacity 4 strip aluminium alloy bus bars - 1 Set</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |        |        |
| B       | <b>Incomer</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |      |        |        |
| (a)     | <b>400 Amps, 4 Pole, 36 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |        |        |
| (b)     | Multifunctional meter with mode selection button and push button type switches with CTs - 1 Set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |        |        |
| ©       | R - Y - B Indicating lamp LED Type Lamp with fuse - 1 Set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |      |        |        |
| C       | <b>Out Goings</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |        |        |
| (i)     | <b>400 Amps, 4 Pole, 36 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 2 Nos. [ 1 No. for RM-Light &amp; VRV/VRF (Ess Indoor) &amp; Lifts , UPS+ 1 No. Spare]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |        |        |
| (ii)    | <b>200 Amps, 4 Pole, 36 KA, MCCB Microprocessor Release (O/C, S/C) with Rotary handle &amp; Spreader link - 2 Nos. [ 2 No. Spare]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |        |        |
| (iii)   | <b>63 Amps, 4 Pole, 25 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 3 Nos. (1 No. for Pump + 2 Nos. Spare)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |        |        |
| (iv)    | <b>32 Amps, 4 Pole, 25 KA, MCCB T/M Release (O/C, S/C) with Rotary handle &amp; Spreader link - 1 No. (1 No. for Street Light FP)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |        |        |
| -       | <b>A to C</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1   | Job  | 739347 | 739347 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Qty   | Unit | Rate         | Amount |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|--------|
|         | <b>APFC Device</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |      |              |        |
| 7.9     | Automatic Power Factor Correction (APFC) System Supply, Installation, testing and commissioning of Automatic Power Factor Correction (APFC) panel, indoor type floor mounted free standing totally enclosed, extendable, IP 42, of following capacity for 3 phase, 415 V + 10 %, 50 Hz AC System for Ambient temperature -5°C to +40°C, fabricated in compartmentalised designed made of CRCA sheet steel of 2.0mm thick for framework & covers, 3 mm thick for gland plate i/c cleaning & finishing complete with 9 tank process for powder coated of approved shade (RAL 7032-Siemens gray or as approved by Engineer-in-Charge), having front section (switchgear and control accessories) and rear section capacitor and reactor, front and rear access, having suitable current carrying capacity, extensible TPN Aluminium alloy bus bar of high conductivity, DMC/SMC bus bar supports, bottom base channel of MS Section, fabrication shall be done in transportable section, entire panel shall have common copper earth bar of minimum size of 25mm x 5mm with 2 nos. earth studs, the earth terminals provided on the body of capacitor bank shall also be bonded to the main capacitor panel earth bus with 2 nos. 8 SWG or 6 SWG GI earth wires/ equivalent size of copper conductor cable, forced ventilation for maintaining temperature rise not more than 5°C from ambient, interconnections, connections with 14% detuned reactor and heavy duty 525 V ISI marked Impregnated MPP (Metalized Polypropylene) Capacitor (IS13340 Part -1 & 2) APFC Panel shall be in compliance with IS:16636 & CPWD Specifications etc. as per below details |       |      |              |        |
|         | (A) Incomers Suitable capacity MCCB Microprocessor base with O/C, S/C, E/L release of TPN 50KA breaking capacity ( $I_{cs}=I_{cu}$ ), ON, OFF, Trip, R, Y, B - LED Indicating Lamp set along with required Instruments and accessories with extended rotary handle and door interlocking arrangement. Current rating of the Incomer in ampere shall be APFC Panel rating in KVAR x 1.4 x 1.5 or Nearest higher standards rating.<br>(B) Instruments & Indications i) 3-Phase current sensing APFC microprocessor relay/controller, advance 8/12 stages (8 stages for capacity below 100 KVAR and 12 stages 100 KVAR & above) with Communication Ethernet/RS485/SNMP port open protocol for BMS integration as per approved by Engineering in charge and having display of Phase wise V, A, PF, Cos-Phi, Kw, KVA, KVAR, THD-V, THD-I, harmonics up to 31 level. 3 nos of dual core CT's accuracy class 1, 15VA at incomer of PCC Panel for APFC relay. ii) Auto Manual Selector switch, auxiliary contactors with timer for delay in manual mode. iii) Digital Multi function meter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |      |              |        |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | AE(E) |      | EE(C)Page342 |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty   | Unit | Rate         | Amount |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|--------|
|         | with LED Display for V, A, PF, KW, KVA, KVAR, THD-V & I, Frequency. iv) Suitable rating control transformer shall be provided for control and indication circuit. v) All components like control transformer, meter, relay and indicating lamp shall be protected by using suitable rating individual MCB's. vi) Wiring of the control circuit shall be done by using 2.5 sq. mm, FRLS/HFFR 1100 V grade, PVC insulated multi stranded copper control wire.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |      |              |        |
|         | (C) Bus Bars 1.3 Amp per Sq.mm, TPN, Electrolytic grade Aluminium bus bar of capacity 1.25 times of incomer rating as per CPWD specification.(D) Outgoings (APFC Section)Selection of the capacitors combinations shall be for continuous rating and each capacitor bank shall have suitable capacity Heavy Duty ISI Marked Capacitor, capacitor duty contactor, the capacitor shall be mounted on channel with base of perforated M S Powder coated sheet, connections inter connections etc. and other features as per CPWD Specifications and relevant IS Code having following: (i) Capacitor bank ratings & stages shall be as per the technical specifications sheet of NIT.(ii) Capacitor will be MPP self healing type with discharge resistor, pressure release mechanism.(iii) Since Capacitor Voltage is 525 Volts, thus higher KVAR has to be considered to get rated output at 415 Volts.(iv) 14% Detuned Reactor of class H insulation & 150% linearity in series with Capacitor.(Note: Technical specifications sheet for selection of the capacitors combinations shall be provided by the NIT Approving Authority with due consideration of number of capacitors i.e. 1KVAR, 2 KVAR, 3 KVAR, 5 KVAR, 10 KVAR ..... for smooth correction). |       |      |              |        |
| a)      | 125 KVAR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2     | Nos  | 320033       | 640066 |
|         | <b>SH:- VIII (EPABX/LAN Wiring)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |      |              |        |
| 8.1     | Supplying, Installation, Testing and commissioning of followingCAT6A Patch Cord should have ETL/UL verification program certificate for compliance with ANSI/TIA-568.2-D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |      |              |        |
| a)      | Copper Patch Cords of length 1m (3ft)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 50    | Nos. | 173          | 8650   |
| b)      | Copper Patch Cords of length 3m (10ft)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 200   | Nos. | 405          | 81000  |
| 8.2     | Supplying, Installation, Testing and commissioning of CAT6ACopper Information Outlet (IO) with face plate of color as per site requirement, should have ETL/UL verification program certificate for compliance with ANSI/TIA-568.2-D. All copper Cable and Components should be from same OEM to maintain compatibility and interoperability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 142   | Nos. | 302          | 42884  |
| 8.3     | Supplying, Installation, Testing and commissioning of RJ45 Connector for CAT 6/6A Cables. RJ45 modular plug supports 4 twisted pairs, 8 positions, 8 connectors. Housing: PC, UL94V- 2, transparent color. Use for 24- 26 AWG stranded wires                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 300   | Nos. | 9            | 2700   |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | AE(E) |      | EE(C)Page343 |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty  | Unit  | Rate  | Amount |
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| 8.4     | Supplying, drawing, Installation, Testing and commissioning of Cat6A UTP 4 pair, 23 AWG solid copper cable in existing conduit/ on surface, U/FTP, LSZH, Non-Plenum, Horizontal(solid) Cable suitable for high speed data networking application supporting upto 10Gbps over a 100 meter channel. The 4 Unshielded Twisted Pairs (UTP) cable with color coded insulation for easy identification should have FLAMEPROPERTIES i.e. Flammability Test - IEC 60332-1, Smoke Density - IEC 61034, LSZH standards compliance: ANSI/TIA-568 C.2, ISO/IEC 11801, IEEE 802.3an, RoHS. Delay Skew should be < 45NS. The outer Cable Diameter should be 7.5 +2 mm. Cable should have been tested and verified by UL/ ETL.                                                                                                                                                                                                                                                                            |      |       |       |        |
| a)      | 1 run of cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 2500 | Mtrs  | 62    | 155000 |
| b)      | 2 run of cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1000 | Mtrs  | 99    | 99000  |
| c)      | 3 Run of cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 800  | Mtrs  | 137   | 109600 |
| 8.5     | Supplying and drawing following core Fibre Optic Cable having corrugated steel armouring. The Fibre should be SM Fibre Central -loose tube filled with Thixotropic jelly, duly following Standards: ISO 11801, IEC 60793-1/60794-1-2, ITU-T-RECG.652D and Telecordia GR-20-core, High quality Electro Chromium Coated Corrugated Steel tape (ECCS ) and HDPE Sheath, Operating ambient Temperature should be - 5 deg C to +50 deg C and Storage Temperature shall be - 5 deg C to +50 deg C, Max Attenuation $\pm 0.36$ (db / km) at Operational Wavelength 1310 nm and $\pm 0.22$ db / km at Operational Wavelength 1550 nm. type of fibre should be 9/125 / G.652D& Refractive Index should be 1.4670/1.4675. The value for Mode-field, Cladding Diameter $9.2 \pm 0.4 \mu\text{m}$ and $125 \pm 0.7 \mu\text{m}$ correspondingly. The Dispersion value $\leq 3.5 \leq 18$ ps/nm-km and PMD value $\leq 0.2$ ps/km and Cable Cut-off wavelength $\leq 1260$ nm etc complete as required. |      |       |       |        |
| a)      | Single Mode 6 Core Optical fibre cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 500  | Meter | 64    | 32000  |
| 8.6     | Supply and fixing following port Rack Mount loaded LIU with pigtail, Front-mounted cable saddles for jumper management, suitable to manage both splices and terminations, Preassembled shelves in multiple configurations, Rubber fibre slotted bracket built-in, metal splice shelf to protect the fibres, 2fiber spools built-in for 900µm tight buffered fibre storing, Capable of storing up to 3 meters of 900µm tight buffered fibre per adapter, Removable front and rear covers for better access to interior of LIU, Should be Single / Multi mode LC Type fully loaded. Accessory kit consists of cable ties, mounting ear screws, and spiral wrap tube etc complete as required.                                                                                                                                                                                                                                                                                                |      |       |       |        |
| a)      | 12 Port LIU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5    | No    | 7040  | 35200  |
| b)      | 24 Port LIU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2    | No    | 10049 | 20098  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Qty | Unit | Rate  | Amount |
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| 8.7     | Supply and fixing Patch Cord of Optical Fibre Multi Mode or Single Mode LC to LC Fibre Duplex having high precision ceramic ferrule with good concentricity, Fibre corning single mode G652D, Cable Type 2mm with Mechanical specification Apex Offset < 50 µm, Fibre Height + 100 nm, End-face radius of Curvature 7mm < R <25mm, Repeatability < 0.2 dB, Working ambient Temperature - 5 deg C to +50 deg C, Storage Temperature - 10 deg C to +50 deg C, Length --2meter, Type -- LC-LC Duplex etc complete as required.                                                                                                                                                                                                                            | 50  | No   | 705   | 35250  |
| 8.8     | Supply and fixing of following size Wall Mount Rack having Fixed Structure with 0.8mm CRCA Sheet, completely knocked-down condition (CKD) Shape, Vertical Mounting Rail 1.6 mm with 'U' Marking, Minimum 2 cable entry/exit provision at Top and bottom with rubber protection, Front 5mm Toughened Glass with lock, wall mounting kit, Powder coated Color- RAL- 7035, complied with UL & RoHS, 2 x 6 sockets 16A power distribution units, 3 numbers closed cable organizer, Hardware mounting screws packet of 20 x 1 number, etc. complete as required.                                                                                                                                                                                            |     |      |       |        |
| a)      | 6U Rack                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5   | No   | 6939  | 34695  |
| b)      | 9U Rack                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5   | No   | 8960  | 44800  |
| c)      | 15U Rack                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5   | No   | 13330 | 66650  |
| 8.9     | Supply and fixing 24U Rack with 4 inch Castor wheels and front brake Floor Standing Rack with Main Frame Pillar of 1.25mm CRCA Sheet with removable side panels, L- Shape adjustable Vertical Mounting Rail of 2mm with 'U' Marking completely knocked-down condition (CKD) Shape, fitted with 4number cooling fans, minimum 5nos two line cable entry/exit provision at top and bottom with rubber protection, Front door 5mm Toughened Glass with MS frame or MS perforated with lock, Rear MS vented or perforated door, Powder coated Color- RAL- 7035 or black, complied with UL & RoHS, 2 x 6sockets 16A power distribution units, 3 numbers closed cable organizer, Hardware mounting screws packet of 20 x 1number, etc. complete as required. | 1   | No   | 21201 | 21201  |
| 8.10    | Supply and fixing 42U Rack with 6 inch Castor wheels and front brake Floor Standing Rack with Main Frame Pillar of 1.6mm CRCA Sheet with removable side panels, L- Shape adjustable Vertical Mounting Rail of 2mm with 'U' Marking completely knocked-down condition (CKD) Shape, fitted with 4number cooling fans, minimum 8nos two line cable entry/exit provision at top and bottom with rubber protection, Front door 5mm Toughened Glass with MS frame or MS perforated with lock, Rear MS vented or perforated door, Powder coated Color- RAL- 7035 or black, complied with UL & RoHS, 2 x 6sockets 16A power distribution units, 3 numbers closed cable organizer, Hardware mounting screws packet of 20 x 1number, etc. complete as required.  | 1   | No   | 32954 | 32954  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Qty | Unit | Rate   | Amount |
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| 8.11    | <p>Supplying, installation, Testing and commissioning of following capacity 24 port Layer 3 Network Switch having features and specifications etc. as mentioned here under: At least 20 X RJ-45 Gigabit Ethernet Ports and additional 4 combo 10/100/1000base-t/SFP Ports with additional 4 SFP+ ports non-blocking architecture by having Switching capacity of min. 128Gbps and packet forwarding rate of 95Mpps or higher, 16K MAC table. Console Port, USB port, Internal AC Power supply with operating temperature of 0 to +50 degree Celsius. Stacking port with stacking support of minimum 8 units per stack. 32KMac address, 9K or more Jumbo frame, ERPS with enabling ring to converge in less than 50 ms from node or link failure, Static routing, Static, 6to4, ISATAP and GRE, .IPv6 Neighbour Discovery (ND), BGP/ISIS/ MPLS/VRRP v2/OSPFv2/v3, PBR, Route Redistribution, RIPv1/v2/ng, IP Helper all L3 Protocols should support from day 1 for both IPv6 and IPv4,802.1x, Port security , Radius C TACACS+ authentication C accounting, DAD, DAI, DoS attack prevention, SSH, Guest VLAN, IP Access List, MAC Access List. Multicast: VLAN, PIMSM,PIM-DM, PIM-SDM, PIM-SMv6, DVMRP v3 and MSDP,IGMP C MLD Snooping, Flow mirroring, IGMP C MLD Snooping Querier, Per-VLAN IGMP C MLD Snooping. SNMP, Dual configurations, Multiple images, RMON, LLDP/LLDPMED, sFlow, DHCP/BOOTP Client, IPv4/IPv6, Syslog server, Debug command, 802.3ah Ethernet Link OAM, 802.1agConnectivity Fault, Y.1731 OAM, 802.1Qbb Priority- based Flow Control (PFC), Dying Gasp, Cable Diagnostics , 6 kV surge protection on all Gigabit Ethernet ports and on all GE RJ-45 access ports. Certifications: FCC, CE marked, UL/EN, RoHS and relevant MTCTE(TEC)/BIS compliance/certification as applicable, etc. complete as required.</p> | 1   | No   | 193791 | 193791 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate   | Amount |
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| 8.12    | Supplying, installation, Testing and commissioning of following capacity 24 port Layer 2 indoor Network Switch having features and specifications etc. as mentioned here under: At least 24 X RJ-45 Gigabit Ethernet Ports and additional 2 X 10GBase -T with 4 X SFP Ports with non-blocking architecture by having Switching capacity of min. 128Gbps and packet forwarding rate of 95Mpps or higher, 16K MAC table. Console Port, USB port, Stacking support of min. 4 units per stack. Internal dual AC Power supply, STP, RSTP, MSTP, BPDU Filter, BPDU Restriction, Min. 9K Jumbo Frame, LBD, IGMP Snooping V1/V2/V3, MLD Snooping V1/V2. IGMP/ MLD Groups 1K or more, IPv4/ IPv6 Loopback Interface, 16 L3 IP Interface, Ipv6 ND, VRRPv3, UDP Helper, ECMP. VLAN:802.1Q, Port based, Q-in-Q, Multicast VLAN, Protocol VLAN,VLAN Trunking, DHCP Snooping, Server, server Screening. RADIUS , TACACS+ Authentication, QoS: 802.1P, 8 queues per port, QoS : WRR, Strict + WRR, WRED, 802.1p. ACL: MAC based, IPv4C IPv6, TCP/ UDP Port number, time based ACL, TFTP Client, SNMP V1, v2c, v3, SNMP traps, RMON, DHCP server, relay, client, LLDP, LLDP-MED, OAM, Dying Gasp,802.3ah, sflow, RIP, OSPF v2/v3, policy based route, SSL,SSH. 6 kV surge protection on all Gigabit Ethernet ports and on all GE RJ-45 access ports. Certifications: FCC, CE marked, UL/EN, RoHS and relevant MTCTE(TEC)/BIS compliance/certification as applicable, etc. complete as required. |     |      |        |        |
| a)      | 24 port PoE Layer 2 Network Switch with PoE Support of 370W or higher with each cooper port supporting 802.3at PoE+ min.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5   | No   | 125393 | 626965 |
| b)      | 24 port Layer 2 Non-PoE Network Switch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | No   | 86163  | 86163  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty | Unit | Rate    | Amount  |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------|---------|
| 8.13    | Supplying, installation, Testing and commissioning of 10 Giga Bandwidth Data Centre Network Switch of 48 port Layer 3having features and specifications etc. as mentioned hereunder: - ToR/EOR/Core Network Switch 48x 10GbE SFP+, 6x100GbE QSFP28, RPS, with Console Port, Management Port and 1 x USB 2.0 Type A port, The switch must provide as witching capacity of no less than 1.76 Tbps and a forwarding rate of at least 1600 Mpps, ensuring non-blocking performance for high-bandwidth applications. It should support hot-swappable dual power supply modules (AC or DC) for 1+1redundancy and load sharing, as well as hot-swappable, front to-back airflow fan trays with N+1 redundancy to ensure continuous availability. IEEE 802.1X support for port-based and MAC-based authentication should be available, along with integration for RADIUS and TACACS+ authentication services. Guest VLANs, DoS prevention, and management access restrictions are essential. SNMP v1/v2c/v3, syslog, sFlow, and support for auto-configuration via DHCP. Support for Open Flow v1.4, Netconf/YANG, and LLDP is required for modern network automation. Support ONIE (Open Network Install Environment), IEEE 802.1Q bb Priority-based Flow Control (PFC), Open Flow v1.4, ERPS, IPv6 Tunneling, IP interfaces and supported, VXLAN, Private VLAN, Multicast VLAN, Guest VLAN Double VLAN (Q-in-Q), RoCEv2, PIMSSM/SM, MSDP. Support High Availability with MLAG/VSS and Layer 2/3 VPNs Critical for Multi-tenant, Virtualized, and Containerized Environments. BGPv4/v6, OSPFv2/v3, IS-IS, RIPng. VRRP, ECMP, BFD, and route redistribution for high availability routing. Support flexible routing domains and secureinter-segment traffic flow. Certifications: FCC, CE marked, UL/EN, RoHS and relevant MTCTE (TEC)/BIS compliance/certification as applicable etc. complete as required | 1   | Nos. | 1055981 | 1055981 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qty | Unit | Rate   | Amount |
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| 8.14    | Supply, Installation, Testing & Commissioning of AI/ML Based Wireless controller, should have min 8x10/100/1000 Base T ,Min 1x10GSFP+ Port,2x 100/1000 Base SFP in Combo WAN ports . Should be managed as on premise or Cloud environment. Controller should accommodate 256 Access point. Not more than 50W in full load. QOS: Load balance, IEEE 802.11e, Domain based flow control. management,802.11g,802.11i, ISO/IEC. Topology discovery option for cloud management. Authentication: RADIUS, AAA Accounting, Authentication through Portal .All Network Switches, Wireless and Fiber Modules must be from same OEM. Wireless controller (Detailed Minimum Technical Specifications) min 8x10/100/1000 Base T ,Min 1x10GSFP+ Port,2x 100/1000 Base SFP in Combo WAN ports .1x USB ports , Should have built in LCD screen to see temperarture , operatinoal time etc . Controller should accommodate 2030 Access point Operating temperature 10°C~50°C CAPWAP AC discovery through Option43 and DNS AC&AP cross-layer3 networking and cross NAT networking Layer-2/Layer-3 roaming AC, AP synchronization of clock, version and configuration Local and cloud portal authentication SMS authenticationAccount-based period control and bandwidth control Authentication-free whitelist Power consumption Not more than 50W in full load Network Security ACL and firewall policy of IP, MAC Rich VPN protocols such as L2TP/PPTP, IPSEC, GRE and SSL ARP anti-spoofing functions such as ARP Scan, DHCP Snooping Attack protection such as Anti-Flood, Ping of Death, Teardrop, WIPS/WIDS, Static / Dynamic Blocklist, URL Filter, Traffic management Flow classification based on IP quintuple, queue scheduling functions such as CBWFQ , Blacklist and white list, Elastic bandwidth control policies based on user groups and time period, Should have inbuilt LCD for real-time operation, fault diagnosis and online help information, NTP Server, FTP Server, Multiport Binding, Should support roaming within same controller or amongst redundant controller, IEEE 802.11/a/b/g/n/ac/ax support . QOS Load balance, IEEE 802.11e, Domain based flow control RF Automatic channel negotiation, Static Channel configuration, Automatic power transmission mechanism, Channel should be configured when AP is in operational mode for hassle free deployment environment. Authentication RADIUS, AAA Accounting, Authentication through Portal Management and maintenance Console Telnet, SSH, SNMP, TR069 management,802.11g,802.11i, ISO/IEC Warranty-3 Years from OEM with Toll free number for support in India | 1   | Nos  | 538877 | 538877 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Qty | Unit | Rate    | Amount  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------|---------|
| 8.15    | Supply, Installation, Testing & Commissioning of Network management solution in virtual mode on industry standard Server with AI ops monitoring tool Should support 500 devices from day 1 and can be scalable to Min 8 K devices in future. Same platform could be achieved in cloud infrastructure as well as and when required by taking subscriptions. Should have dashboard to present summery report. Should be real time-based monitoring system Should have device system log. NMS should be capable of storing purchase Information's Cost, Order, Date etc information while it identify each unique piece of hardware so that to know which specific device it is. Should have alarm with different sound and email notifications. Should have alert notification based on any service contract expiry threshold based on requirement. Should have option for QR code database. For asset management, vendor could offer a separate software with hardware. Should have fault maintenance level alert customization based on different colour and sound. Role Based user management. Windows & Linux both platforms supported. Auto scheduling task like back, firmware upgradation etc. The NMS should be of the same Make as Switch, Fiber modules.                                                                                               | 1   | Nos  | 1357932 | 1357932 |
| 8.16    | Supplying, Installation, Testing and commissioning of indoor Wireless Access Point for High density use having features and specifications etc. as mentioned here under- WiFi6802.11ax 574Mbps (2.4GHz) + 2402Mbps (5GHz), atures and specifications etc. as....WIFI 6 Certified/Wi-Fi Alliance, MG 2.5G LAN POE Port, having console management function, factory reset, WPA/WPA2/WPA3™ Personal/Enterprise, WEP 64/128-bit, SSID broadcast disable, MAC address... access control, Internal RADIUS server, SNMP, Customizable Captive Portal, Auto Channel, Works as Access Point, WDS, WDS with AP, Wireless Client ., Web (HTTP), Secure Socket Layer(SSL), Traffic control, Support ATF/Fast Roaming/Band Steering, Supports enhanced security - WPA-PSK/WPA2-PSK/WPA3-PSK and RADIUS client, and Cipher negotiation, and MAC/ IP ACL for networks, Certifications: FCC, CE marked, UL/EN, RoHS and relevant MTCTE(TEC)/BIS compliance/certification as applicable. Works as Standalone, Compatible with S/W & H/W.. Controller with additional features like - Real-Time Monitoring and Alerts, Rich Advanced Features, Centralized Device Management, Role-Based Administration, Real-Time Monitoring, VLAN and Access Control, Auto RF Management and Bandwidth Optimization, Multi-SSID and Captive Portal Authentication. etc. complete as required. | 25  | Nos  | 35559   | 888975  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty | Unit | Rate    | Amount  |
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| 8.17    | Supplying, Installation, Testing and commissioning of smallform-Pluggable (SFP) for Network Switches. Must be hotPluggable, RoHS Complaint, etc. complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |         |         |
| a)      | 1G SFP Single Mode/Multi Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 12  | No   | 4211    | 50532   |
| b)      | 1G Copper SFP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5   | No   | 7018    | 35090   |
| c)      | 10 G SFP + Single Mode/Multi Mode 14972                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10  | No   | 14972   | 149720  |
| 8.18    | Supply of 24 port Cat6 Patch Panel loaded. Must be of 1Uheight with clear label holders and white label with the panel.24 Ports Cat-6 Patch Panel should have ETL/UL verification program certificate for compliance with ANSI/TIA-568.2-D                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 18  | No   | 5278    | 95004   |
| 8.19    | Supply, installation, testing and Commissioning of IP based voice communication system with 04 Port Voicemail, 04 Port FXS, 04 Port FXO, 1 PRI Trunk lines (30 Channels) Circuit with CLIP Facility, min 100 IP users License with provision for further additions, 100 analogue users, 01 Number IP based Operator Console, 100 Party Conference, Speed Dial, Music on Hold, Internal/ External ring difference, Call Barring, Call Pickup, Redundant server in active -Active mode and as per technical specification including supporting accessories etc. complete as required.                                                                                                                          | 1   | Nos  | 1578920 | 1578920 |
| 8.20    | Supply, installation, testing and Commissioning of IP at its core with IP switching technology and 100% non blocking communication system with 04 Port Voicemail, 04 Port FXS, 04Port FXO, 1 PRI Trunk lines (30 Channels) Circuit with CLIP Facility, min 100 IP users License with provision for further additions, 100 analogue users, 01 Number IP based Operator Console, 45 Party Conference, Speed Dial, Music on Hold, Internal/ External ring difference, Call Barring, Call Pickup. The system should be reductant which offer 100% duplication of power supply and CPU card and to match the hybrid IP-PBX asper technical specification including supporting accessories incomplete as required. | 1   | Nos  | 1246949 | 1246949 |
| 8.21    | Supply, Installation, Testing & Commissioning of Type 1 IP Phone having 2 VoIP account, 120 x40 DOT matrix screen with backlight, Full HD duplex speaker phone, IPV6, Gigabit Ethernet, PoE etc. complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6   | Nos  | 11698   | 70188   |
| 8.22    | Supply, Installation, Testing & Commissioning of Analog phones having standard features like 16 digit LCD display, 2 way speaker, caller ID and number storage facility etc. complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 110 | Nos  | 1544    | 169840  |
| 8.23    | Supplying and drawing 20 Pair 0.5 mm dia FRLS PVC insulated annealed copper conductor, unarmoured telephone cable in the existing surface/ recessed steel/ PVC Conduit etc. complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10  | Nos  | 344     | 3440    |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Qty | Unit | Rate  | Amount |
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| 8.24    | Online UPS - Input supply: Single Phase, Output Supply : Single Phase Supplying, installation, Testing & Commissioning of following capacity at full load (Unity Power Factor) ON LINE Uninterrupted Power Supply (UPS) system suitable for Single Phase input, Single Phase output AC Supply. The UPS shall include a Rectifier, inverter, battery bank suitable for 30 minutes back up (Battery VAH capacity shall not be less than 1600 VAH per KVA of UPS rating per Hour backup time) on full load (Battery shall be VRLA, SMF in ABS Container) and Static Bypass switch alongwith manual bypass, suitable isolation transformer for additional protection against neutral faults etc. The UPS systems shall be Microprocessor based Digital Control, using Insulated Gate Bipolar Transistor (IGBT)'s both for the rectifier & inverter with PWM (Pulse Width Modulation) Technology. The quality of design, manufacturing and inspection process should confirm to the relevant Inter-national standards such as IEC/EN/VDE. The operating efficiency of the UPS systems shall be >95% at 100% non-linear loads. Current total harmonic distortion (ITHD)/ total demand distortion (TDD) on the input grid shall be < 5% at 100% load. (The required LC filters shall be included in UPS cost), extreme power factor kit to be include to limit the input pf to 0.99 and output power factor shall be unity (i.e. kw rating of the UPS shall be kva rating x 1) however UPS shall be suitable to take load at 0.7 lagging to 0.7 leading power factor loads. UPS shall be suitable for incoming supply AC single phase 160-270V 50 Hz and delivering output AC supply true sine wave single phase 220/230/240 Volt, 50Hz +/- 0.2Hz, Overload capacity of 120% for 10 mins and 150% for 1 minute. |     |      |       |        |
|         | Operating temperature 0 to 40 deg C, Relative humidity 0-95%non condensing, noise level less than 60db at 1 meter distance, Protection for Under voltage, over voltage, abnormal output voltage, battery over charging, output over current, short-circuit, battery deep discharge , 10 KV surge. Display for watt/VA, Amp and Voltage power parameters etc. UPS shall comply with low voltage electromagnetic compatibility (EMC)achieved as per EN 6204, EN6204 Part I and Part 2, it shall be a Voltage and Frequency Independent (VFI) type UPS (as per standard IEC 62040-1, 2 & 3) . The UPS should be with IGBT Based Inverter Technology, Communication RS232/RS485/SNMP port open protocol for BMS integration asper approved by Engineering in charge. Required battery racks, DC breaker of suitable rating and interconnecting copper conductor cable of suitable size and connectors and all required accessories are inclusive in the cost. The UPS should have QR code which should contain drawing, test report OEM manual, Geo- Tag of manufacturing location etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |       |        |
| a)      | 2 KVA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 8   | Nos  | 45894 | 367152 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty | Unit | Rate | Amount |
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|         | <b>SH:- IX (CCTV)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
| 9.1     | <p>Supplying Installation Testing and Commissioning of 4MP IP IR Dome Camera having following specifications and features etc :-</p> <p>1) Signal System: PAL/NTSC, Signal to Noise Ratio: &gt; 50 dB, Camera should display Camera title, Date &amp; Time in live &amp; recorded video</p> <p>2)Image Sensor: 1/2.8" or better progressive Scan CMOS to get color image even at night condition(Minimum Illumination: 0.006 Lux@ F1.4, AGC ON, 0 lux with IR or better) True Day &amp; Night High Performance Mechanical IR cut filter with auto switch, Integrated IR Source (Auto, Manual)- Inbuilt IR LED's</p> <p>with effective distance upto 50 meter or better and 30 meter for colour view in night, Imaging: 1/3s to 1/30000s electronic shutter support, Auto Gain Control, White Balance- Auto, Back Light Compensation, Multi zone Privacy Masking, HLC, Digital Watermarking.</p> <p>3) Compression (Minimum): Video:- H.265 or better, H.264H, H.264, Audio:- G.711U/A, G.711Mu, G.726, AAC, G.723</p> <p>4) Wide Dynamic Range:- WDR (120db or more)</p> <p>5) Digital Noise Reduction:- DNR (3D) On/Off</p> <p>6) Video Streaming &amp; Frame Rates:- Triple streaming, configurable Main stream: 4MP (2560×1440)25/30fps, Sub streams minimum: 720P @ 25/30 fps</p> <p>7) Image Setting: Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser, Edge Analytics: Tripwire, Intrusion, Motion Detection</p> <p>8) Cyber Security: AES 256-bit Encryption, Configuration encryption, trusted execution, Digest, security logs, account lockout, video encryption, IP/MAC filtering, HTTPS, trusted upgrade.</p> |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Qty | Unit | Rate  | Amount |
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|         | <p>9) On board Storage: Camera should support built-in Micro SD/ SDHC/ SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.</p> <p>10) Recording Management: Format SD, overwrite, storage management, video to NAS device,</p> <p>11) Alarm Trigger : Motion/tampering detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection</p> <p>12) Network Protocol: SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS, unicast,</p> <p>13) System Capability: ONVIF, Camera shall support open source VMS</p> <p>14) Ethernet: 1 RJ 45 10/100 Ethernet port</p> <p>15) Audio : It should support 1 x Built-In Mic and 1/1 Alarm In/ Out for External Mic. and Speakers as per site requirement.</p> <p>16) Power Input: The camera should support simultaneous dual power input—12 VDC (via power adapter) and PoE (802.3af)-to ensure continuous operation in the event of a failure in one power source.</p> <p>17) Power Requirement: 12VDC/24 VAC/PoE (802.3af)/ePoE</p> <p>18) Housing/ Enclosure:- IP67 weather proof, IK10, Metallic body</p> <p>19) Operating Condition:- Ambient Temperature:- (-) 05°C to 50°C, humidity 95% (max) (non-condensing)</p> <p>20) IR life: 40000 hours or higher</p> <p>21) Video Bit rate: 32 KBPS - 8 MBPS or better</p> <p>22) Standards: BIS with ER, STQC Certified, CE, FCC and RoHS</p> |     |      |       |        |
| a)      | 4MP @ 25/30fps @1440P (2560x1440) Dome Camera with 2.7mm ~13.5mm Motorized lens, Vari Focal (view Angle for H: 104°-29°; V: 54°-16°; D: 125°-34°)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 25  | Nos  | 23754 | 593850 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate | Amount |
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| 9.2     | <p>Supplying Installation Testing and Commissioning of 5/6 MP IP IR Bullet Camera having following specifications and features etc :-</p> <p>1) Type of Camera: Bullet Camera</p> <p>2) Image Sensor: 1/2.8" or better progressive Scan CMOS get color image even at night condition</p> <p>3) Signal System: PAL/NTSC</p> <p>4) Minimum Illumination: 0.006Lux@ F1.4, AGC ON, 0 lux with IR or better</p> <p>5) Imaging: 1/3s to 1/30000s, Auto Gain Control, White Balance- Auto, Back Light Compensation, Multi zone Privacy Masking, HLC, Digital Watermarking.</p> <p>6) On Screen Display: Camera should display Camera title, Date &amp; Time in live &amp; recorded video both.</p> <p>7) Signal to Noise Ratio: &gt; 50 dB</p> <p>8) Lens Type &amp; Focus: 3.6mm/6mm fixed lens ( optional as per site requirement)</p> <p>9) Day &amp; Night: True Day &amp; Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt IR LED's with effective distance upto 50 Mtrs integrated IR and 30 Mtrs for colour view in night.</p> <p>10) Video Compression (Minimum): H.265 or better, H.265, H.264H, H.264, Audio:- G.711U/A, G.711Mu, G.726, AAC, G.723</p> <p>11) Wide Dynamic Range: WDR (120db or more)</p> <p>12) Digital Noise Reduction: DNR (2D/3D) On/Off</p> <p>13) Streaming: Triple streaming, configurable</p> <p>14) Video Streaming &amp; Frame Rates: Triple streaming, configurable Main stream: 5/6MP @25/30 fps, Sub streams: D1@25/30 fps or better</p> <p>15) Image Setting: Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser</p> <p>16) Profile Management: User configuration import, export</p> <p>17) Security: User Authentication, Digital Water Marking</p> <p>18) On board Storage: Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.</p> |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty | Unit | Rate  | Amount |
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|         | 19) Recording Management: Format SD, overwrite, storage management, video to NAS device,<br>20) Edge Analytics: Tripwire, Intrusion, Motion Detection<br>21) Alarm Trigger : Motion/tampering detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection<br>22) Alarm Support: It should have 1/1 Alarm In/ Out Port<br>23) Audio Support: It should have 1x Built-In Mic and 1/1 Audio In/ Out Port for external Mic. and Speaker (As per site requirement) with G.711U/A / G.711Mu/ AAC/ G.726 audio compression<br>24) Network Protocol: SFTP, IPv6, IPv4, DNS,RTCP, NTP, RTP, HTTP, HTTPS, SNMP TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS, unicast,<br>25) System Capability: ONVIF<br>26) VMS: Camera shall support open source VMS<br>27) Cyber Security: trusted boot, AES 256-bit Encryption, Configuration encryption, trusted execution, Digest, security logs, account lockout, , video encryption, IP/MAC filtering, HTTPS, trusted upgrade.<br>28) Ethernet: 1 RJ 45 10/100 Ethernet port<br>29) Power Input: The camera should support simultaneous dual power input - 12 VDC (via power adapter) and PoE - to ensure continuous operation in the event of a failure in one power source.<br>30) Power Requirement: 12VDC/24 VAC/PoE (802.3af)/ePoE<br>31) Enclosure: IP67 weather proof, IK10<br>32) Operating Condition: Ambient Temperature:- (-)05°C to 50°C, humidity 95% (max) (non-condensing)<br>33) IR life: 40000 hours or higher<br>34) Video Bit rate: 32 KBPS - 8 MBPS or better<br>35) Standards: BIS with ER, STQC Certified, CE, FCC and RoHS |     |      |       |        |
| a)      | 5/6MP ((3200 × 1800)@20 fps or better) IP IR 2.7mm ~13.5mm Motorized lens, Vari Focal outdoor Bullet Camera, Angle of View: H: 104°-32°, V: 54°-18°, D: 125°-36° or better                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4   | Nos  | 26993 | 107972 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Qty | Unit | Rate | Amount |
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| 9.3     | <p>Supplying Installation Testing and Commissioning of PTZ (Pan, Tilt and Zoom) IP IR Camera having following specifications and features etc :-</p> <p>PTZ (Pan, Tilt and Zoom) IP IR Camera having following specifications and features etc :-</p> <p>1) IP IR PTZ Camera: Motorized PAN TILT ZOOM with IR</p> <p>2) Image Sensor: 1/2.8" or better progressive Scan CMOS</p> <p>3)Signal System: PAL/NTSC</p> <p>4) Minimum Illumination: 0.008 Lux@ F1.6, AGC ON, 0 lux with IR, or better</p> <p>5) Imaging: 1/1s to 1/30000s, Auto Gain Control, White Balance- Auto, Back Light Compensation, Image Rotation, Multi zone Privacy Masking (Upto 24 Area), HLC, Defog, Region Of Interest and EIS features.</p> <p>6) On Screen Display: Camera should display Camera title, Date &amp; Time in live &amp; recorded video both.</p> <p>7) Signal to Noise Ratio: &gt; 50 dB</p> <p>8) Event Notification: Through Relays, E-Mails or FTP</p> <p>9) Day &amp; Night: True Day &amp; Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt IR LED's with effective distance. The camera should have IR LED's and cover distance up to 300 meter or above</p> <p>10) Auto Tracking: The camera should be equipped with Deep learning- based auto tracking function using simultaneously all of the panning, tilting and zooming should be available. When a motion is detected in a registered monitoring area, the camera should track the motion (object) and capture it.</p> <p>11) Pre/Post Event Buffering: The camera should support at least of 5 seconds of pre &amp; post event buffering.</p> <p>12) Pre-sets: 300 Pre-sets</p> <p>13) Video Compression (Minimum): H.265 or better, H.265, H.264H, H.264, Audio:- G.711U/A, G.711Mu, G.726, AAC, G.723</p> <p>14) Wide Dynamic Range: WDR (120db or more), HLC &amp; BLC</p> <p>15) Digital Noise Reduction: DNR (2D+3D) On/Off</p> <p>16) Image Setting: Rotate Mode, ROI ,EIS, Defog, saturation, brightness, contrast, sharpness adjustable through client software or web browser</p> <p>17) Profile Management: User configuration import, export</p> |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Qty   | Unit | Rate         | Amount |
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|         | <p>18) Cyber Security: Configuration encryption, AES 256-bit Encryption, Digest, account lockout, video encryption, IP/MAC filtering, trusted boot, trusted upgrade, trusted execution</p> <p>19) On board Storage: Camera should support built in Micro SD/SDHC/SDXC Card slot upto 512 GB . It should be supplied with minimum 128GB Memory.</p> <p>20) Recording Management: Format SD, overwrite, storage management, video to NAS device, remote archive access via FTP login</p> <p>21) Edge based Video Analytics &amp; Alarm Trigger: Motion/tampering detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection, Tripwire, Intrusion, Object Abandon/ Missing, SMD, Face Detection</p> <p>22) Network Protocol: SFTP, IPv6, IPv4, DNS,NTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, ICMP, DHCP, SMTP, RTSPS.</p> <p>23) System Capability: ONVIF Profile S, G &amp; T. CCTV Camera<br/>OEM should be fulltime member of ONVIF and quoted models should be listed on ONVIF official website (All the certifications &amp; Credentials should be valid on the date of technical evaluation).</p> <p>24) VMS: Camera shall support open source VMS</p> <p>25) Connectivity: 1x LAN RJ-45 (10/100Base-T)</p> <p>26) Audio Support: Audio Interface : The camera should have 1/1 Audio In/Out to connect External Mic and Speaker<br/>Audio Compression : PCM, G.711U/A, G.711MU, G.726, MPEG2-Layer2, G.722.1</p> <p>27) Alarm In/Out : Alarm In/out- 7/2 Ch In/Out 28) Power Input: The camera should support simultaneous dual power input - DC/ AC (via power adapter) and PoE (802.3af) - to ensure continuous operation in the event of a failure in one power source.</p> <p>29) Power Requirement: 24 VDC, 2.5 A (<math>\pm 25\%</math>), PoE+ (802.3at)</p> <p>30) Enclosure &amp; Weather Proof Standard: IP67 weather proof and IK10, TVS 8000V lightning proof, surge protection, voltage transient protection</p> <p>31) Operating Condition:- Ambient Temperature:- (-)05°C to 50°C, humidity 95% (max) (non-condensing)</p> <p>32) IR life: 40000 hours or higher</p> <p>33) Video Bit rate: 32 KBPS - 8 MBPS or better</p> <p>34) Standards: BIS with ER, STQC Certified, CE, FCC and RoHS</p> |       |      |              |        |
| a)      | <p>5MP IP IR motorized PTZ (2960 x 1668@25/30fps or better) camera, Triple streaming , configurable on resolution:- Main stream: 5MP@25/30 fps Sub streams:1080p@25/30 fps, varifocal lens 3.95mm (<math>\pm 5</math>mm) ~ 177.75mm (<math>\pm 5</math>mm) or better with Automatic &amp; manual Focus Adjustment provisions, 45x Optical zoom and 16x Digital zoom with angle of view H: 65.7°- 1.9°V: 39.4°-1.1°D: 73.1°-2.1, PAN Travel: Pan: 0° ~ 360° endless, Manual Pan: 260° /s, Pre-set : 300° /s, Tilt Travel: Tilt: - 20° ~ 90°, auto flip 180°, Manual Tilt: 120° /s, Pre-set : 200° /s</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3     | No   | 107974       | 323922 |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | AE(E) |      | EE(C)Page358 |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty | Unit | Rate | Amount |
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| 9.4     | <p>Supplying Installation Testing and Commissioning of following Channel Network Video Recorder (NVR) with camera licenses to record for all channels having specifications and features etc as mentioned below :</p> <p>1) Network Video Recorder Embedded/ Installed OS (Linux) along with Camera Licenses to record per NVR and to provide a live view, storage and simultaneously Multi-channel playback of all IP camera or more and must be ONVIF with minimum support of 384 Mbps incoming Bandwidth.</p> <p>2) NVR should support video compressions : H.265 or better, H.264, MJPEG.</p> <p>3) Must support 1 channel RCA Input, 2 channel RCA Output for Two-way Talk with G.711U/A, G.711u, PCM, G726 audio compressions.</p> <p>4) Intelligent auto power on when power resumes after power outage.</p> <p>5) Storage: It should support minimum 8 SATA Slots with 20TB capacity/ Slot and RAID support of RAID 0/1/5/6/10.</p> <p>6) Connectivity Interface : 2 Nos. x 10/100/1000 Mbps Ethernet Ports, 1x RS485, 1x RS232, 1x eSATA Port</p> <p>7) Backup Interface : Its should have 4 Nos USB port (2x USB3.0, 2xUSB2.0)</p> <p>8) Video Output Ports: 2x HDMI and 2 VGA</p> <p>9) Alarm Ports: It should have 16/8 Ch In/ Out ports to connect various type of external sensors and output devices like hooter/ Siren etc.</p> <p>10) Email &amp; SMS Alert options: Option for SMS/ Email Alerts to minimum 5 designated mobile number for power failure, HDD failure, vandalism, tempering, network disconnection and panic</p> <p>11) Web &amp; Mobile Application: Web, Mobile app ( For iPhone, iPad, Android Phone) for alerts and viewing.</p> <p>12) Protocols: HTTP, HTTPS, TCP/IP, IPv4/IPv6, UDP, DHCP, DNS, SMTP, UPnP, IP Filter, PPPoE, FTP, DDNS, Alarm Server, IP Search, Multicast, Auto Registration, ONVIF 21.12 (Profile T, Profile S, Profile G), CGI, SDK and OEM Cloud for remote monitoring without any public IP need.</p> <p>13) Standards: CE, FCC, RoHS, BIS Certified</p> <p>14) Power Supply : Should support AC100-240V, 50/60Hz Power supply.</p> |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty | Unit | Rate | Amount |
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|         | <p>15) Operating Condition : -5°C to 50°C, humidity 90% (max) (non-condensing)</p> <p>16) The VMS application shall support all the features &amp; functionalities of the offered cameras.</p> <p>17) VMS should consist Licenses for all channels to record Cameras with General, motion detection, intelligent, alarm and POS recording modes. VMS should be provided with Camera Licenses , with no dependency of VMS licenses by binding with the MAC address of the cameras to achieve the functionality.</p> <p>18) The NVR OEM shall be responsible for providing a mobile application compatible with both Android and iOS devices, enabling remote monitoring and playback of cameras/NVR footage.</p> <p>19) The OEM must provide its own DDNS server hosted in India, eliminating the need for a public IP address for remote monitoring over the Internet.</p> <p>20) Must support Continuous, Alarm, Motion, Instant, Panic Recording Mode</p> <p>21) It should support Resolution: 32MP; 24MP; 16MP; 12MP; 8MP; 5MP; 4MP; 1080p; 720p; D1; CIF; QCIF</p> <p>22) When alarm recording is enabled and an event occurs, you can click the alarm icon on monitoring page to view the alert details. The snapshot function is supported on monitoring and playback page</p> <p>23) The Network Video Recorder (NVR) shall be configured to send email whenever a system message is created or an alarm event occurs. The email server shall be a valid SMTP server. Each recipient email address shall be configured to receive any combination of critical, warning, or informational messages or alarm notifications. When an alarm occurs, the email message includes the NVR name, time of alarm and a list of camera that is configured to record upon alarm</p> <p>24) It should have Web and GUI interface.</p> <p>25) Built-In Artificial Intelligence: NVR should have built-in AI :- 2 Channel face detection and recognition, - Minimum 4 Channel perimeter protection, - Minimum 8 Channel Smart Motion Detection</p> |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Qty | Unit | Rate  | Amount |
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|         | <p>26) Face Recognition Database Capacity: It should support total Blacklist and Whitelist capacity of Minimum 20,000 Faces or more with Face Detection speed of 12 face images/sec and facility to add Name, gender, birthday, address, credential type, credential No., countries &amp; regions and state to each face image.</p> <p>27) Face &amp; Human Attributes Search: Search Pictures/ Video by Gender, age group, glasses, expressions, face mask, beard, Top color, top type, hat, bag, age, gender and umbrella.</p> <p>28) ANPR Capability: It should support ANPR Camera with License plate, plate color, vehicle body, vehicle model, vehicle logo, calling, seatbelt, vehicle registration location etc vehicle attributes.</p> <p>29) Alarm Notifications based on: Motion detection, video tampering, video loss, scene changing, PIR alarm, Camera external alarm, Face detection, face recognition, perimeter protection (intrusion and tripwire), ANPR, people counting, stereo analysis, crowd distribution, heat map, Disk Full, Storage Error, IP Conflict and abnormal behaviour of fan, cybersecurity exception</p> <p>30) Alarm Notification should be linked with Recording, snapshots, Camera external alarm output, buzzer, logs, pre-sets and email.</p> <p>31) General AI Based Search: Search Pictures by channel, time, event type, target classification (Fall Detection, People Approach Detection, People No. Exception Detection, People Staying Detection, Violence Detection.</p> <p>32) Smart playback function: Should support smart search for the selected area in the video and smart playback to improve the playback efficiency</p> <p>34) VCA (Video Content Analytic): Should support multiple video contented analytics based on camera analytics</p> <p>35) Analytics by NVR: Perimeter protection and face recognition</p> |     |      |       |        |
| a)      | 64 Channel Network Video Recorder (NVR) having display split :- Main screen: 1/4/8/9/16/25/36/64, 2nd screen: 1/4/8/9/16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1   | Nos  | 82600 | 82600  |
| 9.5     | Supplying, Installation, Testing and Commissioning following capacity Surveillance grade Hard Disk with upto 256MB/s Transfer Rate, 256 MB Cache, 7200 RPM Disk Speed, 3.5 inch form factor, SATA Interface, BSMI, ICES-003/NNB-003, CE, FCC, KC, Maghreb, RCM, UKCA, VCCI, CB-Scheme, TUV, UL Certifications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |       |        |
| a)      | 10 TB (Terabytes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5   | Nos  | 24798 | 123990 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty   | Unit | Rate         | Amount |
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| 9.6     | Supplying, Installation, Testing and Commissioning of following size LED display (LED monitor) industrial grade with 3840x2160 resolution or better, USB playback, Bluetooth and miracast connectivity, 4X HDMI 2.0, DP 1.2, HDR 10/10+, brightness: 500-nits or better, Video wall mode should be available, contrast ratio: 1200:1, OPS slot, viewing angle (H/V): 170°/ 170°, response time less than 12ms, Display control shall be on monitor screen and programmable with remote (remote shall be supplied with system), Key Board, Optical Mouse, etc. as required.                                                                                                                                                                                                                 |       |      |              |        |
| a)      | 55 inch or larger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 10    | Nos  | 82057        | 820570 |
|         | <b>SH-X ( DG SET)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |      |              |        |
| 10.1    | Supply, installation, Testing & Commissioning of 'Silent Type Diesel Generating set as per CPCB IV + or better norms along with having Prime Power Rating of KVA as below, 415 volts at 1500 RPM, 0.8 lagging power factor at 415 V suitable for 50 Hz, 3 phase system & for 0.85 Load Factor, including testing at factory and site with fuel, load for test and other necessary arrangements Complete as per CPWD specifications, should have QR code which should contain drawing, test report OEM manual, Geo- Tag of manufacturing location, rating plate as per relevant IS Code etc. and consisting of the followings:                                                                                                                                                              |       |      |              |        |
|         | <b>Diesel engine (200 KVA)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |      |              |        |
| a)      | Tourbocharged Diesel engine 4 stroke water cooled, multi cylinder, dynamically balanced fly wheel, electric start of suitable BHP at 1500 RPM suitable for above output of alternator at 40 Degree C, 50% RH & at 1000 Meter MSL , capable of taking 10% over loading for one hour after 12 hours of continuous operation. The engine will be with Electronic governor, Dry type Air filter with service indicator, first filling of engine fuel (after commissioning) lubricating Oil, Coolant and other consumables complete with all the required accessories, the Electronic governor shall be as per ISO 8528. The engine shall comply to the latest CPCB norms (CPCB IV + or better) and Conforming to BS 5514, BS 649, IS 10000, IS 10002, IS 13018 and as per CPWD specifications. |       |      |              |        |
| b)      | Engine mounted Instrument Panel fitted with and having digital display for following:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |      |              |        |
|         | i) Start-stop push button                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |              |        |
|         | ii) Water temperature indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |      |              |        |
|         | iii) Lubrication oil pressure trip indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |      |              |        |
|         | iv) Lubrication oil temperature trip indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |      |              |        |
|         | v) Battery charging indication and voltage indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |      |              |        |
|         | vi) RPM indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |      |              |        |
|         | vii) Over speed indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |      |              |        |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | AE(E) |      | EE(C)Page362 |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty   | Unit | Rate         | Amount |
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|         | viii) Low lubrication Oil trip indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |      |              |        |
|         | ix) Engine Running Hours indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |      |              |        |
|         | x) Fuel Level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |      |              |        |
| c)      | <b>Alternator</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |      |              |        |
|         | Synchronous alternator rated of appropriate KVA, 415 volts at 1500 RPM, 3 phase 50 Hz, AC supply with 0.8 lagging power factor at 40 Degree C, 50% RH & at 1000 Meter MSL. The alternator shall be having Screen Protected Drip Proof (SPDP) enclosure IP23, brushless, continuous duty, dynamically balanced rotor, capable of taking 10% over loading for one hour after 12 hours of continuous operation, self cooled, self-excited and self-regulated through AVR conforming to IS13364(Part 2)/IS: 4722/BS 2613 suitable for tropical conditions and with class- H insulation. |       |      |              |        |
| d)      | <b>Base Frame &amp; Foundation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |              |        |
|         | Both the engine and alternator shall be mounted on suitable base frame made of MS channel with necessary reinforcement which shall be installed on suitable cement concrete foundation and vibration isolation arrangement as per recommendations of manufacturer.                                                                                                                                                                                                                                                                                                                  |       |      |              |        |
| e)      | <b>Fuel Tank:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |      |              |        |
|         | Daily service fuel tank of suitable liters capacity as per CPWD Specifications, fabricated out of 3 mm thick M.S. sheet complete with all standard accessories and fuel piping between fuel tank and diesel engine with MS class 'C' pipes of suitable dia. Complete with valves, level indications & accessories as required as per specifications.                                                                                                                                                                                                                                |       |      |              |        |
| f)      | <b>Exhaust system</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |      |              |        |
|         | Dry exhaust manifold with hospital type exhaust silencer and catalytic convertor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |      |              |        |
| g)      | <b>Starting System</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |      |              |        |
|         | 12V/24V DC starting system comprising of starter motors: voltage regulator and arrangement for initial excitation complete with suitable numbers of batteries (180 AH capacity lead acid SMF type) as required as per specifications. The battery shall be housed inside the acoustic enclosure of DG Set.                                                                                                                                                                                                                                                                          |       |      |              |        |
| h)      | Acoustic and weather proof enclosure with arrangement for fresh air intake for cooling of the engine & alternator, extraction, discharging hot air in to the atmosphere and the temperature rise inside the enclosure, noise level outside enclosure. The acoustic enclosure should be suitable for cable connection/connection through bus-trunking. Such arrangements on acoustic enclosure should be water proof & dust-proof conforming to IP-65 protection. The enclosure shall be as per CPCB IV + or better norms etc. and as per CPWD specifications.                       |       |      |              |        |
| i)      | <b>AMF Panel</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |      |              |        |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | AE(E) |      | EE(C)Page363 |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Qty | Unit | Rate | Amount |
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|         | Free standing floor mounted IP 42 automatic mains failure control panel including auto by-pass, suitable for KVA as below for silent type DG set complete with relays, timers, set of CTs for metering & protection and energy analyser to indicate currents, phase and line voltages, frequency, power factor, KWH, Kilo Volt Ampere Reative Hour (KVARH), KVA (Phase & Total), KW & provision for overload, short circuit, restricted earth fault, under frequency, power aluminium) and control (copper ) cabling of suitable size upto 15 meter between AMF panel, LT Panel and DG Set including connection interconnection etc. as required, all complete and inter locking and communication/ Ethernet /RS485/SNMP port open protocol for BMS integration including suitable software, the panel shall be of DG Set OEM make etc. as per approved by Engineering in charge and including the following: |     |      |      |        |
|         | 1)Suitable numbers and appropriate capacity 4 pole motorised electrically operated draw out with cradle type 3 position ACB/ MCCB with electronic release for O/C & E/F and shunt trip.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |      |        |
|         | 2) Auto/Manual/Test/Off selector switch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |      |        |
|         | 3) Protection for under and over voltage phase reversal (2 nos Over voltage relay, 2 Nos. reverse power relay and 2 Nos. under voltage relay).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |      |        |
|         | 4)3 Sets of current transformers 15 P 10 accuracy for protection and 15 VA class-I for metering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
|         | 5) Energy analyser unit to indicate current, Voltage( L-N & L_L), kW, kVA (Phase & Total), Frequency, KWH, PF.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |      |        |
|         | 6) LED Indicating lamps for load on mains and load on set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |      |        |
|         | 7) Fuse/ MCB for instruments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |      |        |
|         | 8) Battery charger, complete with transformer/ rectifier, D.C. voltmeter and ammeter, selector switch for trickle, off and boost and current adjustment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |      |        |
|         | 9)Main supply failure monitor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |      |        |
|         | 10)Supply failure timer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |      |        |
|         | 11)Restoration timer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |      |        |
|         | 12)Control unit with three impulse automatic engine start/stop and failure to start lockout.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |      |        |
|         | 13)Impulse counter with locking and reset facility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |      |        |
|         | 14)ON/OFF/Control circuit switch with indicator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
|         | 15)Audio/Video annunciation for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
|         | i)High water temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |      |        |
|         | ii)Low lubricating oil pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |      |        |
|         | iii) Engine over speed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |      |      |        |
|         | iv) Engine fails to start                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |      |        |
|         | v) Full load/maximum load warning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty | Unit | Rate    | Amount  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------|---------|
|         | 16)Protection for over/under Frequency, Loss of AC sensing, Over Current, Unbalancing load with suitable number of relays and accessories                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |         |         |
|         | 17)Maintenance notification based on Engine Run Hour & due date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |      |         |         |
|         | 18)Load Management through PLC to achieve auto opening and closing of incomer breakers, bus coupler switching of essential panel , interlocking providing signal to AMF Panel for load status and AMF shall give command to DG Set to auto start / auto stop depending upon load status and requirement etc. and necessary hardware and software required to perform the operation shall be provided by the contractor including all control wiring.                                                                                               |     |      |         |         |
|         | <b>200 KVA</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | Set  | 1547620 | 1547620 |
| 10.2    | Providing and laying in position reinforced cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) in foundation of pump, DG set etc including form work etc as required (excluding reinforcement).                                                                                                                                                                                                                                                                                                        | 10  | cum  | 7878.5  | 78785   |
| 10.3    | Supplying and fixing exhaust gas, piping of suitable dia welded black MS B class pipe conforming to IS: 3589 cut to require length and installation with necessary bands support and clamps, anti vibration mounting, insulation of exhaust system with 50mm thick resin bonded fiber glass pipe section insulation having density 80kg/cum duly covered with a layer of 120gm/sqm polythene sheet on existing pipe and finally applying 0.63mm aluminium sheet cladding complete with type3, grade 1 roofing feltstrip at joints etc as required. | 30  | mtr  | 2652    | 79560   |
| 10.4    | Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.                                                                                                                                                                                                                                                                                                  | 2   | Set  | 8351    | 16702   |
| 10.5    | Providing and fixing 25 mm X 5 mm G.I. strip in 40 mm dia G.I. pipe from earth electrode including connection with G.I. nut, bolt, spring, washer excavation and re-filling etc. as required                                                                                                                                                                                                                                                                                                                                                       | 7   | Mtrs | 755     | 5285    |
| 10.6    | Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10  | Mtrs | 287     | 2870    |
| 10.7    | Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 Meter long etc. with charcoal/ coke and salt as required.                                                                                                                                                                                                                                                                                                | 2   | Set  | 15004   | 30008   |
| 10.8    | Providing and fixing 25 mm X 5 mm copper strip in 40 mm dia G.I. pipe from earth electrode including connection with brass nut, bolt, spring, washer excavation and re-filling etc. as required.                                                                                                                                                                                                                                                                                                                                                   | 7   | Mtrs | 1638    | 11466   |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty | Unit  | Rate | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|------|--------|
| 10.9    | Providing and fixing 25 mm X 5 mm copper strip on surface or in recess for connections etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10  | Mtrs  | 1246 | 12460  |
| 10.10   | Supplying, testing & commissioning of 7core x 2.5 ISI marked Communication Cable and PVC sheathed copper conductor unarmoured U.G. cable of 1.1 KV grade IS: 7098 (Part-I) 1988 as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 50  | Metre | 813  | 40650  |
|         | <b>SH-XI ( UPS)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |       |      |        |
| 11.1    | Online UPS- Input supply: Three Phase, Output supply: Three Phase Supplying, installation, Testing & Commissioning of of following capacity at full load (Unity Power Factor) at operating temperature 0 to 40 deg C, Relative humidity 0 to 95%, Online double conversion true sine wave Uninterrupted hot swappable(allow for the replacement or addition of battery modules without shutting down the entire system) modular Power Supply (UPS)system with N+1 modules (N denotes total number of modules required for rated capacity). The UPS shall include a Rectifier, inverter, battery bank suitable for 30 minutes back up (Battery VAH capacity shall not be less than 1600 VAH per KVA of UPS rating per Hour backup time) on full load (Battery shall be VRLA, SMF in ABS Container) and Static Bypass switch along with manual bypass, suitable isolation transformer for additional protection against neutral faults etc. UPS shall have inbuilt phase sequence correction. The UPS systems offered are to be of the latest technology with Digital Control Microprocessor based for reliable operation using Insulated Gate Bipolar Transistor (IGBT)'s both for the rectifier & inverter(3 Level) with PWM (Pulse Width Modulation). The quality of design, manufacturing and inspection process should confirm to the relevant International standards such as IEC/EN/VDE. The operating efficiency of the UPS systems shall be >96% while operating on battery mode and delivering quality power to the100% non-linear loads. Current total harmonic effect(ITHD) on the input grid shall be < 5% at 50 %load. (The required LC (inductor (L) and a capacitor (C)) filters shall be included in UPS cost), extreme power factor kit to be included to limit the input power factor (PF) to 0.99 and output power factor shall be unity (i.e. kw rating of the UPS shall be kva rating x 1), however UPS |     |       |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty | Unit | Rate   | Amount  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|---------|
|         | shall be suitable to take load at 0.7 lagging to 0.7 leading power factor loads. UPS shall be suitable for incoming supply AC :3Phase 400V +/-20%, 50 Hz +/-5 Hz, AC Output voltage:3Phase 415 Volt, 50 Hz +/- 0.2Hz, Overload capacity of 120%for 10 mins, Sine wave output. Non condensing, noise level less than 60db at 1 meter distance, protections: Input Under voltage over voltage, abnormal out voltage, battery overcharging, output over current, short circuit protection, battery deep discharge protection, 10KV surge. UPS must comply with low voltage electromagnetic compatibility (EMC) achieved asper EN 6204, EN6204 Part I and Part 2, it shall be a Voltage and Frequency Independent (VFI)-type UPS. Communication RS232/RS485/SNMP port open protocol for BMS integration, all hardware & software for IoT Communication as per approved by Engineering in charge. Required battery racks and interconnecting copper conductor cables of suitable size and connectors and all required accessories are inclusive of the cost).This system must provide a means for logging and alarming of all monitored points plus email notification. Forced air-cooling with integral inbuilt fans with redundancy (if one fan fail UPS should be able to handle at least 80% of the load, Noise Level65 DB at 1 meter distance. The system shall be in compliance IEC 62040- 1,2 & 3, IS: 16242 and CPWD Specification. Display Panel (minimum) (In-build 5 inch or more LC Display / LED ) to display : a) Input: Voltage, current, Frequency. b) Bypass: Voltage, Frequency. c) Output: Voltage, frequency, Current. d)Battery: Voltage, Capacity. e) Load: KVA, KW, Percentage. f)Temperature: STS, Inverter, PFC. g) Event Logging &Statistical Data (On LCD/LED): UPS should capture and display up to 3000 events like: Over temperature / DC Bus Fail / Fan Fail / Fuse Fail / Overload / Short-circuit / Device Fail / Inverter Fail / Rectifier Fail / Bypass Fail, etc. h) Statistical Data: No. of power failures / Transfers to Bypass / Total Running time, etc. i)Mains Mode of Operation /Battery Mode of Operation / Bypass feeding the load / UPS Fault /Battery charging and discharging, overload, battery voltage and battery capacity. j) Audible Alarms: Mains Failure, Battery Low Alarm, UPS Overload, Fault, Shutdown, Input Over, Under Voltage, Output Over, Under Voltage, Battery Over, Under Voltage, Over Load and short-circuit, Over Temperature. The UPS should have QR code which should contain drawing, test report OEM manual, Geo-Tag of manufacturing location etc. |     |      |        |         |
| a)      | 20 KVA (Each Power module shall be $\leq$ 10 KVA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3   | Nos  | 341772 | 1025316 |
| b)      | 10 KVA (Each Power module shall be $\leq$ 10 KVA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | Nos  | 208893 | 208893  |
|         | <b>SH-XII (Fire Fighting System)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |        |         |
| 12.1    | Supplying, Installation, Testing and Commissioning of E for automatic operation and consisting of following, comj                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |        |         |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate   | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|--------|
| (a)     | Horizontal type, multistage, centrifugal, split casing pump of cast iron body & bronze impeller with stainless steel shaft, mechanical seal conforming to IS 1520.                                                                                                                                                                                                                                                                                                                                                                                              |     |      |        |        |
| (b)     | Suitable HP Squirrel cage induction motor, TFEC, synchronous speed 1500 RPM, suitable for operation on 415 volts, 3 phase, 50 Hz, AC supply with IP 55 protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS-325.                                                                                                                                                                                                                                                                                                  |     |      |        |        |
| (c)     | M.S. Fabricated common base plate, coupling, coupling guard, foundation bolts etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |        |        |
| (d)     | Suitable cement concrete foundation duly plastered with antivibration pads.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |        |        |
| (i)     | 2280 lpm at 70 m Head                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2   | set  | 388181 | 776362 |
| 12.2    | Supplying, Installation, Testing and Commissioning of <b>Diesel Engine driven main fire pump</b> suitable for automatic operation and consisting of following, complete in all respect as required. <b>(Diesel Driven Pump)</b>                                                                                                                                                                                                                                                                                                                                 |     |      |        |        |
| (a)     | Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal conforming to IS 1520.                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |        |        |
| (b)     | Suitable HP, 1500 RPM water cooled with radiator, diesel engine conforming to relevant IS standard complete with auto starting mechanism, 12 / 24 volts electric starting equipment, diesel tank, exhaust pipe extended upto 10 meter outside pump house duly insulated with 50 mm thick glass wool with 1.0 mm thick aluminium sheet cladding, residential silencer, instruments and protection as per standard specification, stop solenoid for auto stop in the event of fault with audio indications, painted with post office red colour etc. as required. |     |      |        |        |
| (c)     | M.S. Fabricated, common base plate, coupling, coupling guard, foundation bolts etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |        |        |
| (d)     | Suitable cement concrete foundation duly plastered with antivibration pads.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |        |        |
| (i)     | 2280 lpm at 70 m Head                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | Set  | 642112 | 642112 |
| 12.3    | Supplying, Installation, Testing and Commissioning of <b>Electric driven Pressurisation pump</b> suitable for automatic operation and consisting of following, complete in all respects, as required. <b>(Jockey Pump)</b>                                                                                                                                                                                                                                                                                                                                      |     |      |        |        |
| (a)     | Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal conforming to IS 1520.                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |        |        |
| (b)     | Suitable HP Squirrel cage Induction motor TFEC type suitable for operation on 415 volts, 3 phase, 50 Hz AC supply with IP 55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS-325.                                                                                                                                                                                                                                                                                                                   |     |      |        |        |

