

**Name of Work:** Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.

**NIT No.:** 01 / CE / EE / MUMBAI I / 2025 – 26 (01/CE-I/EE/Mumbai-I/2025-26)

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**EXECUTIVE ENGINEER  
MUMBAI – I  
C.P.W.D., MUMBAI - 20**

**GOVERNMENT OF INDIA**  
**CENTRAL PUBLIC WORKS DEPARTMENT**

**NOTICE INVITING e-TENDER**

The Executive Engineer, Mumbai -I, CPWD, Mumbai-20 invites on behalf of the President of India, online Percentage rate in single bid from approved and eligible contractors of CPWD enlisted in appropriate class for the following work :-

**NIT No.: 01 / CE / EE / MUMBAI I / 2025 – 26 (01/CE-I/EE/Mumbai-I/2025-26)**

**Name of Work:** Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.

**Estimated Cost: Rs. 34,95,96,698/- (Rs. 25,57,55,621 (Civil) + Rs. 9,38,41,077/- (Electrical))**

**Earnest Money:Rs. 44,95,967/-**

**Period of completion:**15 (Fifteen) Months.

**Last time and date of submission of bid: 30/04/2025 UPTO 15:00 HRS.**

The bid forms and other details can be obtained from the website [www.etender.cpwd.gov.in](http://www.etender.cpwd.gov.in)

[The notice inviting e-tender is also available on www.eprocure.gov.in.](http://www.eprocure.gov.in)

**Note:** - Applicants are advised to keep visiting the above-mentioned web-sites from time to time (till the deadline for bid submission) for any updates in respect of the tender documents, if any. Failure to do so shall not absolve the applicant of his liabilities to submit the applications complete in all respect including updated thereof, if any. An incomplete application may be liable for rejection.

**PART - A**

**GENERAL INFORMATION**

### INFORMATION & INSTRUCTIONS FOR CONTRACTORS FOR e-TENDERING

The Executive Engineer, Mumbai - I, (Formerly EE, MCD-I), CPWD, Old CGO building, Pratihtha Bhavan, 5th floor, MK Road, Mumbai-20 (Telephone No. 022-22031115, Email Id- [eemcd1@yahoo.co.in](mailto:eemcd1@yahoo.co.in)) on behalf of the President of India invites online Percentage rate bids from approved and eligible contractors of CPWD in appropriate class for the following work :-

NIT No	<b>NIT No.: 01 / CE / EE / MUMBAI I / 2025 – 26 (01/CE-I/EE/Mumbai-I/2025-26)</b>
Name of Work	Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.
Location	Mumbai
Estimated cost put to bid	<b>Rs. 34,95,96,698/- (Rs. 25,57,55,621 (Civil) + Rs. 9,38,41,077/- (Electrical))</b>
Earnest Money	<b>Rs. 44,95,967/-</b>
Period of Completion	15 (Fifteen) Months
Last date & time of online submission of bid	Up to 15:00 Hrs. on 30/04/2025
Time and date of opening of bid	Up to 15:30 Hrs. on 30/04/2025

1. 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.
2. Information and Instructions for bidders posted on website shall form part of bid document.
3. 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 [eprocure.gov.in/CPWD](http://eprocure.gov.in/CPWD) free of cost.
4. The bid can only be submitted after deposition of original EMD 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 document shall only be issued from the place in which the office of receiving division office is situated) and uploading the mandatory scanned documents such as Insurance Surety Bonds, Account Payee Demand Draft or Banker's Cheque or Fixed Deposit Receipts or / and Bank Guarantee (for balance amount as prescribed) from any of the Commercial Bank towards EMD in favour of Executive Engineer as mentioned in NIT, receipt for deposition of original EMD to Division Office of any Executive Engineer, CPWD and other documents as specified.

A part of earnest money (EMD) is acceptable in the form of bank guarantee also. In such cases, 50% of earnest money or Rs. 20 Lakh whichever is less, will have to be deposited in shape prescribed above and balance can be accepted in form of Bank Guarantee issued by a Commercial bank. The bank guarantee submitted as a part of Earnest Money shall be valid for a period of six months or more from the last date of submission of bid.

5. Those contractors not registered on the website mentioned above, are required to get registered beforehand. If needed they can be imparted training on online bidding process as per details available on the website. The necessary training materials including videos with step-to-step process are available on downloaded section of <https://etender.cpwd.gov.in>.
6. The intending bidder must have valid class-III digital signature to submit the bid 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. Bidder should ensure that the document uploaded is legible and full documents page is properly scanned.
10. Contractor must ensure to quote his percentage rate (above/below) in the attached schedules. However, if a tenderer 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 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 the scan copies of all the documents stipulated in 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/subhead in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

## 12 List of Documents to be scanned and uploaded within the period of tender submission:

- i. Copy of receipt for deposition of original EMD to division office of any Executive Engineer (including NIT issuing EE), CPWD.
- ii. Scan copy Banker's cheque of commercial bank or Account payee Demand Draft of commercial bank or Fixed Deposit receipt (FDR) of commercial bank or insurance surety bonds and/or bank guarantee or e-bank guarantee (for balance amount as prescribed) of commercial bank against EMD **drawn in favour of Executive Engineer, MCD-I, CPWD, Mumbai-20.**
- iii. CPWD Enlistment Order of the Contractor in appropriate category.
- iv. GST registration certificate of the State in which the work is to be taken up, if already obtained by the bidder.

If the bidder has not obtained GST registration in the state in which the work is to be taken up or as required by GST authorities, then in such case the bidder shall scan & upload following undertaking along with other bid documents.

*"If work is awarded to me, I/we shall obtain GST registration certificate of the State in which work is to be taken up within one month from date of receipt of award letter or before*

*release of any payment by CPWD, whichever is earlier, falling which I / we shall be responsible for any delay in payments which will be due towards me / us on account of work executed and/or any action taken by CPWD or GST department in this regard."*

- v. The bidders have to submit an undertaking that *"I/We will either obtain valid electrical license at the time of execution of electrical work or associate contractors having valid electrical license of eligible class."*
- vi. Permanent Account Number (PAN) as issued by the Income Tax Department.
- vii. ERP (Enterprise Resource Planning) Training Certificate in the name of the Proprietor / Agency/ Authorised representative issued by the Competent Authority of CPWD.