| Sl. No.    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Qty | Unit | Rate   | Amount |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|--------|
| (c)        | M.S. Fabricated common base plate, coupling, coupling guard, foundation bolts etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |      |        |        |
| (d)        | Suitable cement concrete foundation duly plastered with antivibration pads.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |      |        |        |
| (i)        | 2280 lpm at 70 m Head                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2   | Set  | 109254 | 218508 |
| 12.4       | Fabrication, Supply, Installation, Testing and Commissioning of Electrical control panel of cubical construction, floor mounted type, fabricated out of 2 mm thick CRCA sheet, compartmentalised with hinged lockable doors, dust and vermin proof, powder coated of approved shade after 7 tank treatment process, cable alley, interconnection with suitable size copper conductor cable / solid copper strip, having switchgears and accessories, mountings and internal wiring, earth terminals, numbering etc. complete in all respect, suitable for main fire pump, pressurisation pump & diesel pump set complete as per CPWD specification with following in coming and outgoing, suitable for operation on 415 V, 3 phase, 50 Hz. AC supply with enclosure protection class IP 42 as required. |     |      |        |        |
| <b>I</b>   | <b>INCOMER</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |        |        |
| (a)        | 400A, 50kA 4 Pole MCCB, Ics=100% Icu Rating Digital Voltmeter 0-500V with selector switch Ammeter (0-400 A) with selector switch & CTs etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |      |        |        |
| (b)        | LED type RYB phase indicating lamps, ON, OFF, trip indicating lamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |        |        |
| (e)        | Set of Copper Bus Bar 500Amps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |        |        |
| <b>II</b>  | <b>OUTGOING</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |      |        |        |
|            | (Note : All outgoing feeders for pumps should have digital Ammeter with selector switches and LED type ON, OFF, trip indicating lamps)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |        |        |
| <b>(a)</b> | <b>Main Fire Pump</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |      |        |        |
|            | 125 Amp, 50kA TPN MCCB, Ics=100% Icu, with fully automatic Star/Delta starter suitable for 60 hp pump with overload protection, current sensing type single phase preventor complete with all accessories and internal wiring required for automatic operation, selector switch for local/remote, auto/manual/OFF operation. - 2 sets                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |      |        |        |
| <b>(b)</b> | <b>Jockey Pump</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |        |        |
|            | 63 Amp, 50kA TPN MCCB, Ics=100% Icu, with Suitable HP fully automatic Star/Delta starter with overload protection, current sensing type single phase preventor complete with all accessories and internal wiring required for automatic operation, selector switch for local/remote, auto/manual/OFF operation. - 2 sets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |        |        |
| <b>(c)</b> | <b>Diesel Engine Control</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |        |        |
|            | Control for Diesel Engine comprising -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |        |        |