**If the above-mentioned documents are not scanned and uploaded within the period of bid submission, the bid shall be treated as invalid and cancelled.**

**All modifications/addendums/corrigendum issued regarding this bidding process, shall be uploaded on website only and shall not be published in any Newspaper.**

If any information furnished by the applicant is found incorrect at a later stage, he shall be liable to be debarred from tendering/taking up of works in CPWD. The department reserves the right to verify the particulars furnished by the applicant independently.

After submission of the bid the agency can re-submit revised bid any number of times but before last time and date of submission of bid as notified.

While submitting the revised bid, agency can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) in case of item rate tender and / or revise the percentage in case of percentage rate tender, within the last time and date of submission of bid as notified.

13. The main contractor should possess valid electrical contractor license applicable for the work site.. In case the main contractor does not have the electrical license to operate in the concerned location/jurisdiction Internal & External EI, Street light and Water Supply Pump Sets. & Light Fitting condition, he shall associate an electrical contractor who has the license to operate in the said relevant jurisdiction . The main contractor shall however continue to be responsible in all respects for the work done by his associate and also for the necessary statutory compliances. Such associate contractor shall be eligible in terms of the criteria given below himself meets the above criteria, he shall be allowed to execute this sub-head of work after due verification by the Engineer-in-Charge of Electrical Works.
- i. Three similar works each of value not less than 40% of Estimated Cost Put to tender(375.36Lakh)
  - Or**
  - ii. Two similar works each of value not less than 60% of of Estimated Cost Put to tender(563.05Lakh)
  - Or**
  - iii. One similar works each of value not less than 80% of of Estimated Cost Put to tender(750.73Lakh)
  - iv.

Note: -The value of executed similar 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 the last day of the month previous to the one in which the tenders are invited.

**Executive Engineer,  
Mumbai - I, CPWD, Mumbai-20**

**Government of India CPWD  
Notice Inviting Tender for e-Tendering**

1. Executive Engineer, Mumbai - I, (Formerly EE, MCD-I), CPWD, Old CGO building, Pratihtha Bhavan, 5th floor, MK Road, Mumbai-20 (Telephone No. 022-22031115, Email Id- [emcd1@yahoo.co.in](mailto:emcd1@yahoo.co.in)) on behalf of the President of India invites online Percentage ratetenders from approved and eligible contractors of CPWD in appropriate class for the following work:-

**NIT No.: 01 / CE / EE / MUMBAI I / 2025 – 26 (01/CE-I/EE/Mumbai-I/2025-26)**

**Name of work:** Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.

The enlistment of contractors shall 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 shall be valid on the original date of submission of bids.

**Joint ventures / Consortium and Special Purpose Vehicles (SPV) are not acceptable.**

- 1.1 The work is estimated to cost Rs.34,95,96,698/- (Rs. 25,57,55,621 (Civil) + Rs. 9,38,41,077/- (Electrical)). 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 bids, the bidders, besides indicating the percentage above/below the combined estimated cost put to bid, should also indicate the amount in word for each component separately. The eligibility of bidder will correspond to the combined estimated cost of different components put to bid.
2. Agreement shall be drawn with the successful tenderer on prescribed Form No. CPWD-7 (updated up to date correction slips) which is available as a Govt. of India Publication and also available on website [www.cpwd.gov.in](http://www.cpwd.gov.in). Bidder 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 **15 (Fifteen) 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. (i) The site for the work is available.

OR

~~The site for the work shall be made available in parts as available.~~

~~(ii) The architectural and structural drawings for the work are available and made part of this NIT. The same may also be seen in the Office of Executive Engineer, Mumbai — I, during office hours on working days.~~

Or

The architectural and structural drawings if any, shall be made available in phased manner, as per requirement of the same as per approved program 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 and Standard General Conditions of Contract 2023 (updated up to date correction slips) for Construction can be seen from the website [www.etender.cpwd.gov.in](http://www.etender.cpwd.gov.in) or [www.cpwd.gov.in](http://www.cpwd.gov.in) and [eprocure.gov.in](http://eprocure.gov.in) free of cost.
6. After submission of the bid the contractor can re-submit revised bid any number of times, but before last time and date of submission of tender as notified.
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 components) but before last time and date of submission of tender as notified.
8. Earnest Money in the form of Insurance Surety Bond, Demand Draft or Pay order or Banker's Cheque or Deposit at Call Receipt or Fixed Deposit Receipt (**drawn in favour of Executive Engineer, MCD-I, CPWD, Mumbai**) shall be scanned and uploaded to 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 shall issue a receipt of deposition of earnest money deposit to the bidder in a prescribed format (**FORM-A**) provided in the NIT. The EMD document shall be issued from the place in which the office of EMD receiving division is situated.

**This receipt shall also be uploaded to the e-tendering website by the intending bidder upto the specified bid submission date and time.**

A part of earnest money is acceptable in the form of bank guarantee also. In such case, minimum 50% of earnest money or Rs. 20 lakhs, whichever is less, shall have to be deposited in shape prescribed above, and balance may be deposited in shape of Bank Guarantee of any Commercial bank having validity for six months or more after the last date of receipt of Bids which is to be scanned and uploaded by the intending bidders.

Copy of Enlistment Order and other documents as specified in NIT shall be scanned and uploaded to the e-tendering website within the period of bid submission. **However, certified**

**copy of all the scanned and uploaded documents as specified shall have to be submitted by the lowest bidder only within the period specified 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 office of CPWD** and other documents scanned and uploaded are found in order.

**The bid submitted shall be opened at 03:30 PM on 30/04/2025.**

9. The bid submitted shall become invalid and e-Tender processing fee shall not be refunded if:
- (i) The bidders are found ineligible.
  - (ii) The bidders do not deposit original EMD with division office of any Executive Engineer, CPWD (The EMD document shall only be issued from the place in which the office of EMD receiving division office is situated).
  - (iii) The bidders do not upload all the documents as stipulated in the bid document **including the copy of receipt for deposition of original EMD.**
  - (iv) 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 tenderer in the office of tender opening authority.
10. The contractor whose bid is accepted, will be required to furnish **performance guarantee of 5% (Five Percent)** of the bid amount within the period specified in Schedule F. This guarantee shall be in the form of cash (in case guarantee amount is less than Rs. 10000/-) or Deposit at Call receipt of any scheduled bank/Banker's cheque of any scheduled bank/ demand Draft of any Commercial bank/Pay order of any Commercial Bank of any scheduled bank (in case guarantee amount is less than Rs.1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Commercial Bank or the State Bank of India in accordance with the prescribed form. In case the contractor fails to deposit the said 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.

**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 and Program Chart (Time and Progress) within the period specified in Schedule F.**

11. 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 bidder 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.
12. 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 bidder shall be summarily rejected.
13. 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 to rejection.
14. 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.
15. The enlisted contractor in CPWD shall not be allowed to participate in the tender for work in the CPWD Zone/Circle/Division/Subdivision responsible for award and/or execution of contract in which his near relative is posted as an officer in any capacity between the grades of the Chief Engineer and Junior Engineer (both inclusive) or Divisional Accountant. He shall also intimate the names of persons who are working or are subsequently employed by him and who are near relatives to any officer working in the Central Public Works Department. Any breach of this condition by the contractor would render him liable to be debarred for a period up to two years from tendering in CPWD as decided by the tender accepting authority mentioned in Schedule-F and his decision will be excepted from Clause 25.
16. No Engineer of gazette 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 previous 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 tender or engagement in the contractor's service.

17. The bid for the works shall remain open for acceptance for a period of Thirty (30) days from the last date of receipt of bid in case of single bid system.
  - i) If any bidder withdraws his bid or makes any modifications in the terms and conditions of the bid which are not acceptable to the department within 7 days after last date of submission of bid then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money absolutely irrespective of letter of acceptance for the work is issued or not.
  - ii) If any bidder withdraws his bid or makes any modifications in the terms and conditions of the bid which are not acceptable to the department after expiry of 7 days after last date of submission of bid then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 100% of the said 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) & ii) above, the bidders shall not be allowed to participate in the re-bidding process of the same work.
18. 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, particular specifications, special conditions, minutes of pre-bid meeting, schedule of quantities 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.
19. In case any discrepancy is noticed between the documents as uploaded at the time of submission of the bid online and hard copies as submitted physically in the office of Executive engineer, then the bid submitted shall become invalid and the Government shall, without prejudice to any other right or remedy, be at liberty of forfeit the entire earnest money as aforesaid. Further the tenderer shall not be allowed to participate in the retendering process of the work.
20. 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, Mumbai-I, CPWD, Mumbai ((Telephone No. 022-22031115, Email Id- eemcd1@yahoo.co.in) or ERP helpline no. 1800 180 3286 or e-mail Id 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.

21. In addition to building work, for demolition work, the bidder apart from registered contractor of appropriate class must associate himself with agencies who are eligible as per eligibility criteria given below :

To become eligible for participating in the bid process, the bidders shall satisfy the work experience criteria given below. CPWD enlisted contractors of appropriate class in composite category also need to upload the work experience certificates as per similar work criteria. The Contractor should have satisfactorily completed the Similar work as under :

Three similar completed works each containing Built up Area not less than 823.00 Sqm.

**OR**

Two similar completed works each containing Built up Area not less than 1235.00 Sqm.

**OR**

One similar completed work containing Built up Area not less than 1647.00 Sqm.

Similar work should have been executed in last seven years ending last day of the month previous to one in which tenders are invited / similar work executed shall be of any state Government, Semi Government or Government undertaking. Private works shall not be considered.

The completion certificate shall indicate the final cost of work as well as whether any compensation has levied been for delayed completion as per form 'D'.

**a. Similar Work shall mean:**

Demolition/Dismantling including disposal of unserviceable material of any residential / commercial/ institutional etc buildings of minimum (G + 1) of any Central Govt./State Govt./ PSUs or any Government Institutions during the last 7 (Seven) years ending last day of month previous to the one in which the tenders are invited.

**OR**

Structural repair work including dismantling / demolition items carried out in a building / structure repairs in building of minimum (G + 1) of any Central Govt./State Govt./ PSUs or any Government Institutions during the last 7 (Seven) years ending last day of month previous to the one in which the tenders are invited.

**Note :** In case the contractor/associated agency submits any work of structural repairs as eligible similar work, he should also upload the self attested pages of the agreement which clearly establish the agreement No., Name of work, Department, Tendered amount, date of start, date of completion as well as the inclusion of demolition / dismantling items to the full satisfaction of Engineer-in-charge.

**b. Documents to be submitted at the time for approval of associated agency before execution of work (Item no. 21.1)**

1. Letter of Transmittal "Form - I"

2. Attested copies of Experience certificates of similar works of any Central Govt./ State Government / PSUs or any Government Institutions from an officer not below the rank of Executive Engineer / Project Manager “Form - II”
3. List of eligible works completed in Form “III”
4. Performance report in Form “IV”
5. Completion Certificate of the works not below the rank of EE
6. Undertaking / Declaration about site inspection (Form - V) with photographs

**Executive Engineer,  
Mumbai - I, CPWD, Mumbai-20.**

**EMD RECEIPT FORMAT****Receipt of deposition of original Bank Guarantee as EMD**

Receipt No..... \* ..... /date..... \* .....