| Sl. No.    | Description                                                                                                                                                                                                                                                                                                                                                                                                               | Qty | Unit | Rate   | Amount  |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|---------|
|            | Automatic/Manual selector switch & 3 attempts starting device, timers and relays as required, push buttons, start/stop in manual mode                                                                                                                                                                                                                                                                                     |     |      |        |         |
|            | Indicating lamp for high/ Low Lub. Oil pressure, High Water Temp and Engine on indication                                                                                                                                                                                                                                                                                                                                 |     |      |        |         |
|            | Battery charger suitable for 12V/24 V DC with boost and trickle selector switch, 0-30 V DC volt meter, and 0-20 A DC Ammeter All standard relays and accessories for automatic operation of diesel engine                                                                                                                                                                                                                 |     |      |        |         |
|            | All standard relays and accessories for automatic operation of diesel engine.                                                                                                                                                                                                                                                                                                                                             |     |      |        |         |
| <b>III</b> | <b>SYSTEM CONTROLLER</b>                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |        |         |
|            | Designing, Supply, Installation, Testing and commissioning of system controller to control operation of main electric fire pump, diesel pump, Pressurization pump, Terrace pump in sequence as per specification consisting of relays, timers. Sensors, annunciation window for fault indication, complete as per specification                                                                                           | 1   | Set  | 388843 | 388843  |
| 12.5       | Providing, Laying, Testing & Commissioning of ' <b>C' class heavy duty MS pipe</b> conforming to IS 1239 / 3589 i/c fittings like elbows, tees, flanges, tapers, nuts bolts, gaskets etc. in ground including welding, excavation & providing cement concrete blocks as supports, anticorrosive treatment with coal tar/ asphalt tape as per IS 10221, refilling the trench etc. of following sizes complete as required. |     |      |        |         |
| (a)        | 150 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                | 300 | Mtrs | 5104   | 1531200 |
| 12.6       | Providing, Laying, Testing & Commissioning of ' <b>C' class heavy duty MS pipe</b> conforming to IS 3589 / IS 1239 including welding, fittings like elbows, tees, flanges, tapers, nuts bolts, gaskets etc. and fixing the pipe on the wall / ceiling with suitable clamp / support frame and painting with two or more coats of synthetic enamel paint of required shade complete as required.                           |     |      |        |         |
| (a)        | 200 mm dia (wall thickness 6.3 mm)                                                                                                                                                                                                                                                                                                                                                                                        | 20  | Mtrs | 6620   | 132400  |
| (b)        | 150 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                | 50  | Mtrs | 4299   | 214950  |
| (c)        | 100 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                | 150 | Mtrs | 3077   | 461550  |
| d)         | 80 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                 | 50  | Mtrs | 2277   | 113850  |
| e)         | 25 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                 | 200 | Mtrs | 920    | 184000  |
| f)         | 32 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                 | 200 | Mtrs | 1039   | 207800  |
| g)         | 40 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                 | 150 | Mtrs | 1259   | 188850  |
| h)         | 65 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                 | 100 | Mtrs | 1955   | 195500  |
| 12.7       | Providing, Installation, Testing & Commissioning of <b>Stainless Steel Y-Strainer</b> fabricated out of 1.6 mm thick stainless steel, Grade 304, sheet with 3 mm dia holes with stainless steel flange.                                                                                                                                                                                                                   |     |      |        |         |
| (a)        | 150 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                | 3   | Each | 11682  | 35046   |
| (b)        | 100 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                | 2   | Each | 7270   | 14540   |