**Name of Work:** Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.**NIT No.:** 01 / CE / EE / MUMBAI I / 2025 – 26 (01/CE-I/EE/Mumbai-I/2025-26)Estimated Cost: **Rs.34,95,96,698/- (Rs. 25,57,55,621 (Civil) + Rs. 9,38,41,077/- (Electrical))**Amount of Earnest Money Deposit: **Rs. 44,95,967/-**

In the form of Insurance Surety Bond or demanddraft or pay order or Banker'scheque or Deposit at call Receipt or Fixed deposit Receipt Rs.....Vide.....Date.....

In the form of Bank Guarantee Rs..... issued by.....Date..... (as per Form- B)

Last date of submission of bid: 15:00 Hrs. on 30/04/2025

Name of Bidder: .....#

Total EMD Deposited: ..... #

Amount of Earnest Money Deposit: ..... #

In the form of Treasury Challan or demanddraft or pay order or Banker'scheque or Deposit at call Receipt or Fixed deposit Receipt Rs.....Vide.....Date.....

In the form of Bank Guarantee Rs..... issued by.....Date..... (as per Form- B)

Last date of submission of bid: 15:00 Hrs. on .....

Signature,

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

**Form of Earnest Money Deposit (Bank Guarantee Bond)**

WHEREAS, contractor .....(Name of contractor) (hereinafter called "thecontractor") shall submit his tender for the construction of(name of work) (hereinafter called "the Tender").

**NIT No.: 01 / CE / EE / MUMBAI I / 2025 – 26 (01/CE-I/EE/Mumbai-I/2025-26)**

Know all people by these presents that we ..... (name of bank) having our registered office at..... (hereinafter called "the Bank") are bound unto..... (in favour of **Executive Engineer, Mumbai Central Division -I, CPWD, Mumbai**) (hereinafter called the "DDO") in the sum of Rs..... Rs. in words..... ) for which payment well and truly to be made to the said DDO, the Bank binds itself, his successors and assigns by these presents. SEALED with the Common Seal of the said Bank this ..... day of 2024.

**The conditions of this obligation are:**

If after tender opening the Contractor withdraws, his tender during the period of validity of tender (including extended validity of tender) specified in the Form of Tender;

If the contractor having been notified of the acceptance of his tender by the Engineer-in-Charge: Fails or refuses to execute the Form of Agreement in accordance with the Instructions to contractor, if required;

OR

fails or refuses to furnish the Performance Guarantee, in accordance with the provisions of tender document and Instructions to contractor,

OR

fails or refuses to start the work, in accordance with the provisions of the contract and Instructions to contractor,

OR

fails or refuses to submit fresh Bank Guarantee of an equal amount of this Bank Guarantee, against Security Deposit after award of contract.

We undertake to pay to the said DDO either up to the above amount or partthereof upon receipt of his first written demand, without the said DDO or the Engineer-in-Charge having to substantiate his demand, provided that in his demand the said DDO or theEngineer-in-Charge will note that the amount claimed by him is due to him owing totheoccurrence of one or any of the above conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date\* ..... after the deadline for submission of tender as such deadline is stated in the Instructions to contractor or as it may be extended by the said DDO or the Engineer-in-Charge, notice of which extension(s) to the Bank is

hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE:

SIGNATURE

WITNESS:

BANK SEAL

(SIGNATURE, NAME & ADDRESS)

\*Date to be worked out on the basis of validity period of 6 months from last date of receipt of tender.

**LETTER OF TRANSMITTAL**

To,  
The Executive Engineer  
Mumbai-III, CPWD, Mumbai.

Subject: Demolishing existing building including disposal of unseizable materials and crediting of distressed/dilapidated survey report 1 no buildings of administrative block and training centre with 1 UG water tank at Indian Institute of Packaging Andheri (East) Mumbai 400093

Sir,

Having examined the details given in the bid document for the above work, I/we hereby submit the relevant information.

1. I/we hereby certify that all the statements made and information supplied in the enclosed forms B, C & D and accompanying statement are true and correct.
2. I/we have furnished all information and details necessary for eligibility and have no further pertinent information to supply.
3. I/we submit the following certificates in support of our suitability, technical knowledge and capability for having successfully completed the following eligible similar works:

Name of work	Certificate from

Certificate : It is certified that the information given in the enclosed eligibility bid are correct. It is also certified that I / We shall be liable to be debarred, disqualified / cancellation of enlistment in case any information furnished by me / us is found to be incorrect.

Enclosures: Seal of bidder

Date of submission:

Signature(s) of Bidder(s).

**FORMAT OF CERTIFICATE OF EXPERIENCE OF SIMILAR WORKS**

- 1. Name of Work: .....
- 2. Agreement No / W.O.No: .....
- 3. Name of Agency : .....
- 4. Built up area of buildings for which demolition / dismantling / structural repairs Work carried out: - .....
- 5. No. of storeys of the building demolished: -.....
- 6. Stipulated Date of Start of Work:- .....
- 7. Stipulated Date of Completion of Work:-.....
- 8. Actual Date of Completion:-.....

**Sign & Seal of Authorized Signatory of Client**

(An officer not below the rank of Executive Engineer / Project Manager)

Client.....

**Name**.....

Designation.....

**Contact Number**.....

Email-Id.....

**Note:** - Demolition / Dismantling / structural repairs work of buildings of Central Govt / State Govt / PSUs or any Government Institutions shall only be considered eligible for similar works as per eligibility criteria.

**LIST OF ELIGIBLE SIMILAR NATURE WORKS COMPLETED DURING THE LAST SEVEN YEARS ENDING THE LAST DAY OF THE MONTH PREVIOUS TO ONE IN WHICH TENDERS ARE INVITED**

SI No.	Name of Work/ Project & Location	Owner or sponsoring organization / department	Built up Area of building demolished	No. of story of building demolished	Date of start as per contract	Stipulated date of completion	Actual date of completion	Litigation / arbitration cases if any pending/in Progress with details	Name and address/ telephone number of corticated issuing officer to whom reference may be	Whether the work done on back to back basis(yes or no)
1	2	3	4	5	6	7	8	9	10	11

Indicate gross amount claimed and amount awarded by the Arbitrator in Column No. 9

Signature of Bidder (S)

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

**FORM- IV****PERFORMANCE REPORT OF WORKS REFERRED TO IN FORM "IV"**

1. Name of Work/ Project & Location .....
2. Name of Agency: .....
3. Agreement No.: .....
4. Estimated Cost : .....
5. Tendered Cost : .....
6. Date of Start of Work:- .....
7. Stipulated Date of Completion of Work.....
8. Actual date of completion: .....
9. Amount of Compensation levied for delayed completion, if any : .....
10. Amount of reduced rate items, if any : .....
11. Performance Report

<b>Sr. No</b>	<b>Description</b>	<b>Remarks</b>
<b>1</b>	<b>Quality of Work</b>	<b>Very Good/ Good/ Fair/ Poor</b>
<b>2</b>	<b>Financial Soundness</b>	<b>Very Good/ Good/ Fair/ Poor</b>
<b>3</b>	<b>Technical Proficiency</b>	<b>Very Good/ Good/ Fair/ Poor</b>
<b>4</b>	<b>Resourcefulness</b>	<b>Very Good/ Good/ Fair/ Poor</b>
<b>5</b>	<b>General Behavior</b>	<b>Very Good/ Good/ Fair/ Poor</b>

**Sign & Seal of Authorized Signatory of Client**

(An officer not below the rank of Executive Engineer / Project Manager)

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

Client.....

**Name**.....

Designation.....

**Contact Number**.....

Email-Id.....

**Note:** - Demolition / Dismantling / structural repairs work of buildings of Central Govt / State Govt / PSUs or any Government Institutions shall only be considered eligible for similar works as pereligibility criteria.

**DECLARATION ABOUT SITE INSPECTION**

To,  
Executive Engineer  
Mumbai - I, C.P.W.D.,  
Mumbai - 400 020.

**Name of Work :** Demolishing existing building including disposal of unseceable materials and crediting of distressed/dilapidated survey report 1 no buildings of aadminstative block and training centre with 1 UG water tank at indian institute of packaging andheri(east) muumbai 400093

Dear Sir,

It is hereby declared that as per CPWD 6 for e-tendering, I/we the bidder inspected and examined the subject site and its surroundings and satisfy my self/ our selves before submitting my/our 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. I/we may require and in general shall myself/ourselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect my/our bid. I/we the bidder shall have full knowledge of the site and no extra Charges consequent upon any misunderstanding or otherwise shall be claimed at later date. I/we the bidder shall be responsible for arranging and maintaining at 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 me/us implies that I/we has read this notice and all other contract documents and has made myself/ourselves aware of the scope and specifications of the work to be done and of local conditions and other factors having a bearing on cost on the execution of the work.

Yours faithfully  
(Seal & Signature)  
(Duly authorized signatory of the bidder)

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

**GOVERNMENT OF INDIA  
CENTRAL PUBLIC WORKS DEPARTMENT**

STATE: MAHARASTRA

BRANCH: B &amp; R

**Percentage Rate Tender and Contract for works**

Tender for the work of:-**Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.**

- (I) To be uploaded by 15:00. Hours on ..... to on website: <https://etender.cpwd.gov.in/>
- (ii) To be opened in presence of tenderers who may be present at 15.30 hours on **30/04/2025** in the office of The Executive Engineer, Mumbai - I, (Formerly EE, MCD-I), CPWD, Old CGO building, Pratishtha Bhavan, 5th floor, MK Road, Mumbai-20 (Telephone No. 022-22031115, Email Id- eemcd1@yahoo.co.in)

**BID**

I / We have read and examined the notice inviting bid, schedule - A, B, C & D specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract for CPWD Works of 2023 for Construction with amendments up to the last date of submission of bids, clauses of contract, Special conditions, schedule of rates & other documents and Rules referred to in the conditions of contract and all other contents in the bid document for the work.

I/We hereby bid for the execution of the work specified for the President of India within the time specified in Schedule 'F' viz., user requirement, schedule of quantity and approved drawings 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 of 2023 for Construction with amendments up to the last date of submission of bids 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 bid open for **Thirty (30) days** from the date of last date of receipt of bid and not to make any modification in its terms and conditions.

A copy of receipt of deposition of Earnest Money Rs. 44,95,967/- in receipt Treasury Challan/ Deposit at call Receipt of scheduled bank/ Fixed deposit Receipt of scheduled bank /Demand draft or

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

pay order or Banker's cheque of scheduled bank/ bank guarantee issued by a scheduled bank is scanned and uploaded. If I/We, fail furnish to furnish the prescribed 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 bid 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(C)** (as modified) of the bid form.

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

I/we undertake and confirm that eligible similar work(s) has/have not been got executed through another agency on back-to-back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for bidding 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 Deposited/Performance Guarantee.

I/We hereby declare that I/We shall treat the bid documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived there from 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:**

**Witness:**

**Signature of Contractor**

**Address:**

**Postal 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.....(Rs.....  
.....).

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

- (a)
- (b)
- (c)

**For & on behalf of President of India**

**Signature .....**

**Designation .....**

**Dated:**

### **Form of Performance guarantee /Bank guarantee bond**

In consideration of the President of India (hereinafter called "The Government") having offered to accept the terms and conditions of the proposed agreement between .....and..... (hereinafter called "the said contractor(s)" for the work (hereinafter called "the said agreement") having agreed to production of an irrevocable Bank Guarantee for Rs..... (Rupees..... only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We..... (hereinafter referred to as the "Bank") hereby undertake to (indicate the name of the Bank) pay to the Government an amount not exceeding Rs (Rupees..... only) on demand by the Government.
2. We .....do hereby undertake to pay the amounts due and payable (indicate the name of the Bank) under this Guarantee without any demur, merely on a demand from the Government stating that the amount claimed is 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).
3. We, the said Bank, further undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder, and the contractor(s) shall have no claim against us for making such payment.