| Sl. No. | Description                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate  | Amount |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 12.8    | Supplying and Fixing Orifice plate made out of 6 mm thick stainless steel (Grade 304) with orifice of required size to be fitted between flange & landing valve of external and internal hydrants to reduce pressure at the outlet to the level of 3.5 kg/cm <sup>2</sup> complete as required. | 10  | Each | 1436  | 14360  |
| 12.9    | Supplying, Fixing, Testing & Commissioning of <b>Butterfly valve PN 1.6</b> rating with bronze / gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets, confirming to IS 13095 of following sizes as required.                                                              |     |      |       |        |
| (a)     | 150 mm dia                                                                                                                                                                                                                                                                                      | 8   | set  | 9737  | 77896  |
| b)      | 100 mm dia                                                                                                                                                                                                                                                                                      | 8   | set  | 7271  | 58168  |
| c)      | 80 mm dia                                                                                                                                                                                                                                                                                       | 15  | set  | 5406  | 81090  |
| 12.10   | Providing, Installation, Testing & Commissioning of <b>Non-Return Valve</b> of following sizes conforming to IS 5312 complete with rubber gasket, GI bolts, nuts, washers etc. as required.                                                                                                     |     |      |       |        |
| (a)     | 150 mm dia                                                                                                                                                                                                                                                                                      | 3   | Set  | 18884 | 56652  |
| b)      | 100 mm dia                                                                                                                                                                                                                                                                                      | 8   | set  | 11853 | 94824  |
| c)      | 80 mm dia                                                                                                                                                                                                                                                                                       | 2   | Set  | 8255  | 16510  |
| 12.11   | Supplying and Fixing <b>Single headed external yard hydrant valve</b> with 1 No. 63 mm dia instantaneous FM Gun metal / Stainless Steel coupling and cast iron wheel, ISI marked, conforming to IS 5290 (Type - A) with black Gunmetal / Stainless Steel cap and chain as required.             |     |      |       |        |
| (a)     | Single Headed Gunmetal                                                                                                                                                                                                                                                                          | 4   | Set  | 8208  | 32832  |
| 12.12   | Supplying and Fixing <b>Single headed internal yard hydrant valve</b> with instantaneous Gun metal / Stainless Steel coupling of 63 mm dia with cast iron wheel ISI marked conforming to IS 5290 (Type - A) with black Gunmetal / Stainless Steel cap and chain as required.                    |     |      |       |        |
| (a)     | Single Headed Gunmetal                                                                                                                                                                                                                                                                          | 14  | set  | 8208  | 114912 |
| 12.13   | Supplying and Fixing 63 mm dia, 15 m long <b>RRL hose pipe</b> with 63 mm dia male and female couplings duly bound with GI wire, rivets etc. conforming to IS: 636 (Type -A) as required.                                                                                                       |     |      |       |        |
| (a)     | Gun Metal                                                                                                                                                                                                                                                                                       | 36  | set  | 5455  | 196380 |
| 12.14   | Supplying & Fixing 63 mm dia Gun metal <b>short branch pipe</b> with 20 mm nominal internal diameter size nozzle conforming to IS: 903 suitable for instantaneous connection to interconnect hose pipe coupling as required.                                                                    |     |      |       |        |
| (a)     | Gun Metal                                                                                                                                                                                                                                                                                       | 18  | each | 4977  | 89586  |
| 12.15   | Providing and fixing in position the industrial type pressure gauges with gun metal / brass valves complete as required                                                                                                                                                                         | 10  | Nos  | 1491  | 14910  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty | Unit | Rate  | Amount |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 12.16   | Supplying and fixing air vessel made of 250 mm dia, 8 mm thick MS sheet, 1200 mm in height with air release valve on top and flanged connection to riser, drain arrangement with 25 mm dia gun metal wheel valve with required accessories, pressure gauge and painting with synthetic enamel paint of approved shade as required.                                                                                                                                                                | 4   | Nos  | 19402 | 77608  |
| 12.17   | Supplying and fixing first-aid Hose Reel with MS construction spray painted in post office red, conforming to IS 884 complete with the following as required.                                                                                                                                                                                                                                                                                                                                     |     |      |       |        |
| a)      | 20 mm nominal internal dia water hose thermoplastic (Textile reinforced) type -2 as per IS: 12585                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |       |        |
| b)      | 20 mm nominal internal dia gun metal globe valve & nozzle.                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |      |       |        |
| c)      | Drum and brackets for fixing the equipments on wall.                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |      |       |        |
| d)      | Connections from riser with 25 mm dia stop gun metal valve & M.S. Pipe and socket.                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |       |        |
|         | 30 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 14  | Nos  | 9440  | 132160 |
| 12.18   | Supplying and fixing of <b>hose cabinet</b> of size 750 mm x 600 mm x 250 mm made of 16 Gauge MS sheet with 6 mm thick glazed glass doors including necessary locking arrangement suitable to accommodate 2 Nos. 15 meter long Hose pipe, 1 No. branch pipe, mounted on wall OR raised brick platform and fully painted with Post Office Red externally and white internally with synthetic enamel paint complete in all respect, for internal hydrant as required.                               | 14  | Each | 6740  | 94360  |
| 12.19   | Providing & Fixing of <b>Hose cabinet</b> of size 900 mm x 600 mm x 500 mm made of 16 Gauge MS sheet with 6 mm thick glazed glass doors i/c necessary locking arrangement suitable to accommodate external hydrant with butterfly valve, 2 Nos. 15 mtr. long hose pipe, 1 No. branch pipe, mounted on wall or raised brick platform and duly painted with post office red externally and while internally with synthetic enamel paint complete in all respect, for external hydrant, as required. | 4   | Each | 13938 | 55752  |
| 12.20   | Supplying and Fixing of <b>Fire Brigade Connection</b> of cast iron body with Gun Metal male instantaneous inlet couplings complete with cap and chain as required for suitable dia MS Pipe connection conforming to IS 904 as required.                                                                                                                                                                                                                                                          |     |      |       |        |
| (a)     | 3 way - 150 mm dia M.S. Pipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2   | Set  | 10097 | 20194  |
| 12.21   | Providing and Fixing <b>flow switch</b> in flowwing size MS pipe line including connection etc. as required.                                                                                                                                                                                                                                                                                                                                                                                      |     |      |       |        |
| (a)     | 150 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3   | Each | 9644  | 28932  |
| (b)     | 100 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2   | Each | 8069  | 16138  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                          | Qty | Unit | Rate  | Amount |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 12.22   | Providing, Installation, Testing and Commissioning of ISI marked <b>CO2 Wheeled Type Fire Extinguisher of 9 kg capacity</b> consisting of trolley with handle & wheel, wheel type release valve, locking arrangement and shut - off valve fitted with delivery hose horn, etc and conforming to IS:16018 etc. complete with up to date test certificate as required. | 10  | Each | 18666 | 186660 |
| 12.23   | Supplying and laying of one number XLPE insulated and PVC sheathed aluminium conductor armoured UG power cable of 1.1 KV grade of following size in the existing RCC/ HUME/ METAL pipe as required                                                                                                                                                                   |     |      |       |        |
| a)      | 3.5 core 240 sq.mm. ( <b>from station to main fire panel</b> )                                                                                                                                                                                                                                                                                                       | 50  | Mtr. | 2226  | 111300 |
| 12.24   | Supplying and Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing masonry open duct / open air/ area as required.                                                                                                                                                                               |     |      |       |        |
| a)      | 3.5 core 240 sq.mm.                                                                                                                                                                                                                                                                                                                                                  | 20  | Mtr. | 2202  | 44040  |
| 12.25   | Supplying and Fixing of Aluminium conductor armoured one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade confirming to IS:7098 (Part 1) 1988 of following size on surface/existing cable tray including testing, commissioning complete etc as required.                                                                                    |     |      |       |        |
| a)      | 3.5 core 95 sq.mm.( <b>from Main fire panel to Main Electric pumps</b> )                                                                                                                                                                                                                                                                                             | 30  | Mtr. | 1234  | 37020  |
| b)      | 3.5 core 35 sq.mm.( <b>from Main fire panel to Jockey pumps</b> )                                                                                                                                                                                                                                                                                                    | 30  | Mtr. | 551   | 16530  |
| 12.26   | Supplying, testing & commissioning of following Size ISI marked Communication Cable and PVC sheathed copper conductor unarmoured U.G. cable of 1.1 KV grade IS: 7098 (Part-I) 1988 as required.                                                                                                                                                                      |     |      |       |        |
| a)      | 3 core 2.5 sq.mm.                                                                                                                                                                                                                                                                                                                                                    | 100 | Mtr. | 356   | 35600  |
| 12.27   | Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.                                  |     |      |       |        |
| (a)     | 150 mm width x 50 mm depth x 1.6 mm thickness                                                                                                                                                                                                                                                                                                                        | 80  | Mtrs | 803   | 64240  |
| 12.28   | Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required.                                                                                                                                                              |     |      |       |        |
| a)      | 3.5 X 240 sq. mm (62mm)                                                                                                                                                                                                                                                                                                                                              | 2   | Each | 1160  | 2320   |
| b)      | 3.5 X 95 sq. mm (45 mm)                                                                                                                                                                                                                                                                                                                                              | 4   | Each | 684   | 2736   |
| c)      | 3.5 X 35 sq. mm (32 mm)                                                                                                                                                                                                                                                                                                                                              | 2   | Each | 437   | 874    |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty | Unit | Rate  | Amount |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 12.29   | Supplying and laying of following size DWC HDPE pipe ISI marked along with all accessories like socket, bend, couplers etc. conforming to IS 14930, Part II complete with fitting and cutting, jointing etc..direct in ground (75 cm below ground level) including excavation and refilling the trench but excluding sand cushioning and protective covering etc., complete as required.                                                                                                                                                                   |     |      |       |        |
| a)      | 160 mm dia (OD-160 mm & ID-135 mm nominal)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 230 | Mtrs | 537   | 123510 |
| 12.30   | Providing & fixing of pressure switch in M.S. pipe line including connection etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5   | Nos  | 1670  | 8350   |
| 12.31   | Providing, fixing, testing & commissioning of 15mm dia quartzoid bulb type sprinklers of rating 68 degree centigrade with required accessories :                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |       |        |
| a)      | Pendent Sprinkler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 70  | Nos  | 599   | 41930  |
| b)      | Horizontal side wall sprinkler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 30  | Nos  | 699   | 20970  |
| 12.32   | Providing, fixing, testing & commissioning of installation control valve of cast iron body, brass/bronze working parts comprising of water motor alarm, bronze seat clapper, clapper arm and hydraulically driven mechanical gong bell to sound continuous alarm when the wet riser/sprinkler system activates, pressure gauges, emergency releases, strainer, pressure switch, cock valve complete with drain valve and bypass, test control box, ball valves, MS pipe of required size, flanges, orifice plate, gasket etc of follwing sizes as required |     |      |       |        |
| a)      | 150mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1   | Set  | 50805 | 50805  |
| 12.33   | Supplying, installation, testing & commissioning of sprinkler flexible pipe (UL Listed) of stainless steel complete with 15 NPT on reducer thread with maximum working pressure of 175 PSI test pressure of 875 PSI (Burst) with branch line (Inlet) 25mm NPT male thread to sprinkler head (Outlet) 15mm NPT female thread with reducer, nipple, 2 side brackets, center bracket, stockbar of following sizes complete as required.                                                                                                                       |     |      |       |        |
| a)      | 1000mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40  | set  | 1703  | 68120  |
| 12.34   | Supplying ,Installation testing & commisioing of ABC Powder fire Extinguser of 6 kg capacity with release valve, discharge pipe, locking arrangement, operational manual and bracket etc as reqd.                                                                                                                                                                                                                                                                                                                                                          | 30  | Nos. | 5833  | 174990 |
| 12.35   | Supplying ,Installation testing & commisioing of Co2 Portable fire Extinguser of 4.5 kg capacity with delivery hose run,wheel type relese valve,locking arrangement,operational manual and bracket etc as reqd.                                                                                                                                                                                                                                                                                                                                            | 30  | Nos. | 7269  | 218070 |
|         | <b>SH-XIII (Fire Alarm and PA System)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |       |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty | Unit  | Rate   | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|--------|--------|
| 13.1    | Supplying, installation, testing and commissioning of micro processor based intelligent addressable main fire alarm panel, central processing unit with the following loop modules and capable of supporting not less than 240 devices (including detectors) and minimum 120 detectors per loop and loop length up to 2 km, network communication card, minimum 320 character graphics/ LCD display with touch screen or other keypad and minimum 4000 events history log in the non volatile memory (EPROM), power supply unit (230 ± 5% V, 50 hz), 48 hrs back-up with 24 volt sealed maintenance free batteries with automatic charger. The panel shall have facility to connect printer to printout log and facility to have seamless integration with analog/digital voice evacuation system (which is part of the schedule of work under SH: PA System) and shall be complete with all accessories. The panel shall be compatible for IBMS system with open protocol BACnet/ Modbus over IP complete as per specifications. |     |       |        |        |
| a)      | Ten Loop Panel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | Each  | 476893 | 476893 |
| 13.2    | Supplying, installation, testing & commissioning of repeater panel with 320 character/ Touch screen LCD display with inbuilt reset, acknowledge and silence switches complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 6   | Each  | 113734 | 682404 |
| 13.3    | Supplying, installation, testing & commissioning of intelligent analog addressable photothermal detector complete with mounting base complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 150 | Each  | 3004   | 450600 |
| 13.4    | Supplying, installation, testing & commissioning of response indicator on surface/recessed MS Box having two LED, metallic cover complete with all connections etc as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50  | Each  | 306    | 15300  |
| 13.5    | Supplying, installation, testing & commissioning of intelligent addressable programmable sounder complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12  | Each  | 2787   | 33444  |
| 13.6    | Supplying, installation, testing & commissioning of intelligent addressable thermal detector with rate of rise cum fixed temperature thermistor complete with base as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 8   | Each  | 2866   | 22928  |
| 13.7    | Supplying, installation, testing & commissioning of addressable manual call point complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 15  | Each  | 4063   | 60945  |
| 13.8    | Supplying, installation, testing & commissioning of addressable horn cum strobe complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 10  | Each  | 3682   | 36820  |
| 13.9    | Supplying & laying of 2x1.5 sqmm fire survival armoured cable, 600/1000V rated with annealed copper conductor having glass mica fire barrier tape covered by an extruded layer of Cross Linkable Ethylene Propylene Rubber (EPR) insulation and LSZH inner bedding, steel wire armouring & LSZH outer sheath complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 300 | Mtrs. | 386    | 115800 |
| 13.10   | Supplying, installation, testing & commissioning of fire fighter telephone handset complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5   | Nos   | 6016   | 30080  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty  | Unit  | Rate   | Amount |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|--------|--------|
| 13.11   | Supplying, installation, testing & commissioning of 6 zone, voice alarm controller with USB, MP3 player (including 6 zone button paging station) with seamless integration facility with main fire alarm panel for voice evacuation complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1    | No    | 132115 | 132115 |
| 13.12   | Supplying, installation, testing & commissioning of 1.5/3/6W metal box ceiling/wall speakers complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 80   | No    | 1891   | 151280 |
| 13.13   | Supplying, installation, testing & commissioning of ceiling/wall mounted loud speaker, 3/1.5 Watt in ABS enclosure complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20   | No    | 2555   | 51100  |
| 13.14   | Supplying, installation, testing & commissioning of digital audio amplifier 75 Watt, 25V rms operating at 240 Volt AC Supply complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1    | No    | 152368 | 152368 |
| 13.15   | Supplying, installation, testing & commissioning of exit point directional sound speaker with voice and integral audio amplifier with selectable sound pulse patterns complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 5    | No    | 10618  | 53090  |
| 13.16   | Supplying, installation, testing & commissioning of Voice command keypad 6 zone, with microphone assembly complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1    | No    | 85450  | 85450  |
| 13.17   | Supplying and drawing of cable Fire Retardant PVC insulated copper conductor cable in the existing surface / recessed steel conduit of following pairs, cores and size including connections and interconnections etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |       |        |        |
| a)      | Speaker cable Single pair, 2-core, 1.5 sqmm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2000 | Metre | 61     | 122000 |
| 13.18   | Supplying and fixing 25 mm dia MS flexible pipe with PVC coating along with all ancillaries and accessories like coupler etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 200  | Metre | 60     | 12000  |
|         | <b>SH-XIV( EV Charger)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |       |        |        |
| 14.1    | Supply, Installation, Testing and commissioning of EV charging station As per specifications and in Compliance to relevant IS codes etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |       |        |        |
| a)      | Light EV AC Charger (Mode-3)<br>Power : 7 kW, Input power supply: 1phase 230 +10% Volt, output supply: 230 Volt AC, Frequency:50 Hz +/- 3%, Operational temperature range : -25 to 55 degree C (outdoor), -5 to 55 degree C(Indoor)., RH upto 95%, Charging Device as per IS-17017-22-1 EV-EVSE Communication: as per relevant IS Codes, Bluetooth Low Energy, one Charge Point Plug/ Socket as per IS-60309 and IS-17017-2, Vehicle Inlet/ Connector As per EV manufacturer, suitable for 2 Wheelers and 4 wheelers. Indoor use: at least IP41; Outdoor use: at least IP44. Mechanical Strength :protection of the external enclosure against mechanical impact shall be IK08 according to IEC 62262.O/L,S/C protection. Insulation Resistance > 1 M Ω. Cable Length: 7.5 m. RCD having a rated residual operating current not exceeding 30 mA; Separate RCD for multiple outputs. Telecommunication port of the EV supply equipment according to IS 13252 | 1    | Nos   | 23385  | 23385  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty | Unit | Rate   | Amount |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|--------|
|         | (Part 1) : 2010. OCPP (Open charge point protocol) 1.6J upgradable to ocpp 2.0. Device Should follow 17017 series of IS codes in general and the installation of the system shall comply with relevant IS Codes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |      |        |        |
| b)      | Parkbay AC Charger (Mode -3) Power Level 2: Normal Power ~11kW/ 22 kW, 3 phase 415VAC(-40% to +20%), Frequency:50 Hz +/-5%, output supply: 240 Volt AC, Operational temperature range : -25 to 55 degree C (outdoor), -5 to 55 degree C(Indoor), RH upto 95%, Charging Device as per IS-17017-1 EV-EVSE ISO-15118 for Smart Charging, Infrastructure Socket as per IS-17017-2-2, Vehicle Connector as per IS-17017-2-2 Vehicle Inlet/ Connector As per EV manufacturer, suitable for 4 wheelers. Indoor use: at least IP41; Outdoor use: at least IP44.Mechanical Strength :protection of the external enclosure against mechanical impact shall be IK08 according to IEC 62262. O/L,S/C protection. Insulation Resistance > 1 M $\Omega$ . Cable Length: 7.5 . RCD having a rated residual operating current not exceeding 30 mA; Separate RCD for multiple outputs. Telecommunication port of the EV supply equipment according to IS 13252 (Part 1) : 2010. OCPP (Open charge point protocol) 1.6J upgradable to ocpp 2.0. Device Should follow 17017 series of IS codes in general and the installation of the system shall comply with relevant IS Codes.                               | 1   | Nos  | 84219  | 84219  |
|         | Parkbay DC Charger (Mode-3) Power Level 2: Normal Power ~24KW and above, 3 phase 415VAC(-40% to +20%), Frequency:50 Hz +/-5%, output supply: DC 12/24 Volt, Operational temperature range : -25 to 55 0C (outdoor), -5 to 55 0C (Indoor), RH upto 95%, Charging Device as per Device/protocol: IS-17017-23, EV-EVSE Communication as per IS-17017-24, ISO-15118, Infrastructure Socket as per IS-17017-2-2/3, Vehicle Connector as per IS-17017-2-3 Vehicle Inlet/ Connector As per EV manufacturer, suitable for 4 wheelers. Indoor use: at least IP42; Outdoor use: at least IP54. Mechanical Strength: protection of the external enclosure against mechanical impact shall be IK08 according to IEC 62262. O/L,S/C protection. Insulation Resistance > 1 M $\Omega$ . Cable Length: 7.5 m. RCD having a rated residual operating current not exceeding 30 mA; Separate RCD for multiple outputs. Telecommunication port of the EV supply equipment according to IS 13252 (Part 1) : 2010. OCPP(Open charge point protocol) 1.6J upgradable to ocpp 2.0. Device Should follow 17017 series of IS codes in general and the installation of the system shall comply with relevant IS Codes. | 1   | Nos  | 888982 | 888982 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty | Unit | Rate | Amount |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
|         | <b>SH-XV( LIFT)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |      |        |
| 15.1    | <p>Supplying, Installation, Testing &amp; Commissioning of following capacity passenger Machine room less (MRL) lift with regenerative drive as per CPWD General Specification for Electrical Works (Part-III Lift &amp; Escalator) 2003, BIS Codes, NBC 2016 as amended upto date having provision for barrier free access as per Harmonised Guidelines &amp; Standards for Universal Accessibility in India - 2021 of MoHUA, serving different floors in the lift shaft as per detailed specifications enclosed and as under including all other equipment and accessories complete as required :-</p> <p>(i) Speed-1.5 MPS</p> <p>(ii) Floors-7 (B+G+5)</p> <p>(iii) Travel -29 Meters (approx.)</p> <p>(iv) Stops &amp; opening- 7 stops and 7openings</p> <p>(v) Controller: A.C. variable voltage &amp; variable frequency</p> <p>(vi) Automatic rescue device (ARD) complete with dry maintenance free batteries as required.</p> <p>(vii) Operation: Microprocessor based single automatic push button/simplex selective collective/ duplex collective selective with/without attendant</p> <p>(viii) Power-415 Volts+10%, 3 phase, 50 Hz, 4 wires system</p> <p>(ix) Car Enclosure: Stainless steel scratch proof (Moon Rock /Honeycomb / Hairline Finish) on all sides and stainless steel decorative ceiling with fans (indirect throw) and LED fitting.</p> <p>(x) The car flooring should be smooth and antiskid as approved by engineer-in-charge.</p> |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty | Unit | Rate    | Amount  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------|---------|
|         | <p>(xi) Type of doors</p> <p>a) Car: Power operated, centre opening horizontal sliding stainless steel scratch proof (Moon Rock/Honeycomb/ Hairline Finish).</p> <p>(b) Landing doors: stainless steel scratch proof.</p> <p>(xii) A hand rail not less than 600mm long at 900mm above floor level to be fixed adjacent to control panel in the lift car.</p> <p>(xiii) Voice announcement system in the car to announce the position of the elevator in the hoist way as the car passes or stops at floor served by the elevator.</p> <p>(xiv) Closed loop Control System, protection against power fluctuation, self diagnostic control, Landing doors 2 hours Fire rated, Overload detection and protection, Over speed Governor, Dot Matrix LED D &amp; P Indicators In Car &amp; Landings, BMS Compatibility, tamper proof infrared curtain covering almost the entire height of the lift car door, Alarm horn, Anti Nuisance Operation, CCTV camera system with 4 MP IP camera, suitable NVR and HDD for 30 days storage backup, Firemen switch, 2/3 way intercom, Emergency Stop Switch with battery backup for fan and light fitting for 1 hour, pit ladder.</p> <p>(xv) The lift doors shall have a vision panel to enable persons with hearing impairment to signal for help or assistance in the event of an emergency.</p> <p>(xvi) An appropriate technological support be provided (Through emergency messaging  services or alarms etc.) to respond to the emergency requirements of person with hearing impairment or deafness.</p> <p>(xvii) In case of failure of ARD or other electronic devices, a provision of manual rescue be provided</p> |     |      |         |         |
| a)      | 13 passenger (884kg)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | Nos  | 2067975 | 2067975 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Qty   | Unit | Rate         | Amount |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|--------|
| 15.2    | <p>Supplying, Installation, Testing &amp; Commissioning of 2000kg Machine room less (MRL) goods lift with regenerative drive as per CPWD General Specification for Electrical Works (Part-III Lift &amp; Escalator) 2003, BIS Codes, NBC 2016 as amended upto date, serving different floors in the lift shaft as per detailed specifications enclosed and as under including all other equipment and accessories complete as required :-</p> <p>(i) Speed - 0.5 MPS</p> <p>(ii) Floors - 7(B+G+5)</p> <p>(iii) Travel - 29 metres(approx.)</p> <p>(iv) Stops &amp; opening : 7 stops and 7 openings</p> <p>(v) Controller: A.C. variable voltage &amp; variable frequency</p> <p>(vi) Automatic rescue device (ARD) complete with dry maintenance free batteries as required.</p> <p>(vii) Operation: Microprocessor based single automatic push button/simplex selective collective/duplex collective selective with/without attendant</p> <p>(viii) Power-415 Volts+10%, 3 phase, 50 Hz, 4 wires system</p> <p>(ix) Car Enclosure: Stainless steel scratch proof (Moon Rock/ Honeycomb/ Hairline Finish) on all sides and stainless steel decorative ceiling with fans (indirect throw) and LED fitting.</p> <p>(x) The car flooring should be strong to take the rated load without any deformation or damage and antiskid as approved by engineer-in-charge.</p> |       |      |              |        |
|         | <p>(xi) Type of doors:-</p> <p>(a) Car: Power operated, centre opening horizontal sliding stainless steel scratch proof (Moon Rock/ Honeycomb/ Hairline Finish).</p> <p>(b) Landing doors: stainless steel scratch proof .</p> <p>(xii) A hand rail not less than 600mm long at 900mm above floor level to be fixed adjacent to control panel in the lift car.</p> <p>(xiii) Voice announcement system in the car to announce the position of the elevator in the hoist way as the car passes or stops at floor served by the elevator.</p> <p>(xiv) Closed loop Control System, protection against power fluctuation, self diagnostic control, Landing doors 2 hours Fire rated, Overload detection and protection, Over speed Governor, Dot Matrix LED D &amp; P Indicators In Car &amp; Landings, BMS Compatibility, tamper proof infrared curtain covering almost the entire height of the lift car door, Alarm horn, Anti Nuisance operation, CCTV camera system with 4 MP IP camera, suitable NVR and HDD for 30 days storage backup , Firemen switch, 2/3 way intercom, Emergency Stop Switch with battery backup for fan and light fitting for 1 hour, pit ladder.</p> <p>(xv) In case of failure of ARD or other electronic devices, a provision of manual rescue be provided.</p>                                                                           |       |      |              |        |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | AE(E) |      | EE(C)Page380 |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty | Unit   | Rate    | Amount  |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------|---------|
| a)      | 2000 kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1   | Nos    | 4976774 | 4976774 |
|         | <b>SH: XVI ( VRV/VRF)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |        |         |         |
| 16.1    | Supply, Installation, Testing & Commissioning of Modular type Variable Refrigerant Flow/Variable Refrigerant Volume air cooled Outdoor units suitable for cooling/heating having 100%hermetically sealed inverter type twin Rotary/Scroll Compressor(s),minimum two compressors (with individual separate PCB) for above 14HP modules, microprocessor based Controller, top discharge type condensing unit(s), withR-410-A Refrigerant or equivalent, vibration Isolators with suitable foundation etc. complete as required. To have better efficiency condenser fan shall be capable to operate at different speed with respect to load. The unit shall deliver therated capacity and in confirmation as per IS 18728:2024 and CPWD Specifications and work even at 50°C ambient temperature without tripping. The system shall be able to deliver 100% of the rated capacity upto 39 Degree Celcius. The unit shall be suitable to work on 400V +/- 10%, 3Phase, 50Hz AC power supply and BMS compatible. The units hall be filled with first charge of the refrigerant and ready for use as required. The condenser should be coated with a hydrophilic film to prevent water accumulation on the surface of the heat exchanger, enhance water dispersion, and reduce the risk of degradation, thereby improving overall performance and durability. The Indian Seasonal Energy Efficiency Ratio(ISEER) of the unit shall be as per Energy Conservation and Sustainable Building Code (ECSBC) 2024 as below and complete as per CPWD specification, connections, interconnections etc. as required. (For capacity <40 kWr ISEER6.4, Capacity > 40 and <70 ISEER 6.5, Capacity > 70 ISEER6.6 for ECSBC+ Building) For Cooling or Heating or Both |     |        |         |         |
| a)      | 10 HP to 12 HP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 50  | Per HP | 21422   | 1071100 |
| b)      | 14 HP to 22 HP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 150 | Per HP | 20385   | 3057750 |
| 16.2    | Supply, Installation, Testing and Commissioning of following minimum capacity 4 way Cassette Type Indoor ceiling mounted unit equipped with synthetic washable media pre filter, fan section with low noise fan/dynamically balanced blower, multispeed motor, coil section with DX Copper coil, electronic expansion valve, outer cabinet, drain pump, grill, necessary supports, vibration Isolation, Corded remote control etc., suitable for operation on single phase 230 V ± 10%, 50HzAC supply, complete, as required. The Indoor units must shutdown upon receiving a signal from the BMS System/Fire Signals. The system shall be capable to adjust air flow as per room requirement in auto mode. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19Degree C WB temperature. (Make will be same as of Outdoor)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |        |         |         |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Qty | Unit | Rate  | Amount  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|---------|
| a)      | 1.6 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12  | No   | 39464 | 473568  |
| b)      | 2.0 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12  | No   | 39734 | 476808  |
| c)      | 2.6 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 15  | No   | 40814 | 612210  |
| d)      | 3.6 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 30  | No   | 44269 | 1328070 |
| 16.3    | Supply, Installation, Testing and Commissioning of following minimum capacity High wall type Indoor unit equipped with and comfort washable synthetic media pre-filter, fan section with low noise fan/dynamically balanced blower, multispeed motor, coil section with DX copper coil, electronic expansion valve, outer cabinet, cord less remote control, drain pan, necessary accessories etc., suitable for operation on 230 V $\pm$ 10%, 50 Hz, single phase AC supply, complete as required. The Indoor units must shut down upon receiving a signal from the /Fire Signals. The system shall be capable to adjust air flow as per room requirement automatically. The cooling capacity of indoor unit will be at air inlet conditions of 27Degree C DB and 19 Degree C WB temperature. (Make will be same as of Outdoor)                                                                                                                                                            |     |      |       |         |
| a)      | 1.0 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2   | No   | 17816 | 35632   |
| b)      | 1.6 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2   | No   | 22027 | 44054   |
| c)      | 2.0 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2   | No   | 22674 | 45348   |
| 16.4    | Supply, Installation, Testing and Commissioning of following minimum capacity and external static pressure VRF/VRV ceiling mounted mid high static ductable type Indoor unit equipped with washable synthetic media pre-filter, fan section with low noise fan/dynamically balanced blower, multispeed motor, coil section with DX copper coil, electronic expansion valve, corded remote control, outer cabinet, vibration Isolators, drain pan, drain pump, other necessary supports etc., suitable for operation on single phase AC supply 230 V $\pm$ 10%, 50 as required. The Indoor units must shut down upon receiving a signal from the BMS System/Fire Signals. The system shall be capable to adjust air flow as per room requirement automatically. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19 WB temperature. (Make will be same as of Outdoor) High Static Ductable units (minimum 49 to 77 Pascal external static pressure) |     |      |       |         |
| a)      | 2.0 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5   | No   | 36063 | 180315  |
| b)      | 4.0 TR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2   | No   | 45997 | 91994   |
| 16.5    | Supply, Installation, Testing and Commissioning of Y/T/Multi Joints. Joints shall be of same Original Equipment Manufacturer (OEM) make as of ODUs and IDUs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |       |         |
| a)      | Indoor Units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 50  | No   | 4535  | 226750  |
| b)      | Outdoor Multi Joint                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30  | No   | 8098  | 242940  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Qty | Unit  | Rate | Amount |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|------|--------|
| 16.6    | Supply, Installation, testing and commissioning including vaccumiazation and Nitrogen testing of following nominal sizes of soft/hard drawn copper refrigerant piping for VRV/VRF system, complete with fittings, with suitable adjustable ring type hanger supports, jointing/brazing including accessories, insulated with XPLE Class-O tubular insulation/with Class-O closed cell elastomeric nitrile rubber tubular sleeves sections of 19 mm thick insulation as given below for Suction and Liquid lines, all accessories as per specifications etc. as required : |     |       |      |        |
| a)      | 6.4 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 150 | Meter | 256  | 38400  |
| b)      | 9.5 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 800 | Meter | 346  | 276800 |
| c)      | 12.7 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 200 | Meter | 487  | 97400  |
| d)      | 15.86 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 800 | Meter | 615  | 492000 |
| e)      | 19 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 300 | Meter | 739  | 221700 |
| f)      | 22.2 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 150 | Meter | 904  | 135600 |
| g)      | 25.4 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 150 | Meter | 1068 | 160200 |
| h)      | 28.58 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 180 | Meter | 1157 | 208260 |
| i)      | 31.8 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 100 | Meter | 1222 | 122200 |
| j)      | 34.9 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 300 | Meter | 1286 | 385800 |
| 16.7    | Supply, installation testing & commissioning of rigid UPVC piping complete with fittings, supports as per specifications and duly insulated with 9 mm thick closed cell nitrile rubber insulation.                                                                                                                                                                                                                                                                                                                                                                        |     |       |      |        |
| a)      | 25 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 100 | Mtr   | 273  | 27300  |
| b)      | 32 mm dia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 390 | Mtr   | 312  | 121680 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Qty  | Unit | Rate   | Amount  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--------|---------|
| 16.7    | Supplying, installation, testing and commissioning of outdoor type cubical type Electrical feeder panel of suitable size fabricated from workshop with IP 54 Protection having depth not less than 400 mm suitable for 415 V 3 phase 4 wires, 50 Hz, AC supply system fabricated in compartmentalized design from CRCA sheet steel of 2mm thick for frame work and covers, 3mm thick for gland plates including cleaning and finishing complete with 7 tank prepaint process painting with powder coating in siemens grey or approved shed, having 300 Amps capacity extensible type TP & N Aluminium Alloy, bus bars of high conductivity, DMC/SMC bus bar supports with short circuit with stand capacity of 31 MVA for 1 second bottom base channel of MS Section not less than 50mm X 50mm X 5mm thick, entire panel shall have a common G.I earth bar of size 25mm X 6mm at the rear with 2 nos. earth stud, solid connections from main bus bar to switch gears with required size of aluminium bus bars and control wiring with 1.5 sqmm FRLS PVC insulated copper conductor single core cable, cable alleys, terminal block for wires & cable, gland plates, providing & installation of following accessories their in complete with connection, interconnection, earthing etc as required. <b>(HVAC Panel)</b> |      |      |        |         |
|         | Incoming -<br>a) 200 A FP 36KA MCCB with adjustable thermal magnetic OL/SC protection (Ics=Icu=100%) with spreader link and extended rotary handle - 1 no b) R/Y/B Phase Indication Lamp(LED)-1Set c) MCB SP 2A 10 KA for protection-3 Nos d) CT Class 1, 15 VA 200/5 - 3 nos. e) Multifunction Metre Outgoing- a) 63A FP 16-18 kA MCCB with adjustable thermal magnetic OL/SC protection (Ics=Icu=100%) with spreader link and extended rotary handle - 6 nos                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3    | Nos  | 184929 | 554787  |
| 16.8    | Supplying, laying & fixing of following sizes of PVC insulated, PVC sheathed Copper Conductor communication cable with medium class (electrical grade) PVC conduit with all PVC accessories like bend, elbow, Tee, Junction, coupler etc. on surface/recess i/c cutting / drilling the wall wherever required and making good the same etc on wall/ surface/ cable tray etc. as required. (For IDU Network, ODU network, for remotecontrol units and for centralized monitoring & control system).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |      |        |         |
| a)      | 2 core x 1.5 sqmm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2000 | Mtr  | 206    | 412000  |
| 16.9    | Supplying, laying & fixing of one number XLPE insulated and PVC sheathed armoured copper conductor power cable of 1.1 kv grade conforming to IS-7098 part-I/1988 on wall/surface etc. as reqd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |      |        |         |
| a)      | 4 x 25 sqmm Copper Conductor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 300  | Mtr  | 3664   | 1099200 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                         | Qty  | Unit  | Rate  | Amount |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-------|--------|
| 16.10   | Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications.                                                                                                                                                                                               | 2    | Sqm   | 9623  | 19246  |
| 16.11   | Supplying & fixing of powder coated extruded aluminium Return Air Grills with louvers but without volume control dampers complete as required.                                                                                                                                                                                      | 2    | Sqm   | 6285  | 12570  |
| 16.12   | Supplying, fixing testing commissioning of supply air diffusers of powder coated aluminium with aluminium volume control dampers with anti smudge ring & removable core.                                                                                                                                                            | 2    | Sqm   | 12841 | 25682  |
| 16.13   | 16.18 Supplying, fixing testing commissioning of Return air diffusers of powder coated aluminium without volume control dampers with anti smudge ring & removable core.                                                                                                                                                             | 2    | Sqm   | 8595  | 17190  |
| 16.14   | Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. |      |       |       |        |
| a)      | 150 mm width X 50 mm depth X 1.6 mm thickness                                                                                                                                                                                                                                                                                       | 300  | Metre | 803   | 240900 |
| b)      | 300 mm width X 50 mm depth X 1.6 mm thickness                                                                                                                                                                                                                                                                                       | 300  | Metre | 1062  | 318600 |
| 16.15   | Supply, installation, balancing and commissioning of site fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required.                        |      |       |       |        |
| a)      | Thickness 0.63 mm sheet                                                                                                                                                                                                                                                                                                             | 200  | Sqm   | 1213  | 242600 |
| b)      | Thickness 0.80 mm sheet                                                                                                                                                                                                                                                                                                             | 100  | Sqm   | 1415  | 141500 |
| c)      | Thickness 1.00 mm sheet                                                                                                                                                                                                                                                                                                             | 100  | Sqm   | 1851  | 185100 |
| 16.16   | Supply, installation, testing and commissioning of GI volume control duct damper complete with neoprene rubber gaskets, nuts, bolts, screws linkages, flanges etc, as per specifications.                                                                                                                                           | 25   | Sqm   | 7580  | 189500 |
| 16.17   | Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface/ recessed steel/ PVC conduit as required.                                                                                                                                                                   |      |       |       |        |
| a)      | 3 x 2.5 Sq. mm                                                                                                                                                                                                                                                                                                                      | 1500 | Mtrs  | 148   | 222000 |
| 16.18   | Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.                                                                                                                           |      |       |       |        |
| a)      | 20 mm                                                                                                                                                                                                                                                                                                                               | 1500 | Metre | 151   | 226500 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty | Unit | Rate  | Amount  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|---------|
|         | <b>SH-XVII (SOLAR PV POWER GENERATION)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |      |       |         |
| 17.1    | Supply, Installation, Testing and Commissioning of on-grid Solar Photovoltaic Power Plant conforming to various applicable standards BIS, IEC, MNRE guidelines, the Central Electricity Authority Regulations and CPWD Specifications as amended up to date, consisting of Mono/Poly Crystalline silicon solar cells module, net metering facility, necessary control, protections, earthing, cabling, mounting structure, junction boxes, power conditioning units, Real time online web interfaced Data Monitoring System, Distribution panels, grid connecting arrangement, conduits, pipes, cable trays and other accessories etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                |     |      |       |         |
| a)      | High Energy Efficiency Solar Photovoltaic Module of capacity 330 Wp or above, manufactured in India, conforming to IS 14286/IEC 61215, IS/IEC 61730-Part-1, IS/IEC 61730-Part-2. Solar Photovoltaic Module conversion efficiency shall not be less than 23% at STC with temperature coefficient of Pmax better than -0.30% per degree Celsius. PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. Solar Modules shall be designed to operate in relative humidity upto 100% with temperature between -10 Deg C and +85 Deg C. Further, each PV module used in any solar power project must have Radio frequency identification tag with information such as name of manufacturer, month and year of manufacturing, country of origin (separately for Solar cell and module), I-V curve, Unique Serial No and Model No of the module, Wattage, Im, Vm and FF, name of test lab issuing IEC certificate. | 30  | KWp  | 54280 | 1628400 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Qty | Unit | Rate | Amount |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|------|--------|
| b)      | Power Conditioning Unit (PCU) of 350-800 V DC Input voltage range and 415 V AC, three phase, 4 wire, 50Hz +/- 2.5 Hz, output voltage suitable to generate AC with a variation of 10% at nominal voltage. Power with efficiency not less than 97%, total harmonic distortion less than 3% and suitable for ambient temperature from 0 to 50 degree C , Minimum IP-65 for outdoor and Minimum IP 21 for indoor, Built-in meter and data logger, MPPT, switching devices GBT/MOSFETs and controller Microprocessor /DSP . PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown. The PCU shall be able to withstand unbalanced load conforming to IEC standard with hutdown/standby mode.It must be provided with grid islanding along with manual disconnect pole isolation switch besides automatic disconnection. Minimum protections: Mains Under / Over Voltage, Over current, Over/Under grid frequency, Over temperature, Surge voltage induced at output due to external source, Shortcircuit, Lightning, Anti Islanding (for grid synch. Mode) and other protections as per applicable standards. LCD/LED display of minimum parameters: DC input voltage, DC current, AC Voltage and current (all 3 phases, in case of 3 phase), Instantaneous & cumulative AC output power, Daily DC energy produced and other parameters applicable standard. Communication interface RS 485 / RS 232. |     |      |      |        |
| c)      | Module mounting structure: The roof top solar plant generation units shall be installed by using supporting Aluminium/Galvanized MS structure (mass of zinc coating shall be as per IS4759 ) having minimum head room clearance of 2.4 meter above the terrace level / ground level. The mounting structure would be designed to sustain wind load and seismic parameter of the site of installation. All the structure shall be design as per applicable BIS code and the material shall also confirm the applicable BIS Code. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. The suitable arrangements for maintenance and cleaning shall be provided.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |      |        |
| d)      | Real time online web interfaced Data Monitoring System complete with accessories for various parameters such as Solar Irradiance, temperature, AC Output Voltage and current, Output Power, Power factor, DC Input Voltage and Current, Time Active, Time disabled, Time Idle, Power produced and other parameters as per standard practices.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |      |      |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty | Unit | Rate  | Amount |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| e)      | Array junction box & Main junction box with IP 65 protection and termination arrangement for incoming and outgoing cable along with glands, lugs and other accessories etc. as required. Each junction box shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement with High quality Suitable capacity Metal Oxide Varistors (MOVs) (semiconductor diode with resistant applied voltage)/ surge arrestors and suitable Reverse Blocking Diodes, isolation switches isolate the DC input to Inverter, copper bus bar etc.                                                                                                                                                                                                                                                             |     |      |       |        |
| f)      | Lightning ,surge voltage protection, earthing protection and grid islanding.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |       |        |
| g)      | Cables: Connections & Interconnections by required size IR/UV protected XLPE insulated copper conductor 1.1 kV grade armored power and control cables(ISI Marked) along with supplying & fixing of necessary channel/conduit, GI cable trays , supports, lugs, thimble and other accessories etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |       |        |
| h)      | DC Distribution Board And AC Distribution Panel Board: IP65, free standing, metal cladded, having copper bus bar, having required protection and control gears, connection inter connection, etc. as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |       |        |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |      |       |        |
|         | <b>SH:- XVIII (50KLD STP/ Plant)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |       |        |
|         | Design, Fabrication, Supply, installation, testing, trial run & commissioning of sewage Treatment Plant of capacity 50 KLD based on Physio-chemical and aerobic, attached growth, moving bed bio reactor technology equipped PVC UV stabilized plastic media attachment for bacteria growth. The said plant cost include following ; All the tanks accessories, pipes etc. shall be in the scope of this Item. of sewage and effluent at inlet:<br>PH : 6.5 - 8.5<br>BOD 5 : 250-300 mg/l<br>S. Solids : 200 mg/l<br>COD : 400-550 mg/l<br>Coliform : $10^6$ - $10^7$ counts / 100 ml<br>Treated Sewage characteristic as per PCB norms.<br>i. pH : (5.5 to 9)<br>ii. BOD : < 6 Mg/L<br>iii. TSS : < 10 Mg/L<br>iv. COD: <50 Mg/L<br>Coliform : Nil<br>The treated effluent shall be odourless, free from oil, grease and other obnoxious matters. |     |      |       |        |
| 18.1    | <b>BAR SCREEN</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |       |        |
| a)      | SITC of SS-304 perforated bar screen with 8-12mm normally placed gaps in screen to allow sewage water flow and prevent higher size debris from entering into the Collection tank at the very entry point itself of the tank. Screen kept inclined at 45 degree to the horizontal with hand track as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | lot  | 33040 | 33040  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                     | Qty | Unit | Rate    | Amount  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------|---------|
| 18.2    | Anoxic Mixer                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |      |         |         |
| a)      | SITC of energy efficient 3 blades mixer with minimum of 0.8 KW and RPM of 1450 suitable for operation on 3 phase 400Volt AC supply as required                                                                                                                                                                                                                                                                                                  | 1   | lot  | 98051   | 98051   |
| 18.3    | MS Treatment Unit                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |         |         |
|         | Providing & fixing of 4 MM MSEP tank including design engineering & fabrication comparing of                                                                                                                                                                                                                                                                                                                                                    | 1   | Lot  | 1554818 | 1554818 |
|         | Anoxic Tank X 1 Nos<br>MBBR 1&2 X 1 No Each<br>Secondary Settling tank X 1 No<br>Filter Feed Tank X 1 No<br>Sludge Holding Tank X 1 No<br>UF Tank X 1 No<br>Treated Water Tank X 1 No                                                                                                                                                                                                                                                           |     |      |         |         |
| 18.4    | OIL SKIMMER                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |         |         |
|         | Supplying, Installation, Testing and Commissioning of oil and grease skimmer of 0-4 LPH with required motor and base frame suitable for mounting on Oil chamber as required.                                                                                                                                                                                                                                                                    | 1   | No   | 47508   | 47508   |
| 18.5    | Sewage Lifting Pump                                                                                                                                                                                                                                                                                                                                                                                                                             |     |      |         |         |
| a)      | SITC of Sewage disposal pumps: submersible sewage pump complete with valves, suction and delivery header of an approved make of suitable capacity capable of handling minimum 15 mm size solids for untreated effluent with suitable HP to work on 400/440 volts, 3 phase, 50 cycles AC supply with suitable rpm.                                                                                                                               | 2   | Nos  | 52259   | 104518  |
|         | Capacity 2.5 Kl/hr at 10 m head                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |         |         |
| 18.6    | Coarse Bubble Diffuser                                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |         |         |
| a)      | SITC of coarse bubble diffuser of 90 mm dia with provide clog free oxygen for equalization tank. The Coarse aeration system with diffuser shall be arranged to provide mixing throughly whole depth & area of toxic volume & shall prevent media from floating at the tank surface etc as required.                                                                                                                                             | 1   | Lot  | 29153   | 29153   |
| 18.7    | Fine Bubble Diffuse                                                                                                                                                                                                                                                                                                                                                                                                                             |     |      |         |         |
| a)      | SITC of fine bubble diffuser with Tubular Fine Membrane set of EPDM/Silicon with anti-fungal treatment of size 63mm X 610 mm Long to provide clog free oxygen for aeration tank as required.                                                                                                                                                                                                                                                    | 1   | Lot  | 38870   | 38870   |
| 18.8    | Air Blower with motors(1W+1S)                                                                                                                                                                                                                                                                                                                                                                                                                   |     |      |         |         |
| a)      | SITC of twin type rotary air blowers capable of delivering 70 cum/hr of Air and 0.51 kg/cm <sup>2</sup> pressure driven through "V" belt or directly coupled through flexible coupling to a TEFC motor of suitable capacity with accessories MS base plate, safety valves, suction filter, NRV, PRV, ant vibration pad, V - belt, Belt guard, Drive and driven pulleys Suitable for 415 ± 10% volts, 3 phase, 50 cycles A/C supply as required. | 2   | Nos  | 156259  | 312518  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Qty | Unit | Rate   | Amount |
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|         | Capacity- 150 cum/hr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |        |        |
| 18.9    | MBBR Media                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |        |        |
| a)      | SITC of MBBR media of PP/PVC self-supporting, cylindrical shaped structure with fins having specific gravity of 0.90- 0.95gm/cm <sup>3</sup> for enhanced Dwelling space for bacterial growth installed in Aeration tank as required. SIZE 16 X 22 MM                                                                                                                                                                                                                                                                                                                                     | 1   | Lot  | 164228 | 164228 |
| 18.10   | SECONDARY TUBE SETTLING MEDIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |      |        |        |
| a)      | SITC of Tube settling media of PP/PVC for for solid and liquid separation to be installed in secondary tube settler tank as required CROSS SECTIONAL AREA 120 X 44 mm                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | Lot  | 105922 | 105922 |
| 18.11   | BIO - SLUDGE RECYCLE PUMP - (1w+1s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |      |        |        |
| a)      | SITC of Centrifugal, mono block sludge recycle pump to recycle sludge to Aeration Tank & excess sludge to sludge tank having discharge rate of minimum 1 m <sup>3</sup> /hrs. at a head of 10-12 meters suitable for operation on 3phase 400Volt AC supply.                                                                                                                                                                                                                                                                                                                               | 2   | Nos  | 39551  | 79102  |
| 18.12   | FILTER FEED PUMP - (1w+1s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |        |        |
| a)      | Supplying, installation, testing, commissioning of Filter Feed pump Centrifugal type, mono block, self priming pumps with CI impeller of an approved make and complete with valves, suction and delivery headers capable of handling clear water complete with TEFC induction motor class B insulation, mounted on a common structural base plate with gun metal isolation cock and suitable anti vibration pads for pump foundation, motor of suitable HP to match with the capacity of the Pressure Feed pump to work on 400/440 volts, 3 phase, 50 cycles AC supply with suitable rpm. | 2   | Nos  | 48977  | 97954  |
|         | Capacity 2.5 Kl/hr at 35 m head                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |        |        |
| 18.13   | ACTIVATED CARBON FILTER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |      |        |        |
| a)      | Supply of Activate carbon filter comprising of FRP vessel with frontal piping and multiport valve of size: 18 X 65 complete with all fittings to remove Color & Odor as required                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | Nos  | 126718 | 126718 |
| 18.14   | PRESSURE SAND FILTER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |        |        |
| a)      | Supply of Multi Grade filter comprising of FRP vessel with frontal piping and multiport valve of size: 18 X 65 complete with all fittings to remove fine suspended solids, as required                                                                                                                                                                                                                                                                                                                                                                                                    | 1   | Nos  | 113599 | 113599 |
| 18.15   | DOSING PUMP FOR HYPO DOSING TANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |        |        |
| a)      | SITC of single phase dosing pump-motor set having flow rates 0-4 LPH and PVC dosing tank for storage of chlorine dosing solution suitable for chlorine dosing in Chlorine contact tank as required.                                                                                                                                                                                                                                                                                                                                                                                       | 2   | Nos  | 24294  | 48588  |
| 18.16   | Centrifuge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |      |        |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty | Unit | Rate   | Amount |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|--------|
| a)      | Supply, installation, testing and commissioning Centrifuge system for online drying of sludge for 50 KLD capacity STP including required size of pumps/ motors including standby arrangement (Capacity 1.0 Cum/hr at 10 m head) including all required fittings, accessories and connections as per GFC drawings and direction of Engineer in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1   | Set  | 155482 | 155482 |
| 18.17   | Ultra Violet Systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |      |        |        |
| a)      | Supply, installation, testing & commissioning of UV lamps for disinfection of tertiary treatment wastewater with minimum capacity as required with high output UV lamp. Disinfection capacity of 2.5 m3/hr 80-85% UVT at the EOL as required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | Lot  | 97759  | 97759  |
| 18.18   | INTERCONNECTING PIPING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |        |        |
| a)      | Providing and fixing of all necessary uPVC pipes and MS pipe (medium duty) including valve, fittings including fixing at site and air grid piping in Equalization, MBBR and sludge tank for providing air for mixing complete with piping, valves and other accessories of MSEP/UPVC as required. complete in all respect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1   | Lot  | 158613 | 158613 |
| 18.19   | CONTROL PANEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |      |        |        |
|         | Fabricating, supplying, installation testing & commissioning of cubical (Weather-proof outdoor cabinet) in IP55 Protection rating, material aluminium with fan. Including lock with 2 keys, Cabling, Switchgear of required capacity for operation of pumps, metering devices etc. as required at site. The panel should be compartmentalized feeder pillar, free standing totally enclosed completed dust and vermin proof suitable for 415 V 3 Phase, 50 Hz supply having hinged gasketed and lockable centre opening double door fabricated from 2 mm thick CRCA sheet front open able complete with interconnection with copper wire, painting, earthing the body i/c providing and fixing of accessories i.e. relays, contactors, pump set starters with over load relays and single phase preventors starters, sequential pump controllers, Aluminium Bus Bars of required capacity, designation labels as per requirement, continuous copper earth bar of size , panel separators, cable clamping support system, bottom cable gland plates for incoming and outgoing cable entries, etc as required. duly powder coated with 7 tank process with copper interconnections, earth strip of 25mm x 5mm with 2 Nos earth terminals with suitable switch gears, and accessories for ON /OFF, protection and controlling of all the pumps etc complete as reqd. |     |      |        |        |
|         | INCOMER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |        |        |
|         | a) 63 Amp 25 KA FP MCCB Thermal Magnetic Release with Adjustable over load & short circuit setting (Ics=100%Icu) complete with spreader links phase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |      |        |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                       | Qty | Unit | Rate   | Amount |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|--------|
|         | 1) barrier and rotary handle -1 No.                                                                                                                                                                                                                                                                               |     |      |        |        |
|         | 2) 0-500 V digital volt meter with inbuilt selector switch - 1 set                                                                                                                                                                                                                                                |     |      |        |        |
|         | 3) 0-100 Amp. Digital Ammeter with inbuilt selector switch and 100/5 amps CT- 3 Nos. - 1 set                                                                                                                                                                                                                      |     |      |        |        |
|         | 4) RYB Indication lamp set with holder, toggle switch and MCB protection- 1 set                                                                                                                                                                                                                                   |     |      |        |        |
|         | 5) 200 Amp capacity Suitable size aluminium bus with PVC sleeves-1set                                                                                                                                                                                                                                             |     |      |        |        |
|         | Outgoing                                                                                                                                                                                                                                                                                                          |     |      |        |        |
|         | DOL starter for 1.00 to 7.5 HP 3 phase rating for pump/motors i/c 3 pole Power contactor AC 3 duty ,MPCB, Push button - Start & Stop, Indication lamp; etc for each blower and each pump i/c connection with copper lugs(with spare compartment)                                                                  | 1   | Lot  | 203206 | 203206 |
| 18.20   | INSTRUMENTATION                                                                                                                                                                                                                                                                                                   |     |      |        |        |
|         | SITC of following complete as required.                                                                                                                                                                                                                                                                           |     |      |        |        |
| a)      | PRESSURE GAUGES                                                                                                                                                                                                                                                                                                   |     |      |        |        |
|         | SITC of Bourdon / Diaphragm type pressure gauges to Indicate the Pressure having range of 0 to 4 Kg/ cm2 for Pumps & 0 to 1.0 Kg/cm2 for Blowers etc as required.                                                                                                                                                 | 1   | Lot  | 9912   | 9912   |
| b)      | LEVEL SWITCHES                                                                                                                                                                                                                                                                                                    |     |      |        |        |
|         | SITC of level switches to Indicate the low & High level inside the tanks as required                                                                                                                                                                                                                              | 1   | Lot  | 13605  | 13605  |
| c)      | PH- METER                                                                                                                                                                                                                                                                                                         |     |      |        |        |
|         | SITC of online p-H meter to measure acidity or alkaneity of the treated water. Push button Front keys; individual High & Low Set Point Relay; Programmable Control Delay Time to prevent Chattering; Hysteresis to Prevent Relay Chattering; IN- Built Diagnostics; IN - Built Alarm Annunciator etc as required. | 2   | Nos  | 25914  | 51828  |
| d)      | ELECTRO MAGNETIC FLOW METER                                                                                                                                                                                                                                                                                       |     |      |        |        |
|         | SITC of Electromagnetic Flow meter 1" line size. Suitable for 2- 10 m3/hr with flow rate for sewage water. Indicator ; enclosure - cast aluminum, weather proof ip-65; mounting- field(direct on sensor); supply power- 230volt ac as required.                                                                   | 1   | No   | 80980  | 80980  |
| 18.21   | ULTRA - FILTRATION                                                                                                                                                                                                                                                                                                |     |      |        |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty | Unit | Rate   | Amount |
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|         | Supply, installation, testing and commissioning of Package type Ultra Filtration System for STP of 50 KLD capacity and designed for maximum hourly flow of 2.5 Cum/ hr fitted with required no of UF membrarnes as per calculations .UF Module (Hollow Fibre-outside in type porocity 0.1 to 0.01 micron) including micron cartridge filter in PP housing,Valve, Automatic Electrical Panel, flow meter and all other accessories making the system complete. The Complete system shall be Skid mounted and membearne shall be housed in PVC Chamber along with required size of pumps/ motors. Dosing system for UF cleaning shall be based on electric dosing .Flushing and backwash system shall consists of SS pump with HDPE filtrate tank of 500 litre capacity. All piping shall be of UPVC including flushing & cleaning and butterfly valves complete as permanufacturer specification, GFC and direction of Engineerin-charge. The following shall be part of UF system | 1   | No   | 777409 | 777409 |
|         | UF MEMBRANE - As per manufacturer calculation<br>UF BAG FILTER - 1 No<br>ROTAMETER - 1 No<br>SS UF SKID - 1 no<br>UF VALVE - 5 nos<br>UF FEED PUMP - 2 nos (1W+1Stby)<br>UF BACKWASH PUMP - 2 nos (1W+1Stby)<br>UF FLUSHING TANK - 2 nos (1W+1Stby)<br>UF ACID DOSING PUMP WITH TANK - 0-10 LPH<br>UF HYPO DOSING PUMP WITH TANK - 0-10 LPH<br>UF PIPING - UPVC<br>UF PLC PANEL - 1 No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |        |        |
| 18.22   | Supply, laying & fixing of PVC insulated and PVC sheathed / XLPE power armoured Copper control cable of 1.1 KV grade confirming to IS 694 of following size on cable tray as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |      |        |        |
| a)      | 3x1.5 Sqmm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 100 | Mtrs | 291    | 29100  |
| b)      | 3x2.5 Sqmm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 50  | Mtrs | 409    | 20450  |
| 18.23   | Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with two numbers GI Suspenders i/c base of suitable size GI angle, GI bolts & nuts, fastner etc as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |      |        |        |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty | Unit | Rate   | Amount |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|--------|
| a)      | 100 mm width X 50 mm depth X 1.6 mm thickness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 100 | Mtrs | 754    | 75400  |
|         | <b>SH: XIX (Water Cooler cum purifier)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |      |        |        |
| 19.1    | Supplying, Installation, Testing and Commissioning of Water Cooler cum inbuild RO-UV purification system, additional pre filter for longer life of cartidge and body made of Stainless Steel body, Food Grade SS-304 with inner tank capacity 120 Ltrs. Flow Rate 50 LPH, Cooling Capacity-80LPH, storage water cooler with in-built RO+UV, 7 stage Purification, Non CFC refrigerant having a Filtration capacity of minimum 50 ltr/hr and storage capacity of 120 litre with 3 faucet(not be push type) one is normal and other two is cooled water, having facility of auto sanitizier storage tank from bacteria, suitable for floor mounting with lockable wheels etc i/c connection etc as required. | 5   | Nos  | 179287 | 896435 |
|         | <b>SH: XX (Refrigration )</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |      |        |        |
| 20.1    | Supplying, Installation, Testing and Commissioning of minimum 3 star Hard Top Deep Freezer of capacity not less than 500L , temprature range +10° to -26° , R290 Refrigerant with 2 nos of Lids, Number of Compartments 2 suitable for 230V, 50Hz supply, floor mounting with lockable wheels etc i/c connection etc as required.                                                                                                                                                                                                                                                                                                                                                                          | 2   | Nos  | 56528  | 113056 |
|         | <b>SH: XXI (Boom Barrier)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |      |        |        |
| 21.1    | Supply, Installation, Testing and Commissioning of Boom Barrier Gate upto 3 Mtr straight arm with following features:<br><ul style="list-style-type: none"> <li>• 2-6 Seconds opening time/closing time (adjustable).</li> <li>• 100% DUTY cycle.</li> <li>• BLDC Motor Operated.</li> <li>• Boom Swing Away function (i.e. Boom shall have breakaway flange to prevent from breaking when hit by a vehicle)</li> <li>• Manual Operation in case of power failure.</li> <li>• Auto-reverse function to enable barrier arm to reverse back as soon as it touches to an obstruction during the closure cycle, preventing injury to human or vehicle damage.</li> </ul>                                       | 4   | Nos  | 204880 | 819520 |
| 21.2    | Supply, Installation, Testing and Commissioning of IR Beam Photo sensors for safety at all Boom Barrier systems, including cabling/ducting required including the RX/TX modules operated on 24VDC and having potentio-free contacts of NO/NC. The Safety Sensors are installed on MS Poles which are powder coated having base plate to bolt down and provision for the RX/TX modules to fix on the same along with cables entry to terminate. The Sensors will have adjustable eye to align the IR beam within the range of minimum 15 mtrs.                                                                                                                                                              | 8   | Nos  | 54986  | 439888 |