4. We..... further agree that the Guarantee herein contained shall (indicate the name of the Bank) remain in full force and effect during the period that would be taken for the performance of the said agreement, and It shall continue to be enforceable till all the dues of the Government under or by virtue of the said agreement have been fully paid, and its claims satisfied or discharged, or till the Engineer-in-charge, on behalf of the Government, certifies that the terms and conditions of the said

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

agreement have been fully and properly carried out by the said contractor(s). and accordingly discharges this guarantee.

- 5. We..... further agree with the Government that the Government. (indicate the name of the Bank) shall have the fullest liberty without our consent, and without effecting in any manner our Obligations hereunder, to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) 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(s), and to for bear 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. This Guarantee will not be discharged due to the change in the constitution of the Bank or.....the contractor(s).
- 7. We.....lastly undertake not to revoke this Guarantee except with (indicate the name of the Bank) the previous consent of the Government in writing.
- 8. This Guarantee 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 six months of the date of expiry or extended date of expiry of this Guarantee all our liabilities under this Guarantee shall stand discharged.

Dated the..... day of.....

For..... (indicate the name of the Bank)

**PROFORMA OF SCHEDULES: A TO F**  
**(Major Component: -Civil Work)**

**SCHEDULE 'A':**

Schedule of quantity for quoting rates:

As per **Page 160 to 211 (For Civil Work)**

**SCHEDULE 'D'**

Extra schedule for specific requirements /document for the work, if any.

NIL

**SCHEDULE 'E'**

Reference to General Conditions of contract:

General Conditions of Contract 2023  
for Construction as amended /  
modified up to the last date of  
submission of Bid.

Name of work: Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.

Estimated cost of work: **Rs.34,95,96,698/- (Rs. 25,57,55,621 (Civil) + Rs. 9,38,41,077/- (Electrical))**

Earnest money: **Rs. 44,95,967/-** (To be returned after receiving Performance Guarantee)

Performance Guarantee: 5% of tendered value.

Security Deposit: 2.5% of tendered value

**SCHEDULE 'F':** (General Rules & Directions)

Officer inviting tender : Executive Engineer, Mumbai-I, CPWD

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 (C)

See below

**Definitions:**

2(v) Engineer-in-charge(Civil work):Executive Engineer, Mumbai-I, CPWD, Mumbai

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

2(viii) Accepting Authority: Chief Engineer, Mumbai-I, CPWD,

2(x) Percentage on cost of materials and labour to cover all overheads and profits : 15%

2(xi) Standard Schedule of Rates:(For Civil) CPWD,DSR2023with amendmentsuptothedate of submissionofbids

2(xii) Department:Central Public Works Department

9(ii) Standard CPWD contract Form GCC-2020 for construction, CPWD Form-7 modified &corrected up to last date of submission of bids:**General Conditions of Contract for Contruccion Works 2023**

#### Clause 1

i) Time allowed for submission of performance Guarantee, program chart, (Time and Progress) and applicable labour licenses, registration with GST, EPFO, ESIC and BOCW Welfare Board or proof of applying thereof from the date of issue of letter of acceptance, in days: 07 (Seven) days

ii) Maximum allowable extension with late fee @ 0.1% (Non refundable)per day of performance Guarantee amount beyond the period provided in i) above in days. 3 days with late fee @ 0.1% per day

#### Clause 2

Authority for fixing Compensation under Clause 2: CE, MUMBAI-I, CPWD, Mumbai

#### Clause 5

Number of days from the date of issue of letter of acceptance for reckoning date of start: 05 (Five) days

Milestones as per table given below

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

### Table of Milestones

#### A- CIVIL & ELECTRICAL WORK

S. No.	Description of Milestone (Financial Progress)	Time Allowed in days from start of work	Amount to be withheld in case of non-achievement of milestone
1	95% Reinforced Cement Concrete (RCC) upto plinth beam work to be completed and submission of all conduit drawings	03 Months	In the event of not achieving the necessary progress as assessed from the running payments, 1.00% of the tendered value of work will be withheld for failure of each milestone subject to maximum 5% (Five percent).
2	95% RCC upto 1 <sup>st</sup> floor + Submission of cable, internal EI fittings samples for approval	05 Months	
3	95% of all RCC works + 95% plaster works + 95% of all Internal electrical work to be completed	09 Months	
4	95% of doors and windows to be completed + 95% Fire fighting and fire alarm work to be completed + All lifts procurement + 95% of False ceiling Work + 95% Plumbing and sanitary fittings	11 Months	
5	Work complete in all respects.	15 Months	

- NOTE:**
1. Withheld amount shall be released if and when subsequent milestone is achieved within respective time specified. However, in case milestones are not achieved by the Bidder for the work, the amount shown against each milestone shall be withheld.
  2. Intending bidder may submit phasing of activities/milestones based on their resources and methodology at the time of bidding corresponding to physical milestones/stages indicated in the above table. These shall form part of the agreement after approval of the accepting authority, otherwise it would be assumed that agency agrees with the above-mentioned physical milestone

**Time allowed for execution of work: 15 (Fifteen) Months**

- i) Authority to convey the decision of shifting of milestone and extension of time, if any : EE, MUMBAI-I, CPWD, Mumbai or his successor(s)
- ii) Authority to decide rescheduling of milestones

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

and Extension of time, if any :

CE, MUMBAI-I, CPWD, Mumbai or his successor(s)

iii) Authority to decide Shifting of date of start in case of delay in handing over of site :

CE, MUMBAI-I, CPWD, Mumbai or his successor(s)

### 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	Entire site	Available
Part B	Portion with encumbrances	Nil	NA
Part C	Portions dependent on work of other agencies	Nil	NA
Clause 5.1 (iv)	Recovery per week for delay in submission of Time and progress chart and monthly progress report		Rs. 2,000/-
Clause 5.4	Recovery per day for delay in submission of revised programme		Rs. 2,500/-

### Schedule of issue of drawings

Part	Category	Time Period for issue of drawings reckoned from date of issue of letter of intent
Part A	Architectural Drawings	On the day of issue of award letter
Part B	Structural Drawings	On the day of issue of award letter
Part C	Plumbing Drawings	Approval within 10 days of submission of drawings by the contractor.
Part D	E&M Drawings	Approval within 10 days of submission of drawings by the contractor.

**Note : - Delay in submission of Plumbing and E&M drawings by contractor shall not be considered as a valid hindrance to the work.**

**Clause 6** : Computerised MB

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

**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:

170.50 Lakhs (for civil)

**Clause 7A**

Whether Clause 7A shall be applicable **Yes, No Running Account Bill / Final Bill shall be paid for the work till the applicable labour licenses, registration with GST, EPFO, ESIC and BOCW Welfare Board, whatever applicable as submitted by the Bidder to the Engineer-in-Charge.**

**Clause 8**

Competent Authorities to inspect and issue part / final completion certificate

:EE, Mumbai-I &amp; CE (Mumbai) - I

**Clause 8A**

Authority to decide compensation on account If contractor fails to submit completion plans for Internal and External Civil, Electrical and Mechanical Services within 30 days

:EE, Mumbai-I, CPWD, Mumbai-20

**Clause 10A**

Testing equipment to be provided by the contractor at Field testing laboratory

: List attached as Appendix I

**Clause 10B (ii)**

Whether Clause 10B (ii) shall be applicable:

Not Applicable

**Clause 10C**

Component of labour expressed as percent of value of work :

25%

**Clause 10CC:**

Applicable

**Clause 11**

Specifications to be followed for execution of work:

- Civil Work

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

1. CPWD Specifications-2019 Vol. I & II with upto date correction slips.

i) Building information model (BIM) is applicable and BIM professional to be deployed by contractor Yes / No

**Note :- All above specifications shall be applicable with correction slips up to last date of submission / uploading of bid.**

**Clause 12.2 (C)**

Deviation limit beyond which clause 12.2 (c) shall apply for building work 100%

Deviation limit beyond which clauses 12.2 (c) shall apply for foundation work (except items mentioned in earth work subhead in DSR and related items 100%

Deviation limit for items mentioned in earthwork subhead of DSR and related items 100%

**Clause 16**

Competent Authority for deciding reduced rate. CE, MUMBAI-I, CPWD, Mumbai or his successor(s)

**Clause 18**

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

Description of Machinery	Quantity
As per Appendix –I	

**Clause 19 (C)**

Authority to decide penalty for each default: Engineer-in-charge

**Clause 19 (D)**

Authority to decide penalty for each default: Engineer-in-charge

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

**Clause 19 (G)**

Authority to decide penalty for  
each default:

Engineer-in-charge

**Clause 19 (K)**

Authority to decide penalty for  
each default:

Engineer-in-charge

**Clause 25**

Conciliator	Special Director General (Mumbai) or his successor(s)
Arbitrator Appointing Authority	Chief Engineer, Mumbai-I, CPWD, Mumbai or his successor(s)
Seat and Place of Arbitration	Mumbai

**Clause 32**

The Requirement of Technical

Representative(s) and Recovery Rates applicable as below:-

Sr. No.	Qualification	Number (Major + Minor Component)	Minimum Experience in years	Designation	Rate of which recovery shall be made from the contractor in the event of not fulfilling provision of Clause 36(i)
1	Graduate Engineer	1	20 (and having experience of one similar nature of work)	Project Manager	Rs. 60,000/- Per month per person
2	Graduate Engineer	1	12 (and having experience of one similar nature of work)	Deputy Project Manager	Rs. 40,000/- Per month per person
3	Graduate Engineer Or Diploma Engineer	1+1	5 or 10 years respectively	Project /Site Engineer	Rs. 25,000/- Per month per person

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

4	Graduate Engineer Or Diploma Engineer	1+1	2 or 5 years respectively	Project planning / quality / billing Engineer	Rs. 15,000/-Per month per person
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Assistant Engineers retired from Government services that are holding Diploma will be treated at par with Graduate Engineers.

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

The above given strength shall be required to be deployed from start of work to date of completion of work.

### CLAUSE 38

i) (a)	Schedule / statement for determining theoretical quantity of cement & bitumen	On the basis of <b>Delhi schedule of Rates 2023</b> printed by CPWD with up-to-date correction slips.
ii)	Variations permissible on theoretical quantities	
a)	i. Cement for works with estimated cost put to tender not more than Rs. 25 lakh ii. Cement for works with estimated cost put to tender more than Rs. 25 lakh	3 % plus / minus. 2% plus / minus.
b)	Bitumen for 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.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

**Appendix-I****Equipments for Testing of Materials & Concrete at Site Laboratory**

Equipments for conducting necessary tests (as per CPWD Specifications 2019) shall be provided and installed at site in the well-furnished site laboratory by the agency at his own cost. The following laboratory equipment should be in general or as and when required be set up at site laboratory: -

**A)Civil: -**

Sl. No.	Equipment	Numbers
2.	Slump cone, steel plate, tamping rod, steel scale, scoop	1 Nos.
3.	Pumps and pressure gauges for hydraulic testing of pressure	1 No.
4.	Weighing scale platform type 100 Kg	1 No.
5.	Graduated glass measuring cylinder of various capacity	As per requirement
6.	Sets of sieves of 450mm internal dia. for coarse aggregate [100mm, 80mm, 40mm, 2mm, 12.5mm]	1 set
7.	Sets of sieves of 200mm internal dia. for fine aggregate [4.75mm; 2.36mm; 1.18mm; 600microns; 300 microns & 150 micron, with lid and pan]	1 set
8.	Sieve Brushes and sieve shaker capable of 200mm and 300mm dia. sieves, manually operated with timing switch assembly	1 No.
9.	Cube moulds size 70mmx70mmx70mm	12 Nos.
10.	Cube moulds size 150mmx150mmx150mm	30 Nos.
12.	Electronic balance 600gx0.1g., 10kg and 50 kg	2 Nos.
13.	Physical balance weight up to 5 kg	1 No.
14.	Measuring jars 100ml, 20ml, 500ml	5 Nos. each size
15.	Spatula 100mm & 20mm with long blade wooden handle	5 Nos.
16.	Vernier calipers 12" & 6" size	1 each
17.	Digital PH meter least count 0.01mm	1 No.
18.	Digital Micrometer Screw Guage least count. 0.01mm	1 No.
19.	GI tray 600x450x50mm, 450x300x40mm, 300x250x40mm	2 Nos. each
20.	Electric Motor mixer 0.25 cum capacity	1 No.
21.	Rebound hammer test digital rebound hammer	As per requirement