| Sl. No.                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Qty | Unit | Rate  | Amount |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------|--------|
| 21.3                                        | Supply, Installation, Testing and Commissioning of LED Traffic Light, 24 Volt, Red and Green Colour with complete housing and IP65 protection for outdoor use, complete with mounting arrangement (2 Red + 2 Green)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4   | Nos  | 84835 | 339340 |
| 21.4                                        | Supply, Installation, Testing and Commissioning of Interlocking Relay Circuit Panel for integrating Boom Barrier with Raise/Lower proximity limits to Automatically control Traffic Lights. Also providing Power Supply for Relay circuit of 12V, 1.5Amp rating along with Re-programming of the Controller for Boom Barrier integration with Raise/Lower Commands for traffic light Functions, including cabling and ducting works.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4   | Nos  | 53437 | 213748 |
| <b>SH: XXII (Audio &amp; Visual System)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |      |       |        |
| 22.1                                        | Supply, Installation, Testing and Commissioning of Chairman Discussion Unit with Digital Signal Processing, Unit with Priority and Next-in-Line Configuration, Priority button silences all delegate microphones and allows only the chairperson to speak, Next-in-line button gives the floor to the next speaker in a waiting list of speakers who requested to speak, User Button with feedback, High-quality integrated loudspeaker, minimum 4W or better, Audio quality : 16 bit digital or better, Microphone Frequency response: 25 Hz-15,000 Hz or better, 3.5 mm stereo jack socket for headphones output with volume adjustment, Connectivity: Concealed conference bus connections. > 2 x RJ 45 ethernet port (IN/OUT - interchangeable). Loop through, daisy-chain cabling (non-proprietary), Unit with Bi color bar indicator, Compatible screw lock detachable microphone connectivity, Certification: CE; BIS, The OEM, product and bidder shall not share the common borders with India and adhere to GFR 144 (xi) guidelines of purchase manual. 2M shielded CAT5e cable included, Microphone with 400MM Gooseneck Length, Polar Pattern: Unidirectional or Cardioid, Shielded microphone, immune to mobile phone interference, Transducer principle: Back electret (condenser), Max SPL @ 1kHz: 110 dB SPL (1% THD+N), S/N Ratio: > 67 dB(A), Sensitivity: (-40.5±2) dBV @ 1Pa, 1KHz, Connection: Screw Lock, Microphone with Ring Indicator to light up Red when active and Green when in Request, Certification: CE. | 1   | Nos  | 85878 | 85878  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty | Unit | Rate   | Amount  |
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| 22.2    | Supply, Installation, Testing and Commissioning of Delegate Discussion Unit with Digital Signal Processing Unit with Microphone On / Off Button, User Button with feedback, High-quality integrated loudspeaker, minimum 4W or better, Audio quality : 16 bit digital or better, Microphone Frequency response: 25 Hz-15,000 Hz or better, 3.5 mm stereo jack socket for headphones output with volume adjustment, Connectivity: Concealed conference bus connections. > 2 x RJ 45 ethernet port (IN/OUT - interchangeable). Loop through, daisy-chain cabling (non-proprietary), Unit with Bi color bar indicator, Compatible screw lock detachable microphone connectivity, Certification: CE; BIS, The OEM, product and bidder shall not share the common borders with India and adhere to GFR 144 (xi) guidelines of purchase manual. 2M shielded CAT5e cable included, Microphone with 400MM Gooseneck Length, Polar Pattern: Unidirectional or Cardioid, Shielded microphone, immune to mobile phone interference, Transducer principle: Back electret (condenser), Max SPL @ 1kHz: 110 dB SPL (1% THD+N), S/N Ratio: > 67 dB(A), Sensitivity: (-40.5±2) dBV @ 1Pa, 1KHz, Connection: Screw Lock, Microphone with Ring Indicator to light up Red when active and Green when in Request, Certification: CE.                                                                                                                                                                                                                                                                                                    | 30  | Nos  | 74326  | 2229780 |
| 22.3    | Supply, Installation, Testing and Commissioning of Hybrid Ready Central Conference Controller with Recording & Web Server Rack-Mountable Conference Controller with Hybrid ready via direct USB interface. Controller unit with 4 Bus Connections (4 branches or 2 closed loops) for fail-safe redundancy technology. The controller should support total cable length of a branch / loop are up to 400M or more. The maximum cable length between units or between units and central unit is 80M or more. Control & Configure the controller via the Integrated Web Server. The Controller easily integrated by using USB audio, AES-67 and analogue audio. The Controller can control up to 250 or more units by adding network extenders. Hands-free mode upto 16 microphones or higher. Camera Control integration capability. The conference units are connected in daisy chain with a CAT5e or better shielded cable (non-proprietary) over the 4 bus connections. AES67 and the multi-channel USB connection which allows to link the system with external devices such as a DSP or an external recording solution. The controller can be configurable in DSP Mode, Audio configurator, can choose where the audio is routed to and group microphones and speakers together, Recording capabilities Internal storage- 3GB or better External flash drive via USB-C On a PC via multi-channel USB connection Power button, Fan-less operation, Extended power, Wake-On-Lan, Auto Power-on, ECO mode, Volume dial- adjusts the system volume, Record button-for starts or stops the recording, Audio & Control | 1   | Nos  | 423705 | 423705  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Qty | Unit | Rate   | Amount |
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|         | feature like Dynamic Mix-Minus, Gain Sharing, API Control,Connectivity: 4x Bus connections (4 branches or 2 loops), LAN connection (Control & AES-67), 2x Lockable USB-C connections for Flash drive interface, Hybrid meeting Interface & Multi-channel audio interface. 2x Balanced XLR inputs, 2x Balanced XLR outputs, 1x Front-facing 3.5mm input & output jack for line or microphone level. 1x Power connection,Link speed 10/100 Mbps - 1 Gbps or better over the Network,Link speed 10/100 Mbps - 1 Gbps or better over the Network,Included power supply: 48 VDC,Certification: CE,The OEM, product and bidder shall not share the common borders with India and adhere to GFR 144 (xi) guidelines of purchase manual.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |      |        |        |
| 22.4    | Supply, Installation, testing, and commissioning of DSP with at least 4 analog inputs, 4 analog outputs,shall support Dante™ digital audio networking that shall allow up to 32 x 32 channels, Shall support Dante™ digital audio networking that shall allow up to 32 x 32 channels, The Dante networking connection shall be implemented on a RJ-45 connector, Shall support Ethernet connection for programming and control on a RJ-45 connector, Shall include 4 channels of GPIO connection for sending or receiving logic signals, shall include a RS-232 connection for control data transmission into or out of the fixed I/O DSP and such operation shall be software programmable, shall include a USB connection on a standard USB-B type connector, shall be software configurable to stream up to 8 channels of digital USB Class 1 Audio transmission either into or out of the fixed I/O DSP or simultaneous input and output, shall support port authentication via IEEE 802.1X, The input connections shall include AEC hardware and firmware, the parameters, routing and operation of which shall be software programmable, shall integrate to Voice Over Internet Protocol (VoIP) systems on a RJ-45 connector for two lines of VoIP communication and shall support Session Initiation Protocol v2.0 or later, shall integrate to standard telephony communications on a RJ-11 connector for a single line of telephone communication, shall provide front panel OLED identification of device power, status, alarm, and activity as well as system-wide alarm, shall be rack mountable (1RU) and feature software-configurable signal processing, including but not limited to: signal routing and mixing, equalization, filtering, dynamics, and delay, as well as control, monitoring, and diagnostic tools, The fixed I/O DSP shall be CE marked, UL listed, and shall be compliant with the RoHS directive, Frequency Response should be 20Hz to 20kHz, +4dBu output: +0.25 dB/-0.5 dB, Dynamic Range (in presence of signal) 22Hz to 22kHz, 0dB gain: > 108dB, Input Impedance (balanced) should be 8kΩ, Output Impedance (balanced) should be 207Ω, Maximum Input shall be +24dBu, Sampling Rate: 48kHz, A/D - D/A Converters: 24-bit, Input Gain Range (6dB steps): 0-66dB. With DSP , cloud platform Software Anytime, anywhere access via secure web interface which | 1   | Nos  | 731866 | 731866 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Qty | Unit | Rate   | Amount |
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|         | should be provide device management, real-time monitoring, should has features like-Status of the device (online, missing, etc.),Firmware status (Up to date, No latest version),Errors presently detected, CPU load, Though software Manage the settings of AV devices remotely, Send commands ,Update firmware ,Reboot devices, Identify devices, alert notifications from device.                                                                                                                                                                                                     |     |      |        |        |
| 22.5    | Supplying, Installation, Testing and Commissioning of wall mounted speaker 30 Watt or higher, Surface-Mount ,Loudspeaker,Compact full range,Vented LF,enclosure, Titanium diaphragm with suitable driver, Full-bandwidth overload protection(LF and HF), Weather-resistant ABS enclosure,with specifications of Frequency Range (-10 dB)- 65 Hz - 20 kHz or better, Max. SPL/1m (calc.) ≥ 100 dB, Nominal impedance-≤ 8 Ω etc. complete as required                                                                                                                                      | 4   | Nos  | 45928  | 183712 |
| 22.6    | Supplying, Installation, Testing and Commissioning of 2 channel Power Amplifier 250 W/CH Power Amplifier,250 W or more per channel for 4 Ω or 70/100 V lines,Bridged mono out for 540 W or more for 8 Ω,Compact 2 RU design,Thermal protection, Integrated rack ears for direct mounting, havin detailed specs of Power Bandwidth THD ≤ 1%, Frequency response-80 Hz - 15kHz or better, Input Impedance ≤ 8 Ω , Power requirement 120 V -230V, 50 Hz, ,Protection -Audio Limiters, High Temperature Peak Current Limiters,Turn-On Delay,Cooling Front-to-Rear etc. complete as required. | 1   | Nos  | 190814 | 190814 |
| 22.7    | Supply and laying of a 2.5 Sq. mm, 2 Core Speaker Cable with the specifications:- Core Arrangement : 2,Gauge : 2.5 sq. mm Material : Stranded Bare Copper - Oxygen Free,Shielding : Unshielded,Jacket Material : TPR, Bend Radius: 4x Diameter etc. complete as required.                                                                                                                                                                                                                                                                                                                | 600 | mtrs | 154    | 92400  |
| 22.8    | Supply and fixing of UL Listed Sound Connectors such as XLR,DP,MONO,3.5MM etc complete as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2   | lot  | 17276  | 34552  |
| 22.9    | Supply, Installation, Testing and Commissioning of Interactive Flat Panel: Size-86" , Brightness :350; Panel Type: VA; Resolution :3,840 x 2,160;Pixel Pitch (HxV), 0.4875(H) mm x 0.4875(W) mm; Contrast Ratio: 4000:1(without glass); Response Time: 6ms(Typ.); Colour Gamut : 72%; Glass Haze: 2%(without glass); Operation Time Support : 16/7 ; HDMI In: 2; DP In: 1 ; USB: 2(Main/Tray), 2.0/3.0, External(Tray); Audio Out: Stereo Mini Jack; Video Out: Yes; RS232 In : Yes; RJ45 In: Yes; WiFi: Yes; Bluetooth: Yes.complete as required.                                       | 1   | Nos  | 232276 | 232276 |
| 22.10   | Supply of OPS Device for intractive Panel with 8th Gen Intel Core i5 8th Gen, 8260u 4K@ 60Hz processor, 16GB DDR4 RAM, 128GB SSD, 1TB HDD, WIFI+BT, Win 11, Wireless Keyboard & Mouse; Make:- As compatiible to the Intractive Panel etc. complete as required                                                                                                                                                                                                                                                                                                                           | 2   | Nos  | 63844  | 127688 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Qty | Unit | Rate   | Amount |
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| 22.11   | Supply, Installation, Testing and Commissioning of Full HD PTZ Camera supporting 1080p at 60 Frames per Second, minimum 12X Optical Zoom with FoV of minimum 70 degree and minimum 255 presets. Camera should support simultaneous outputs through HDMI, USB 3.0 & IP with Audio In and controllable via RS232/422 and IP. Panning angle -170° ~ +170°, Tilting angle -30° ~ +90. Camera should support SRT, PoE & should be compatible with Virtual USB Driver. Quoted model should be BIS, Clickshare, CE, FCC & RoHS Certified with Test Lab Reports etc. complete as required. | 1   | Nos  | 190559 | 190559 |
| 22.12   | Supply, Installation, Testing and Commissioning of high-performance rack-mountable 4K60 4:4:4 AV switcher. to provide four HDMI inputs and four HDMI outputs. Should support of HDR (High Dynamic Range) and Dolby Vision video formats, advanced EDID management, native control via Ethernet, XiO Cloud connectivity, and enterprise-grade security.HDMI Audio De-embedding,Built-In Web Interface etc. complete as required                                                                                                                                                     | 1   | Nos  | 351274 | 351274 |
| 22.13   | Supply Installation Testing & Commissioning of HDMI Transmitter: Transmitter with 1xHDMI input and 1x RJ-45 output which should support a resolution upto 4K60 4:4:4 video, It should support the HDCP up to 2.3, For UHD and 4K signals, TX should have RS-232 & IR ports with HDMI & It should be able to pass HDCP 2.2, EDID, & CEC. Supports Dolby® TrueHD, Dolby Atmos®, DTS HD®, DTS:X®, and uncompressed 7.1 linear PCM audio. A cable length up to 130 ft (40 m) for UHD and 4K. etc. complete as required                                                                 | 3   | Nos  | 44518  | 133554 |
| 22.14   | Supply Installation Testing & Commissioning of HDMI Receiver: Receiver with 1x RJ-45 input and 1x HDMI output which should support a resolution up to 4K60 4:4:4 video, It should support the HDCP up to 2.3, For UHD and 4K signals,RX should have RS-232 & IR ports with HDMI & It should be able to pass HDCP 2.2, EDID, & CEC. Supports Dolby® TrueHD, Dolby Atmos®, DTS HD®, DTS:X®, and uncompressed 7.1 linear PCM audio. A cable length up to 130 ft (40 m) for UHD and 4K etc. complete as required                                                                       | 3   | Nos  | 44518  | 133554 |
| 22.15   | Supply, Installation, Testing and Commissioning of Modular Cable cubby with fully Retracting Lid, aluminium black anodized cover, Consisting of 1 x HDMI, 1 x LAN and 1 x 5 Amp Power,1x USB A, 1X USB C Socket, etc. complete as required                                                                                                                                                                                                                                                                                                                                         | 2   | Nos  | 97602  | 195204 |
| 22.16   | Supply of HDMI - HDMI Cable 1.8 Mtrs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 16  | Nos  | 5255   | 84080  |
| 22.17   | Supply of HDMI - HDMI Cable 5 Mtrs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2   | Nos  | 7564   | 15128  |
| 22.18   | Supply of HDMI - HDMI Cable 10 Mtrs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2   | Nos  | 13318  | 26636  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty | Unit | Rate   | Amount |
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| 22.19   | Supply, Installation, Testing and Commissioning of Desktop with Processor-Intel Core i7_13700,RAM-16GB,Harddrive-1 TB SSD,Wi-Fi-6,Bluetooth-BT 5.3(Yes),Windows-Win Pro-11,Warranty-1 Years,Graphics Card-Integrated(Nvidia), Monitor-20" etc. complete as required                                                                                                                                                                                                                                                                                                                        | 1   | Nos  | 190313 | 190313 |
| 22.20   | Supply, Installation, Testing and Commissioning of Intractive Flat Panel: Size-65" , Brightness : Min 400 Nits; Panel Type:VA; Resolution :3,840 x 2,160, Contrast Ratio: 4000:1 or more; Response Time: min 6ms; HDMI Input: Min 2; HDMI Output:Min 1; USB 2.0: Min 1, USB 3.0: Min 2, USB Type C - 01 No. ; Audio In and out: Stereo Mini Jack- Min 01 no. each; RS232 In, RJ45 In, WiFi, Bluetooth, Suitable processor, OSAndroid 13 or Higher Version/IOS, Min 4GB, RAM, Min 32 GB Storage etc. complete as required                                                                   | 2   | Nos  | 190559 | 381118 |
| 22.21   | SITC of Omni -Directional Speaker Phone with Inbulit Microphone with Following Specifications;Acoustic echo cancellation Automatic Direction finding technology of intelligent microphone (EMI) (AEC), Automatic gain control technology (AGC), Bluetooth etc. complete as required                                                                                                                                                                                                                                                                                                        | 2   | Nos  | 75387  | 150774 |
| 22.22   | Supply, Installation, Testing and Commissioning of 15" Front Of the House (FOH) Speakers, 2 Way, bi-ampable Array speaker having 1.75" or bigger HF compression driver. The speaker should have Freq. Response (-3 dB): 70 Hz - 14 kHz, Frequency range (-10dB) 42 Hz - 18 kHz, sensitivity (1W/1m) ≥ 100 dB SPL, delviering Max SPL ≥ 134dB with power handling ≤ 500W @ 8Ω. The speaker should have a nominal impedance of 8 ohm .The speaker should have a rotatable horn with coverage angle of Horizontal: 90°/60° & Vertical: 60°/90°.Speaker must haveat least 20 suspension points | 1   | Nos  | 441527 | 441527 |
| 22.23   | Supply, Installation, Testing and Commissioning of 18" Floor Subwoofer with a Frequency Range (-10dB):- 28Hz-280Hz ; Axial Sensitivity > 93dB & Long Term Power Handling of ≤ 400W (at a Nominal Impedance of 8 Ω). The Loudspeaker should have a Max. SPL of >132dB.                                                                                                                                                                                                                                                                                                                      | 1   | Nos  | 138280 | 138280 |
| 22.24   | Supply, Installation, Testing and Commissioning of 8" Two-way portable Front Fill, Surround & Fill Speaker with one 1.25" HF compression driver with a Frequency Response(-3dB):- 68Hz-20KHz; Frequency Range (-10dB):- 56Hz-20KHz & Long Term Power Handling of ≤ 250W (at a Nominal Impedance of 8Ohms). The Loudspeaker should have sensitivity of >89dB & Max. SPL of >123dB.The Sound Dispersion should be at least 90x55 Degress.                                                                                                                                                    | 2   | Nos  | 72946  | 145892 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Qty | Unit | Rate   | Amount |
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| 22.25   | Supply, Installation, Testing and Commissioning of 2 channel class D/H Power amplifier(Amplifiers for FOH Speakers & Subwoofers) with built in Audio Digital Signal Processor, a Maximum Output Power $\geq 900W@8$ ohms, $\geq 1750W@4$ Ohms for single channel operation;Max Bridged Output Power $\geq 5500W @ 4$ ohms,Frequency Response (+/- 1dB) ref. 1 KHz:15Hz - 20 KHz,Max input level:+21dBu,Crosstalk< - 80dB,input impedance:20kohm,signal to noise ratio >109 dB,with built in Digital Signal processor like - 31 Band Graphic Equalizer per channel, Parametric Equalizer per channel, Output delays, Audio Limiters, Audio Filters | 2   | Nos  | 207966 | 415932 |
| 22.26   | Supply, Installation, Testing and Commissioning of 2 channel Power amplifier (for Front Fill, Surround Fill )with built in Audio Digital Signal Processor, a Maximum Output Power $\geq 450W@8$ ohms, $\geq 900W@4$ Ohms for single channel operation; Max Bridged Output Power $\geq 2700W @ 4$ ohms,Frequency Response (+/- 1dB) ref. 1 KHz:15Hz - 20 KHz,Max input level:+21dBu,Crosstalk< - 80dB,input impedance:20kohm,signal to noise ratio >105 dB,with built in Digital Signal processor like - 31 Band Graphic Equalizer per channel, Parametric Equalizer per channel, Output delays, Audio Limiters, Audio Filters                     | 1   | Nos  | 167310 | 167310 |
| 22.27   | Supply, Installation, Testing and Commissioning of 22 channel Compact Mixing System (18 x Mic/Line + 4 x Mic/Stereo-Line), Auxiliarys (MON, FX, AUX) : 2 Pre, 2 Post, 2 Pre/Post switchable, Frequency Response, -3 dB, ref. 1 kHz : 15 Hz to 65 kHz, Crosstalk, 1 kHz Channel to Channel < -80 dB, THD at 1 kHz < 0.005%, CMRR MIC input 1 kHz > 80 dB, Dual stereo 24/48-bit multi effects processors, 100 Factory + 20 User, Tap-Delay, Digital Audio Interface Channels : 4 In / 4 Out, AD/DA Conversion, Sampling Rate : 24-bit, 44.1 / 48 / 88.2 / 96 kHz                                                                                   | 1   | Nos  | 524499 | 524499 |
| 22.28   | Supply, Installation, Testing and Commissioning of Corded Vocal Microphone with Dynamic Neodymium Magnet microphone element,with frequency response 80Hz-16kHz, Super-Cardioid polar pattern, sensitivity of 2.2mV/Pa and output impedance 600 ohm                                                                                                                                                                                                                                                                                                                                                                                                | 2   | Nos  | 20358  | 40716  |
| 22.29   | Supply, Installation, Testing and Commissioning of Corded Instrument Microphone with Self Biased condensor microphone element ,with frequency response of 55Hz-16kHz ,Cardioid polar pattern, sensitivity of 5.5mV/Pa, rated impedance of 200 ohm, maximum spl :130dB SPL and dynamic range ;107dB                                                                                                                                                                                                                                                                                                                                                | 4   | Nos  | 16043  | 64172  |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Qty | Unit | Rate   | Amount |
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| 22.30   | Supply, Installation, Testing and Commissioning of Handheld Wireless Mic with the following specifications -<br>Transmitter:<br>1. Frequency Response - 30 Hz to 16 KHz<br>2. Polar Pattern - Cardioid/ Supercardioid<br>3. Sensitivity > 5.2 mV/Pa<br>4. RF Output Power - 50 mW<br>5. Should have the provision of changing Microphone heads<br>Receiver:<br>1. Bandwidth - 36 MHz<br>2. Carrier Frequency Range - 480 to 865 MHz<br>3. Signal to Noise Ratio > 100 dB A<br>4. Frequency Response - 55 Hz to 16 KHz | 2   | Nos  | 121435 | 242870 |
| 22.31   | Supply, Installation, Testing and Commissioning of Headworn Wireless Mic with the following specifications -<br>Transmitter:<br>1. Frequency Response - 30 Hz to 18 KHz<br>2. Polar Pattern - Cardioid/ Supercardioid<br>3. Sensitivity > 0.5 mV/Pa<br>4. Maximum SPL > 129 dB<br>5. RF Output Power - 50 mW<br>Receiver:<br>1. Bandwidth - 36 MHz<br>2. Carrier Frequency Range - 480 to 865 MHz<br>3. Signal to Noise Ratio > 100 dB A<br>4. Frequency Response - 65 Hz to 16 KHz                                   | 1   | Nos  | 125852 | 125852 |
| 22.32   | SITC of On Stage Fixed Valance Bar 10 Mtrs Length Straight as per the design made out of 40NB 48 OD Mild steel pipe dual barrel, supported to hang the Main Valance of the stage system duly powder coated with matt black texture finish paint                                                                                                                                                                                                                                                                       | 1   | Nos  | 46374  | 46374  |
| 22.33   | SITC of High quality Velvet fabric as per approved colour and make with a gathering of 50% stitched as per site condition, curtain provided with eyelets at every 200/250mm for uniform fixing on to curtain trollies (For Main Valance) Size: 10 Mtr x 1.2Mtr                                                                                                                                                                                                                                                        | 1   | Nos  | 52608  | 52608  |
| 22.34   | SITC of Motorized Main Curtain 10 Mtrs straight Centre partting as per design Made up of I Track for complete length Overlap of 0.5~0.9 Mtrs. Trollies uniformly distributed along the track at every 200/250mm with a master trolley. Open and close limit controller. Motor Cable termination box Drive unit with suitable capacity of motor unit, GI Wire rope. Black texture finish paint. All metal parts are powder coated;                                                                                     | 1   | Nos  | 437785 | 437785 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qty | Unit | Rate    | Amount  |
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| 22.35   | SITC of High quality Velvet fabric as per approved colour and make with a gathering of 50% stitched as per site condition, curtain provided with eyelets at every 200/250mm for uniform fixing on to curtain trollies (For Main Curtain) Size:10 Mtr x 5 Mtr.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1   | Nos  | 294621  | 294621  |
| 22.36   | SITC of Active LED Wall LED screen of Screen Configuration-3 Units x 3 Units,Length x Height-9.447 x 5.313 ft,Area-50.191 ft <sup>2</sup> ,Diagonal-130.062 inch,Weight(Only Cabinets)-97.2 Kg,Optimal Viewing Distance-26.2467 ft,Resolution-1152 x 648,Max -1620 Watts,Typical-540 Watts,110V 20A Circuits,20A Circuit-1 Circuit,Cabinet per circuit-9 Cabinets,Cabinet per daisy chain-3 Cabinets,208 V 20A circuits20ACircuit-1 Circuit,cabinets per circuit-18 cabinets,cabinet per daisy chain-6 Cabinets,Max-5526 BTU,Typical-1845 BTU,Orientation-Landscape,No.of cabinets-9,No of spare cabinet-1,Total No of cabinets-10,Pixel Pitch-205mm,Diode type-SMD-3-in-1 2121,Dimensions (mm, LxHxD, per cabinet)-960x540x79.5 mm,Diagonal (inch, DiagonalxD, per cabinet)-43.3x3.13 inch,Weight (per cabinet/per m <sup>2</sup> )-10.8 kg / 20.8 kg,Brightness (Peak/Max)-1,000 nit / 500 nit,Contrast Ratio (Peak/Max)-5,000:1,Viewing angle - Horizontal-150°,Bit Depth-16 bit (Internal processing 18bit),Color temperature - Adjustable-2,800 ~ 10,000K (use S/BOX),Video Rate-50/60 Hz,Input Power Range-100~240 VAC, 50/60 Hz,Power consumption - Max-347 (W/m <sup>2</sup> ) / 180 (W/Cabinet),Power consumption - Type-116 (W/m <sup>2</sup> ) / 60 (W/Cabinet),Heat generation - Max-1,185 (BTU/m <sup>2</sup> ) / 614 (BTU/Cabinet),Heat generation - Typical-1,185 (BTU/m <sup>2</sup> ) / 614 (BTU/Cabinet),Heat generation (Typical)-395 (BTU/m <sup>2</sup> ) / 205 (BTU/Cabinet),Refresh rate-3,840 Hz,Visual Refresh Rate-7,680 Hz. Power consumption - Max-347 (W/m <sup>2</sup> ) / 180 (W/Cabinet),Power consumption - Type-116 (W/m <sup>2</sup> ) / 60 (W/Cabinet),Heat generation - Max-1,185 (BTU/m <sup>2</sup> ) / 614 (BTU/Cabinet),Heat generation - Typical-1,185 (BTU/m <sup>2</sup> ) / 614 (BTU/Cabinet),Heat generation (Typical)-395 (BTU/m <sup>2</sup> ) / 205 (BTU/Cabinet),Refresh rate-3,840 Hz,Visual Refresh Rate-7,680 Hz.Working Temperature / Humidity-0°C~40°C / 10~80%RH,Storage Temperature / Humidity--20°C~45°C / 5~95%RH,IP Rating-IP120,LED Lifetime-100,000 hours,Certifications-Safety : 62368-1, 60950-1 / EMC : Class A | 1   | Nos  | 2373977 | 2373977 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Qty | Unit | Rate   | Amount |
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| 22.37   | SITC of 4K60 4:4:4 transmitter to interoperate with a receiver for the transmission of a HDMI® signal. It should be used with a CAT5e or higher twisted pair cable to extend the HDMI Signals. For 1080p, WUXGA, and 2K signals, a cable length of up to 230 ft (70 m) should be supported. For UHD and 4K signals, a cable length of up to 130 ft (40 m) should be supported. It should support HDR10, HDR10+, and Dolby Vision® video formats, should have compliance with HDCP 2.3, CEC (Consumer Electronics Control), pass-through capability, EDID pass-through capability, Compact surface-mountable design ; | 2   | Nos  | 44518  | 89036  |
| 22.38   | SITC of 4K60 4:4:4 Receiver to interoperate with a Transmitter for the reception of a HDMI® signal. It should be used with a CAT5e or higher twisted pair cable to extend the HDMI Signals. For 1080p, WUXGA, and 2K signals, a cable length of up to 230 ft (70 m) should be supported. For UHD and 4K signals, a cable length of up to 130 ft (40 m) should be supported. It should support HDR10, HDR10+, and Dolby Vision® video formats, should have compliance with HDCP 2.3, CEC (Consumer Electronics Control), pass-through capability, EDID pass-through capability, Compact surface-mountable design      | 2   | Nos  | 44518  | 89036  |
| 22.39   | SITC of rack-mountable 4K60 4:4:4 presentation system 04 HDMI®, two pairs of mirrored HDMI and DM Lite outputs with 4K60 scalars, and analog audio inputs and outputs. Should include support of HDR (High Dynamic Range) and Dolby Vision video formats, audio mixing, advanced EDID management, XiO Cloud connectivity, and enterprise-grade security. Ethernet for connectivity to network, USB for Programming                                                                                                                                                                                                   | 1   | Nos  | 351274 | 351274 |

| Sl. No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Qty   | Unit | Rate         | Amount |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|--------|
| 22.40   | <p>SITC of Digital Podium: Material: Mild Steel; Should have Tray for Keyboard. ( Keyboard Dimension Standard) Built-in Document Camera and 21" Interactive Panel .It should also have the flexible options in sizes for the 19" or 22" Interactive Panel to fit in. Interactive Panel positioning motorized up and down as per the user convenience . The top should be of wood. should have a space for the Desktop in the 19" rack for the equipments to fit in as per the International standards. sliding shelf/Tray with Locks - For placement of extra lap top or Document to show through Inbuilt document Camera and for Presenter with Internal Lock. It should have 3 options in lock- Manual key, RFID and Biometric (finger) for better security and ease of use. The single sliding wooden shelf should cover all equipments - Interactive Monitor, Document camera and multimedia controller. They should be hidden and should not be visible.It should have door locks. Visual Presenter or Document Camera should be installed and placed next to the interactive monitor for ease of use of both the items.Programmable Central Control System : Should be able to control from the controller with easy identified keys Switching between PC, visual presenter and laptop, volume Control. Ports and connectivity : - Front Panel should have touch sensing keys for Control, The controller should get on with a touch of smart key so only authorise person can operate it. power Plug of 220 Volt Power out for Laptop etc., HDMI Input x 1, VGA Input Port X 01, Audio port x 2, Network Port wired Internet x 01, USB X 01 Ports to facilitate inputs directly from Pen Drives / USB based hard disk Drive. back panel of the Controller should have, 1 x RS 232 Projector Control, 2 x 2 VGA matrix, 2 HDMI Input and 2 HDMI Output, 1 USB Ports for front Connectivity, 1 Audio for PC, 1 Audio in for Visualizer, 2 x Audio out, 1 x Projector Power, 1 x Screen Power. The Interactive Monitor touch should work independently for the both Laptop and PC. Whichever source is selected PC/Laptop when both are connected to the Podium the content should appear on Interactive Panel along with touch activated of the selected source, automatically without detaching or attaching a cable etc complete as required</p> | 1     | Nos  | 341041       | 341041 |
| 22.41   | <p>Supply, Installation, Testing &amp; Commissioning of Full HD PTZ Camera supporting 1080p at 60 Frames per Second, minimum 12X Optical Zoom with FoV of minimum 70 degree and minimum 255 presets. Camera should support simultaneous outputs through HDMI, USB 3.0 &amp; IP with Audio In and controllable via RS232/422 and IP. Panning angle -170° ~ +170° , Tilting angle -30° ~ +90. Camera should support SRT, PoE &amp; should be compatible with Virtual USB Driver. Quoted model should be BIS, Clickshare, CE, FCC &amp; RoHS Certified with Test Lab Reports.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2     | Nos  | 190559       | 381118 |
| AE(C)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | AE(E) |      | EE(C)Page405 |        |

| Sl. No.                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qty | Unit | Rate   | Amount           |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------|------------------|
| 22.42                                | SITC of Recording, Streaming & Webcasting Hardware simultaneously, Built-in 4x HDMI & IP Inputs with 4x Line Inputs, 2x HDMI Outputs. The system should be capable to record upto any four inputs simultaneously in a single frame and as well as individual sources simultaneously. Should have minimum 1TB inbuilt storage and can be connected to local NAS storage. The system should be able to support minimum 3 unicast streams. The recorded files should have the option of time and date stamp. Quoted model should be CE, FCC & RoHS Certified with Test Lab Reports. | 1   | Nos  | 528370 | 528370           |
| 22.43                                | supply and Laying of HDMI - HDMI Cable 1.8 Mtrs, High- speed Category 2 HDMI® cable, 24k gold-plated 19-pin Type A connectors, High-flex CL3-rated jacket, it should have guaranteed end-to-end system performance, should support 4K60 4:4:4 video, 18 Gbps bandwidth @ up to 20 ft (6.1 m), Supports 4K60 4:2:0 and 4K30 4:4:4 video @ 30 ft (9.1 m), RoHS compliant; Preferred etc as require                                                                                                                                                                                 | 6   | Nos  | 5210   | 31260            |
| 22.44                                | Supply and Laying of HDMI - HDMI Cable 5 Mtrs, High- speed Category 2 HDMI® cable, 24k gold-plated 19-pin Type A connectors, High-flex CL3-rated jacket, it should have guaranteed end-to-end system performance, should support 4K60 4:4:4 video, 18 Gbps bandwidth @ up to 20 ft (6.1 m), Supports 4K60 4:2:0 and 4K30 4:4:4 video @ 30 ft (9.1 m), RoHS compliant etc complete as required.                                                                                                                                                                                   | 2   | Nos  | 9862   | 19724            |
| <b>Total of Electrical component</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |      |        | <b>103319823</b> |

## Schedule of Quantity (Horticulture component)

**Name of  
Work :**

**Construction of Office Building for NABARD at HEC Area Murma,  
Pundag Ranchi, Jharkhand.**

| Sl. No. | Description of work                                                                                                                                                                                                                                                                                                                                                                                 | Qty  |     | Rate    | Unit    | Amount    |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|---------|---------|-----------|
| 1       | Earth work in surface excavation not exceeding 30 cm in depth but exceeding 1.5 m in width as well as 10 sqm on plan including disposal of excavated earth up to 50 m and lift up to 1.5 m, as per directions of Engineer in Incharge:                                                                                                                                                              | 2400 | sqm | 138.20  | per sqm | 331680.00 |
| 2       | Supply and stacking of good earth at site including royalty and carriage upto 5 km complete (earth measured in stacks will be reduced by 20% for payment)                                                                                                                                                                                                                                           | 60   | cum | 803.75  | per cum | 48225.00  |
| 3       | Supplying and stacking of well decayed cattle manure at site including royalty and carriage upto 5 k.m. lead complete (Cattle manure measured in stacks will be reduced by 8% for Payment).                                                                                                                                                                                                         | 60   | cum | 667.10  | per cum | 40026.00  |
| 4       | Spreading of sludge, dump manure and/or good earth in required thickness as per direction of officer-in-charge (cost of sludge, dump manure and/or good earth to be paid separately).                                                                                                                                                                                                               | 120  | cum | 79.70   | per cum | 9564.00   |
| 5       | Fine dressing of the ground.                                                                                                                                                                                                                                                                                                                                                                        | 2400 | sqm | 5.60    | per sqm | 13440.00  |
| 6       | Providing & laying of Selection no. 1 Doob grass turf with earth 50mm to 60mm thickness of existing ground prepared with proper level and ramming with required tools wooden and then rolling the surface with light roller make the surface smoothen and light watering the same and maintenance for 30 days or more till the grass establish properly, as per direction of the officer-in-charge. | 2000 | sqm | 113.70  | per sqm | 227400.00 |
|         | <b>Trees/Topiaries &amp; Palms</b>                                                                                                                                                                                                                                                                                                                                                                  |      |     |         |         |           |
| 7       | Golden Bottle brush Topiary well developed with fresh & healthy foliage 5 to 6 big ball 115 to 180 cm ht in 40 cm Cement Pot                                                                                                                                                                                                                                                                        | 50   | Nos | 850.00  | Each    | 42500.00  |
| 8       | Providing and stacking of Plumeria alba dwarf dwarf of height 90-105 cm. with 3-4 branches and thick stem in big size HDPE bags as per direction of the officer-in-charge.                                                                                                                                                                                                                          | 50   | Nos | 812.50  | Each    | 40625.00  |
| 9       | Providing and stacking of Foxtail palm ht. 180-210 cm bottom girth 25- 30 cm well developed in big size HDPE bag as per direction of the officer-in-charge.                                                                                                                                                                                                                                         | 50   | Nos | 520.00  | Each    | 26000.00  |
| 10      | Ficus black vivion pillar Topiary (sylinder type) well developed with fresh & healthy 180 to 210 cm ht in 40 cm Cement Pot                                                                                                                                                                                                                                                                          | 50   | Nos | 1800.00 | Each    | 90000.00  |

| Sl. No. | Description of work                                                                                                                                                   | Qty |      | Rate    | Unit | Amount   |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------|------|----------|
| 11      | Bismarckia Palm 115 to 180 cm ht. plant, well developed 12 and above good color fresh and healthy leaves in 40 cm Cement Pot                                          | 10  | Nos  | 1735.00 | Each | 17350.00 |
| 12      | Cycus revoluta in 35 cm challi, specimen plant, having 30 to 40 with fresh and healthy, leaves having 25cm to 30cm circumfrance of base stem well developed           | 40  | Nos  | 1050.00 | Each | 42000.00 |
| 13      | Furcaria Variegated hybrid well developed with fresh & healthy foliage 20 and above attractive leaves in 35 cm Cement Pot                                             | 40  | Nos  | 400.00  | Each | 16000.00 |
|         | <b>Shrubs Plant</b>                                                                                                                                                   |     |      |         |      |          |
| 14      | Acalypha Different colour well developed, fresh & healthy with good foliage, multi branch 30 to 45 cm ht. plant in 20 cm size of Earthen Pot/Plastic Pot              | 300 | Nos  | 32.00   | Each | 9600.00  |
| 15      | Providing and stacking of Tecoma gaudichaudi of height 90-105 cm.,bushy in big size HDPE bag as per direction of the officer-in-charge.                               | 250 | Nos  | 119.15  | Each | 29788.00 |
| 16      | Providing and stacking of Hibiscus rosinensis of height 60-75 cm. with 5-6 branches in p.bag of size 25 cm as per direction of the officer-in-charge                  | 300 | Nos. | 49.35   | Each | 14805.00 |
| 17      | Providing and stacking of Nerium oleander (kaner) dwarf of height 30-40 cm. in earthen pot of size 20 cm as per direction of the officer-in-charge.                   | 200 | Nos. | 42.15   | Each | 8430.00  |
| 18      | Providing and stacking of Tabernaemontana divaricata (Chandni double) of height 90-105 cm., bushy in big size HDPE bag as per direction of the officer-in-charge.     | 200 | Nos. | 97.50   | Each | 19500.00 |
| 19      | Providing and stacking of Jatropha multifida (red colour) of height 60-75 cm. multibranched in p.bag of size 25 cm as per direction of the officer-in-charge.         | 300 | Nos. | 49.35   | Each | 14805.00 |
|         | <b>Ground covers plants</b>                                                                                                                                           |     |      |         |      |          |
| 20      | Asparagus Meyeri, well developed 15 to 20 leaves, full of branches and foliage in 25 cm size of Earthen Pot / Plastic Pot.as per direction of the officer-in-charge.  | 800 | Nos  | 50.00   | Each | 40000.00 |
| 21      | Iresine herbstii, of height 20-25 cm. full of branches well developed in 15 cm size of Earthen Pot / Plastic Pot.as per direction of the officer-in-charge.           | 800 | Nos  | 15.00   | Each | 12000.00 |
| 22      | Duranta Golden, having ht.15 to 20 cm bushy shape with fresh and healthy leaves in 15 cm size of Earthen Pot / Plastic Pot.as per direction of the officer-in-charge. | 700 | Nos  | 19.00   | Each | 13300.00 |
| 23      | Syngonium variegated,of height 30-45 cm. with 2-3 suckers healthy foliage in Earthen Pot/Plastic Pot of size 15 cm.                                                   | 800 | Nos  | 19.00   | Each | 15200.00 |

| Sl. No. | Description of work                                                                                                                                                                                                                                                                           | Qty  |      | Rate   | Unit | Amount   |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--------|------|----------|
| 24      | Dracaena Rosea having ht. 30 cm & above with 8 to10 leaves, well developed, fresh and healthy in 20 cm size of Earthen pot / Plastic pot.                                                                                                                                                     | 200  | Nos  | 40.00  | Each | 8000.00  |
| 25      | Plantation of Trees, Shrubs, and Hedge at site i/c watering and removal ofunserveiceable material's as per direction of officer in charge (excludingunserveiceable material's as per direction of officer in charge (excluding cost of plant & water)                                         |      |      |        |      |          |
| 25.1    | Trees plant                                                                                                                                                                                                                                                                                   | 340  | Nos  | 9.45   | Each | 3213.00  |
| 25.2    | Shrubs Plant                                                                                                                                                                                                                                                                                  | 1800 | Nos  | 4.70   | Each | 8460.00  |
| 25.3    | Hedge Plant /Ground cover                                                                                                                                                                                                                                                                     | 4000 | Nos  | 3.15   | Each | 12600.00 |
|         | <b>Potted Plants</b>                                                                                                                                                                                                                                                                          |      |      |        |      |          |
| 26      | Providing, stacking and Displaying Aglaonema Snow White hybrid plant (three in one), having ht. 30 cm & above with 6 to 8 leaves, bright colour, well developed, fresh and healthy in 25 cm size of Earthen pot / Plastic pot (Specimen Plant) and as per direction of the officer-in-charge. | 50   | Nos. | 240.60 | Each | 12030.00 |
| 27      | Providing, stacking and Displaying Araucaria cookie having ht.1.20 m to 1.35 m, straight, well developed, fresh and healthy with lush green leaves from bottom to top in 25 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.                               | 50   | Nos. | 394.80 | Each | 19740.00 |
| 28      | Providing, stacking and Displaying Areca Palm having ht. 1.20 m to 1.50 m with 5 to 6 suckers, well developed, fresh and healthy with lush green foliage in 25 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.                                            | 100  | Nos. | 185.05 | Each | 18505.00 |
| 29      | Providing, stacking and Displaying Croton Petra Bangalore variety having ht. 60 cm to 75 cm with 4 to 6 branches, well developed, fresh and healthy colorful leaves in 25 cm size of Earthen pot/Plastic pot and as per direction of the officer-in-charge.                                   | 50   | Nos. | 363.95 | Each | 18198.00 |
| 30      | Providing, stacking and Displaying Dracaena 'Song of India' specimen plant (three in one), having ht. 60 cm & above, well developed, fresh and healthy with good foliage in 25 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.                            | 50   | Nos. | 148.05 | Each | 7403.00  |
| 31      | Providing, stacking and Displaying Diffenbachia superba, well developed, with 10-12 fresh, healthy and attractive leaves 45 cm to 60 cm ht. in 25 cm size Earthen pot/ Plastic pot and as per direction of the officer-incharge.                                                              | 100  | Nos. | 172.75 | Each | 17275.00 |

| Sl. No. | Description of work                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Qty   |      | Rate    | Unit              | Amount            |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|---------|-------------------|-------------------|
| 32      | Providing, stacking and Displaying Bougainvillea named variety, Sobhra, Thima, Marry palmar, Cherry Blossom etc. well developed with fresh & healthy bushy plant in full bloom 75 cm to 90 cm ht. plant in 40 cm Cement Pot/ Plastic Pot and as per direction of the officer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 50    | Each | 475.00  | Each              | 23750.00          |
| 33      | Providing, stacking and Displaying Cyprus Golden Conical Shape 150 cm to 165 cm ht. plant, with fresh and healthy Golden colour foliage in 35cm Cement Pot/ Plastic Pot and as per direction of the officer-in-charge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 45    | Each | 1782.85 | Each              | 80228.00          |
| 34      | Complete maintenance of the entire garden features having as per yard stick in the garden area i.e. lawn trees, shrubs, herbs, edge, flower beds, foliages, creepers etc. including hoeing, weeding, pruning, replacement of plants, gap filling, watering, mowing of lawn, grass cutting by lawn mover and brush cutter, removal of garden waste, applying insecticide, pesticide & fertilizers (whenever required) top dressing of lawn with good earth and manure and maintenance of other garden related works for 6 months as directed by office-in-charge (Cost of Good Earth, Manure, Fertilizer, Insecticide, Pesticide will be provided by the Department & lawn mover and brush cutter with fuel and other T & P material/articles shall be provided by the contractor.) and as per direction of officer in charge. 2400 sqm x 06 months= 14400 sqm |       |      |         |                   |                   |
|         | Office accommodation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 14400 | sqm  | 4.95    | per sqm per month | 71280.00          |
| 35      | Maintenance of cement potted plants at ground floor in flats and ground floor bungalow, office complex including application of good earth, manure, insecticide, pesticide and fertilizer, removing of dry parts by pruning, cleaning dry leaves and displaying in appropriate place and replacement of broken pots coloring of pots and change of location of pots and replacing with fresh plants as and when required ( Materials provided by the department) for 6 months as per direction of officer in charge. 100 Nos x 06 months= 600 Nos                                                                                                                                                                                                                                                                                                             | 600   | Nos  | 81.85   | per pot per month | 49110.00          |
|         | <b>Total of Horticulture component</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |      |         |                   | <b>1472030.00</b> |

## Proforma for quoting rates

**Name of Work : Construction of Office Building for NABARD at HEC Area Murma, Pundag Ranchi, Jharkhand.**

| <b>Description</b>                                  | <b>Estimated amount (Rs.)</b> | <b>Rate to be quoted by agency in percentage above/below/at par with respect to estimated cost</b> | <b>Amount Quoted by agency (In Rs.)</b> |
|-----------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>Schedule of quantity<br/>(Civil work)</b>        | <b>32,84,66,818/-</b>         |                                                                                                    |                                         |
| <b>Schedule of quantity<br/>(Electrical work)</b>   | <b>10,33,19,823/-</b>         |                                                                                                    |                                         |
| <b>Schedule of quantity<br/>(Horticulture work)</b> | <b>14,72,030/-</b>            |                                                                                                    |                                         |
| <b>Total Estimated Cost</b>                         | <b>43,32,58,671/-</b>         |                                                                                                    |                                         |

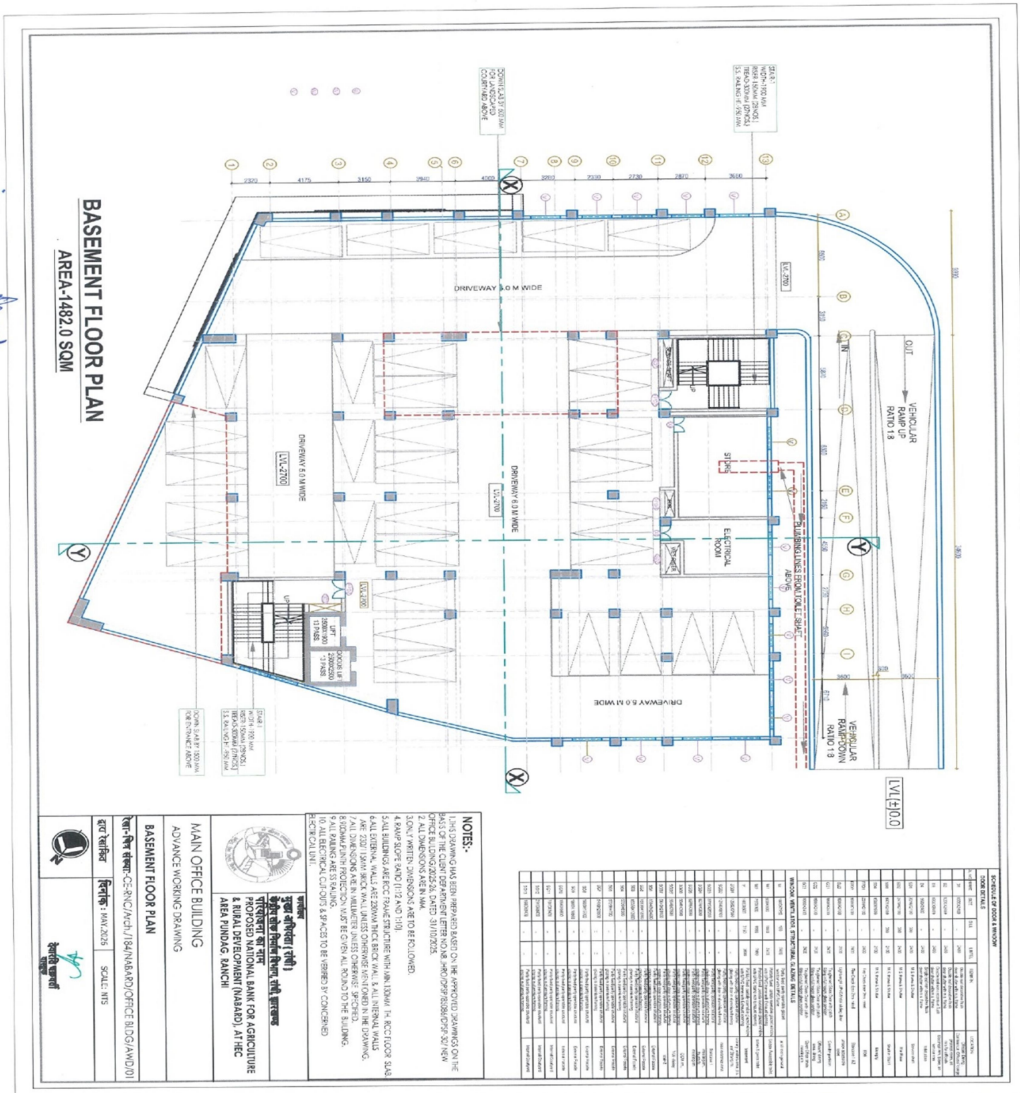
# **PART – E**

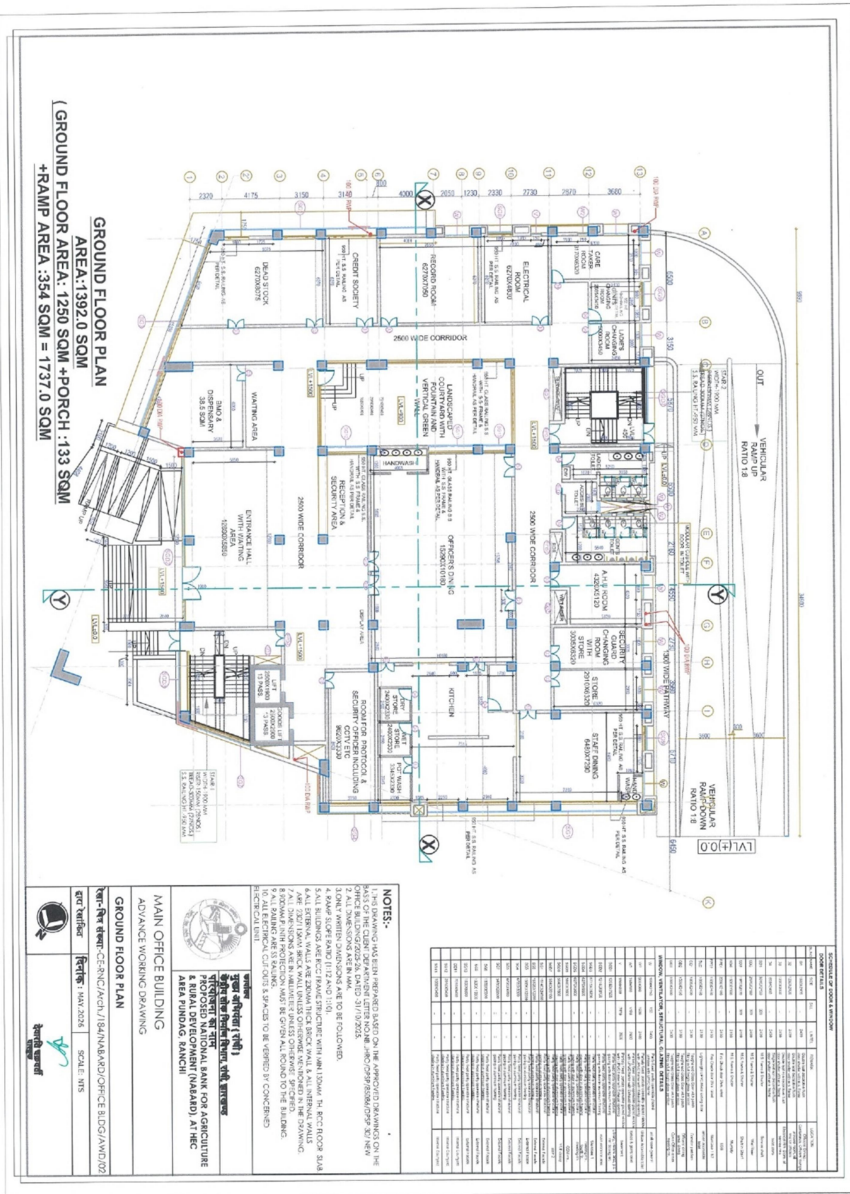
# **(Indicative**

# **Drawings)**

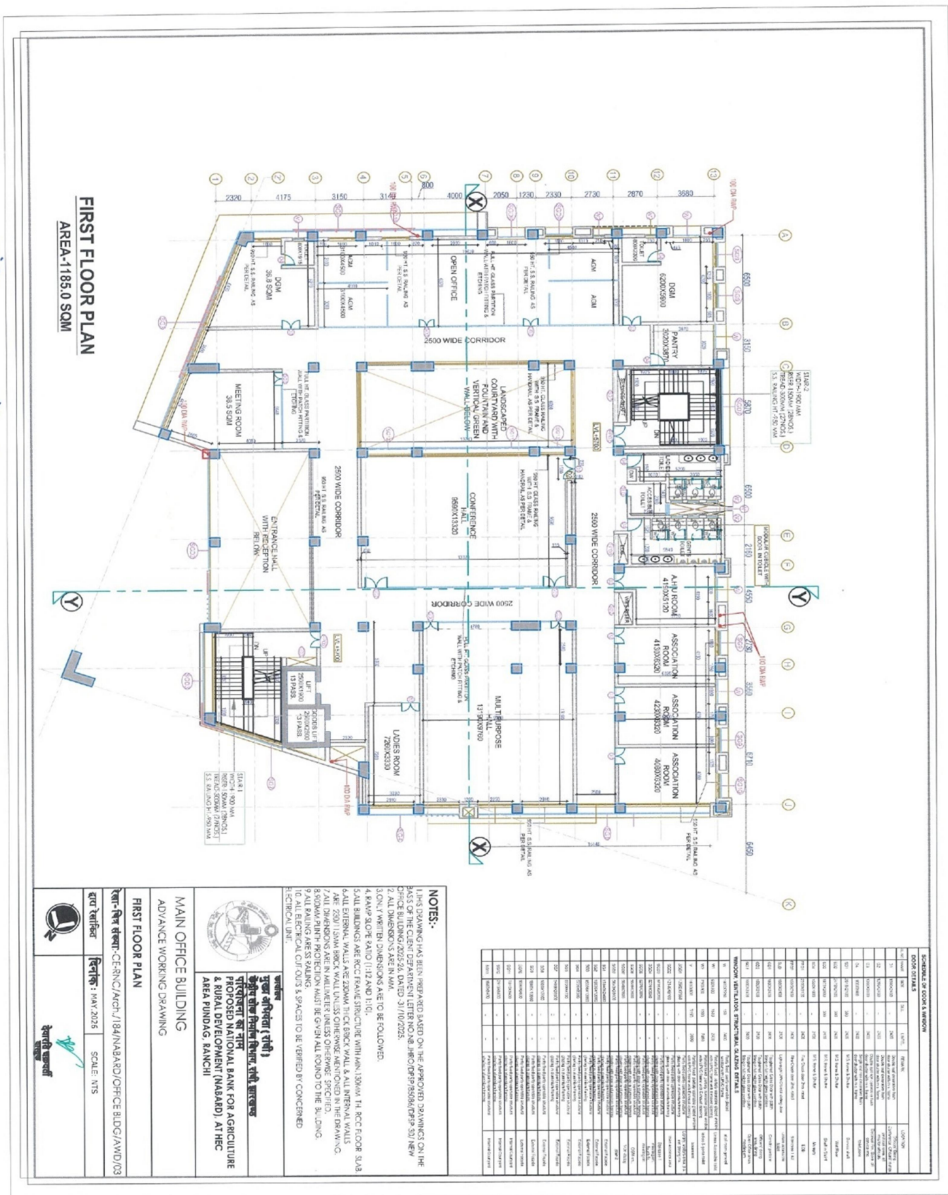


# Basement Floor Plan



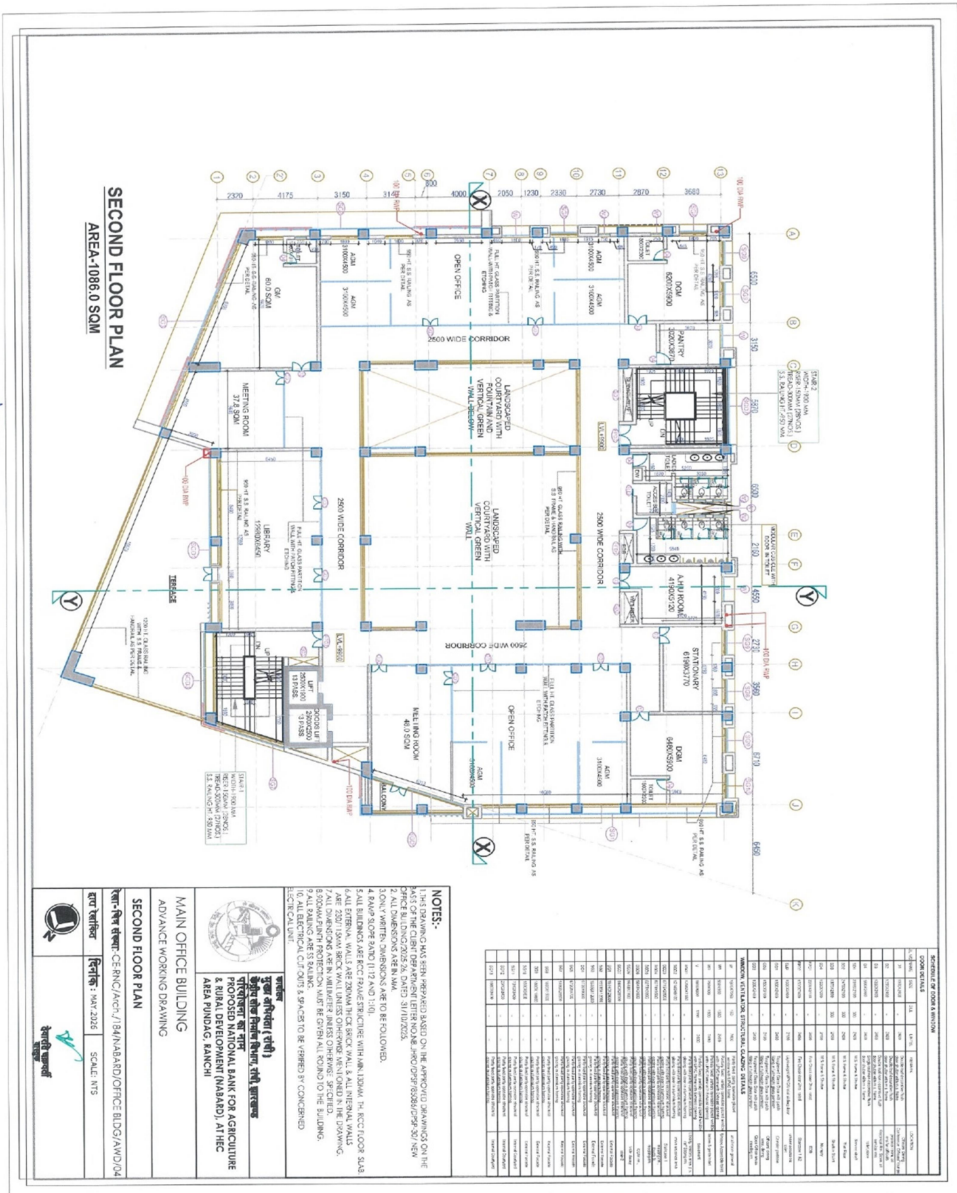


# Ground Floor Plan

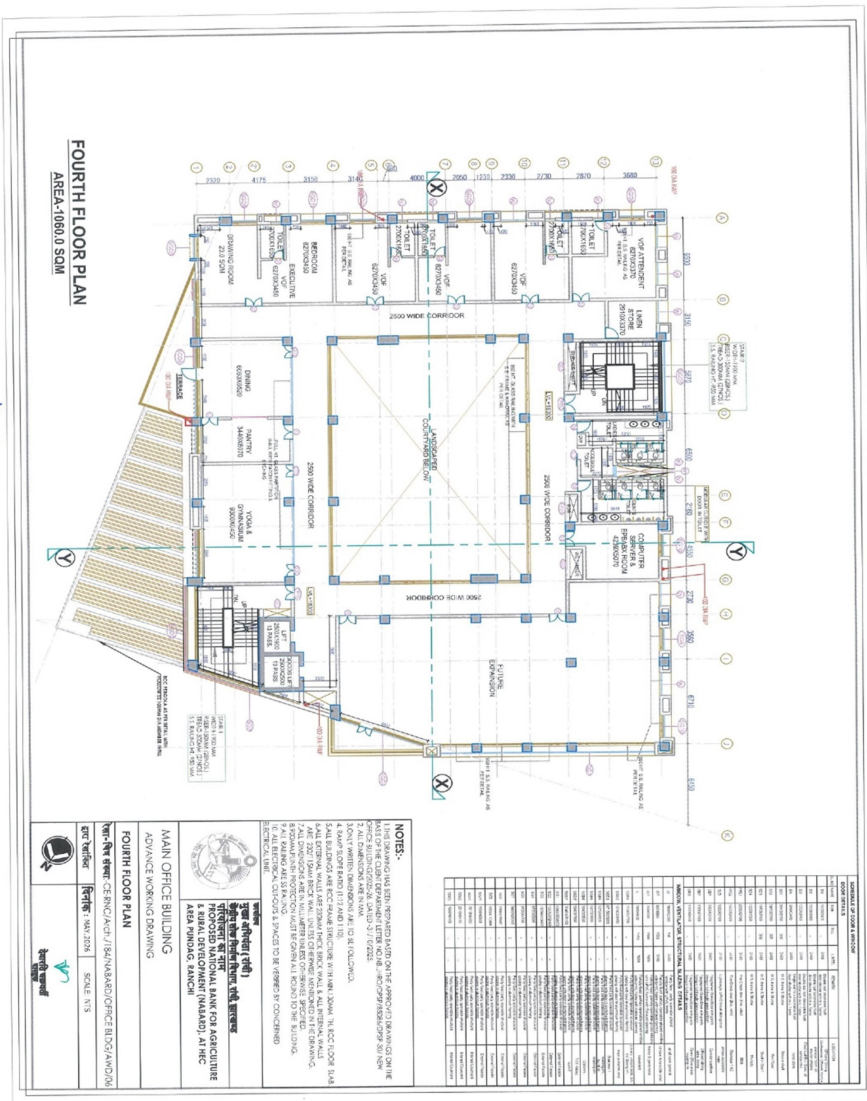


# First Floor Plan

# Second Floor Plan



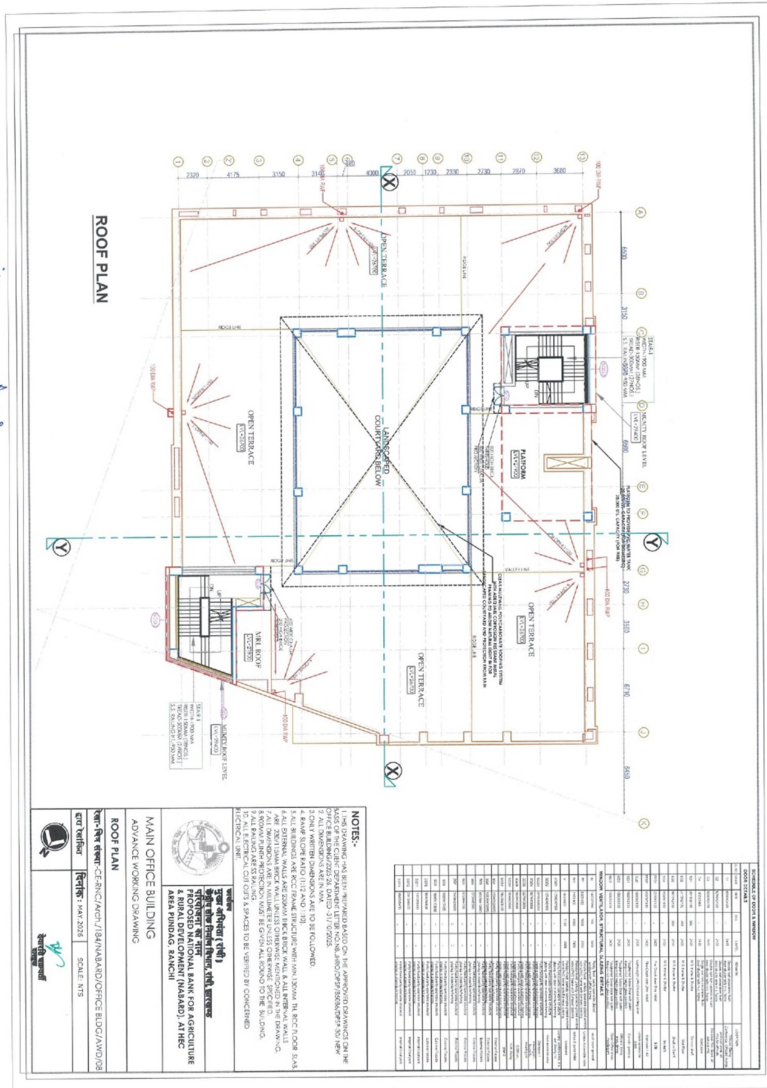
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# Fourth Floor Plan

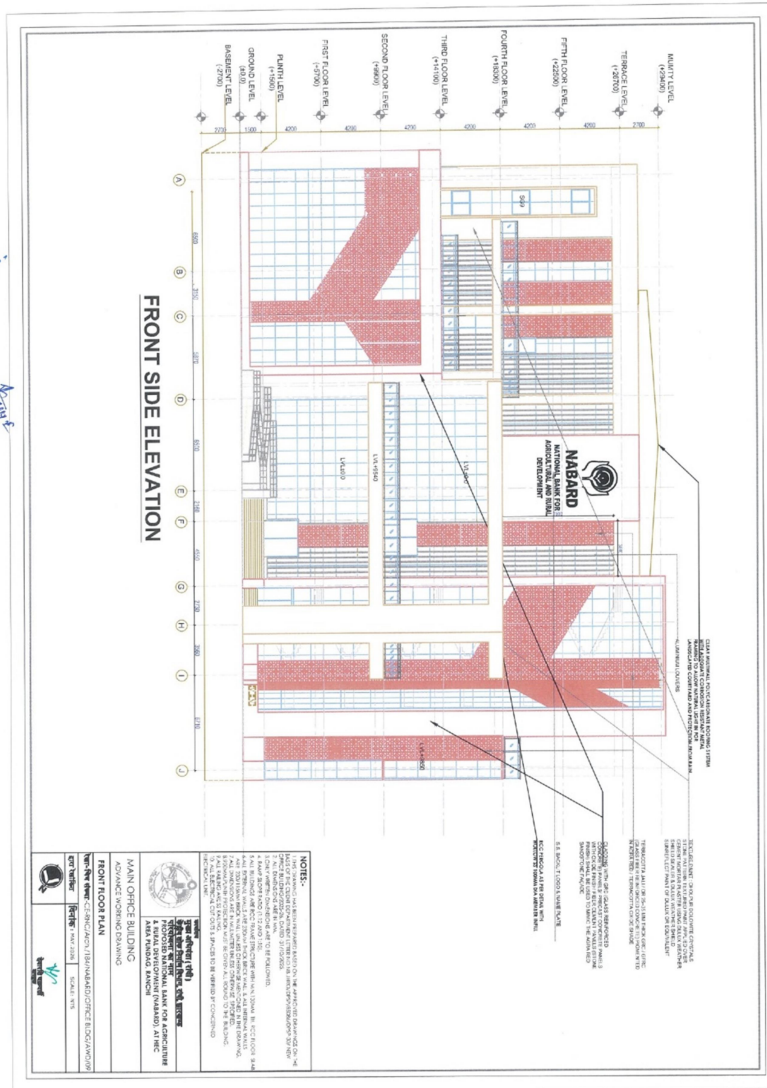


## Fifth Floor Plan



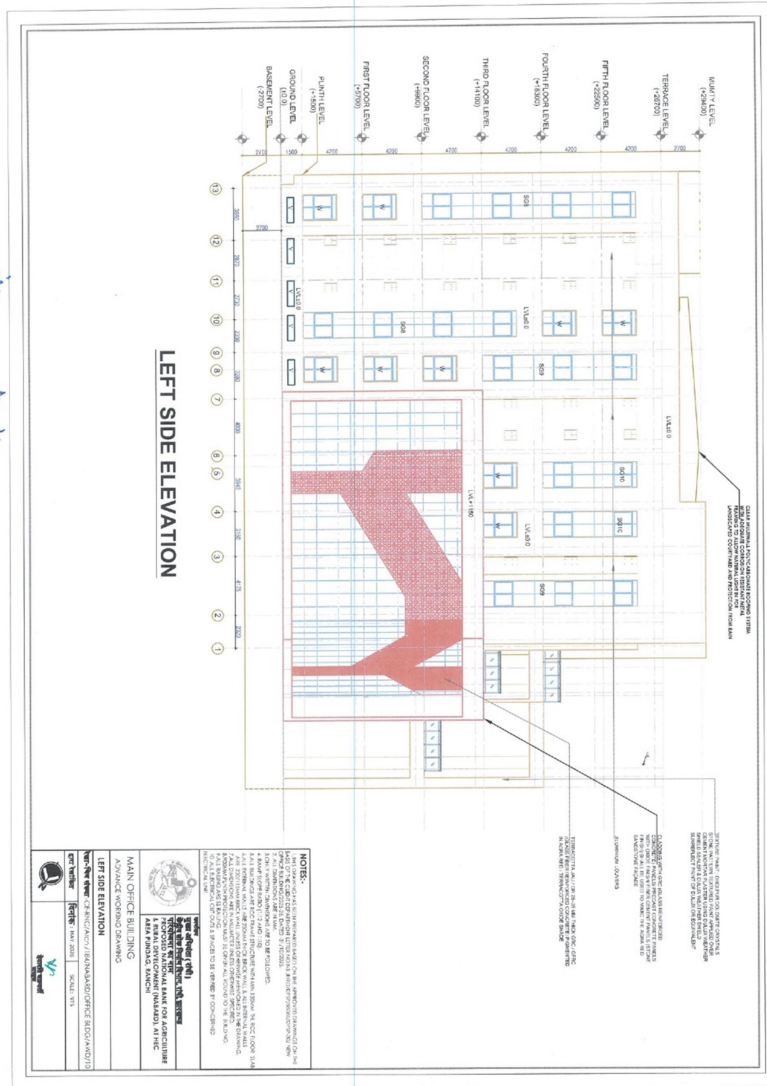
10/10/10  
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# Roof Plan



Rev  
 No. II  
 10/10/2020

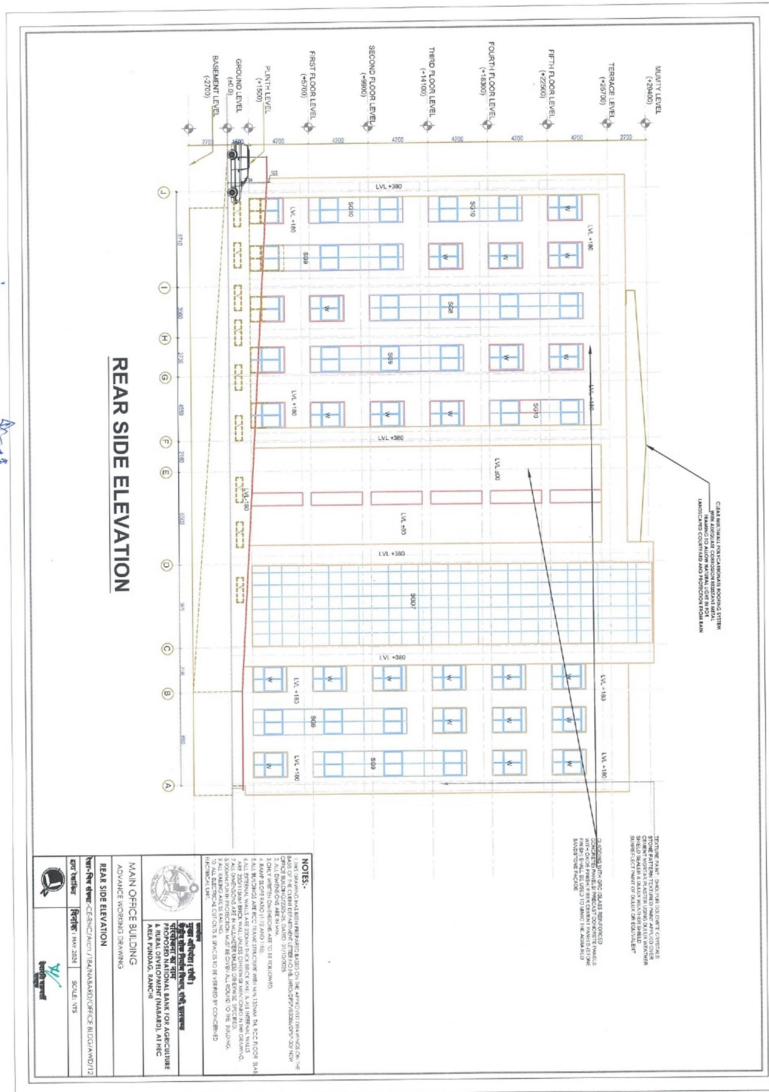
Front Side Elevation



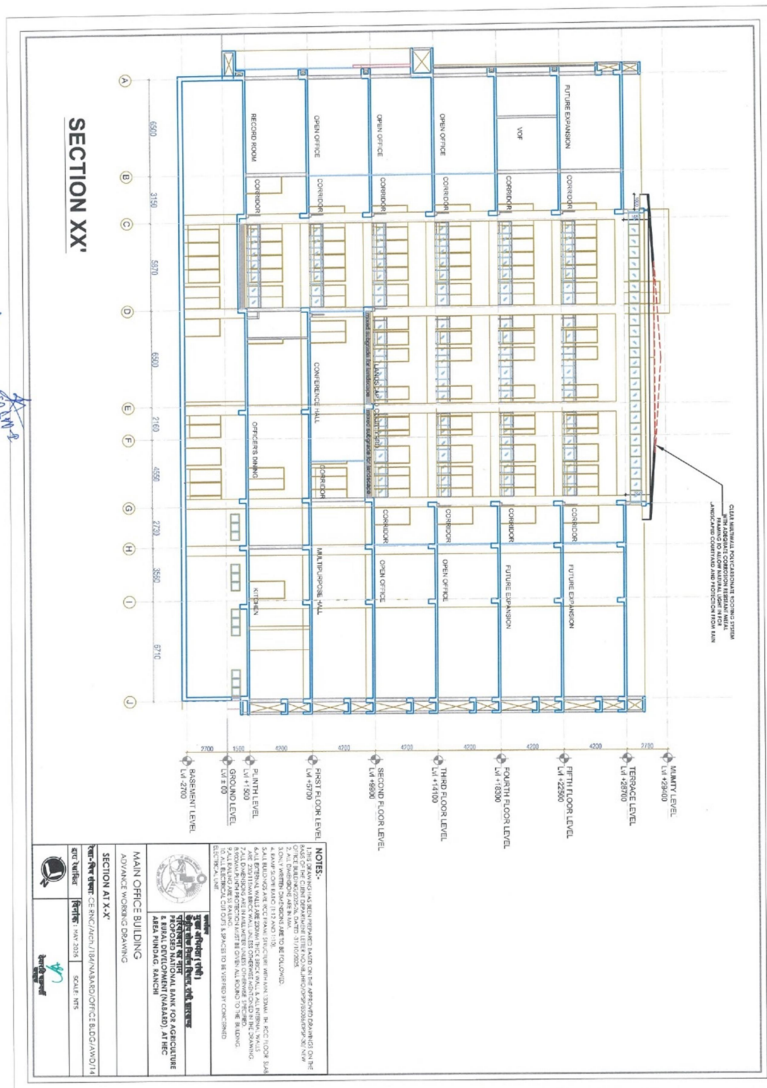
Left Side Elevation



## Right Side Elevation



Rear Side Elevation



Section XX'