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

23.	Water testing kit	1 No.
25.	Extra Bottom plates for 15 cm cube mould	12 Nos.
27.	Counter scale capacity 1 kg and 10 kg	1 Nos. each
28.	Iron Weight of 5 kg, 2 kg, 1 kg, 500 gm, 20 gm, 100 gm	1 each
29.	Brass Weight of 50 gm, 2 gm, 10 gm, 5 gm, 2 gm, 1 gm	1 each
30.	Measuring cylinder TPX or Poly propylene capacity 1000 ml, 500 ml, 250 ml, 100 ml	1 each
31.	Set of box spanner ratchet	1 No.
32.	Hammer 1lb& 2lb	2 each
33.	Measuring tape (5 meter)	5 Nos.
34.	Any other equipment for site tests as outlined in BIS codes and as directed by the Engineer-in-charge.	As per requirement
35.	Concrete Core cutter Machine	As per requirement
	Equipment for measurement of Dry Film Thickness (DFT) of paints / primers / PU coating / Hybrid Polyurea coating etc. with probes that can pick up measurement from concrete or plaster in-situ	As per requirement
	Equipment for testing of adhesion of paints / primers / PU coating / Hybrid Polyurea coating etc. in-situ	As per requirement

**Note:**

1. The above list is only indicative and not exhaustive. The Bidder may be required to deploy more equipment as per requirement of work.

2. All the above plants & machinery are to be deployed as and when required or directed by Engineer-in-Charge.

①  
②

**Central Public Works Department  
Office Memorandum  
No. DG/CON/Construction-2023/02**

**ISSUED BY THE AUTHORITY OF DIRECTOR GENERAL, CPWD  
Nirman Bhawan, New Delhi Dated: 14.11.2023  
Subject: Amendments in Clause 32, Schedule F of Clause 11 and 32 of GCC  
2023 Construction Works.**

The following amendments in Clause 32, Schedule F of Clause 11 and 32 are made in the GCC 2023 for Construction Works.

Existing Provision	Modified Provision
<p><b>Clause 32 Employment of Technical Staff and employees</b></p> <p>Contractors Superintendence, Supervision, Technical Staff &amp; Employees</p> <p>Sl. No. (i) and (iii)</p> <p><b>(iv) No Provision</b></p>	<p><b>Clause 32 Employment of Technical Staff and employees</b></p> <p>Contractors Superintendence, Supervision, Technical Staff &amp; Employees</p> <p>No change</p> <p><b>(iv) Building Information Model (BIM) professional shall be deployed by the contractor for the projects wherever required as mentioned in Schedule F. The BIM professional shall be available for the work as and when required by Engineer-in-Charge. The BIM professional will study 3D architectural models, architectural drawings generated from 3D models, service drawings and structural drawings. The BIM professional will interact with architects, planning &amp; site engineers to get the clashes removed. The recovery shall be made from bill of contractor in case of non-deployment of BIM Professionals/technical staff as mentioned in Schedule 'F' of NIT without giving any notice in writing. The decision of Engineer-in-Charge in this respect is final and binding on the contractor.</b></p>

21/11/2023  
R.K. JAIN  
(EE (Contact))

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

<p style="text-align: center;">23</p> <p><b>SCHEDULE 'F'</b></p> <p><b>Clause 11</b></p> <p>Specifications to be followed for execution of work .....</p> <p><b>No provision</b></p>	<p><b>SCHEDULE 'F'</b></p> <p><b>Clause 11</b></p> <p>Specifications to be followed for execution of work .....</p> <p>i. <b>Building information model (BIM) is applicable and BIM professional to be deployed by contractor ..... (NIT approving authority to write Yes or No)</b></p>
<p><b>SCHEDULE 'F'</b></p> <p><b>Clause 32 Requirement of Technical Representative(s) and recovery Rate</b></p> <p>Assistant Engineers retired from Government services that are holding Diploma will be treated at par with Graduate Engineers.</p> <p>Diploma holder with minimum 10 year 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.</p> <p><b>No Provision</b></p>	<p><b>SCHEDULE 'F'</b></p> <p><b>Clause 32 Requirement of Technical Representative(s) and recovery Rate</b></p> <p><b>No Change.</b></p> <p><b>No Change.</b></p> <p><b>Minimum recovery for not deploying Building Information Model (BIM) professional shall be Rs. two lac per month or as mentioned above, whichever is higher.</b></p>

This issues with the approval of DG CPWD.

  
 14.11.2023  
 (V.P. Sahu)  
 Superintending Engineer (C&M)

Issued from file No. CSQ/CM/17 (1)/2023/Construction e-file 9162768

All CPWD and PWD officers for information and necessary action.  
 (Through CPWD website).

  
 14.11.2023  
 R.K. JAIN  
 (EE (Contact))

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)



<p>progress of the work, and (ii) to omit a part of the works in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions or substitutions shall form part of the contract as if originally provided therein and any altered, additional or substituted work which the contractor may be directed to do in the manner specified above as part of the works, shall be carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided.</p>	
<p>The completion cost of any agreement for Maintenance works including works of upgradation, aesthetic, special repair, addition/ alteration should not exceed 1.25 times of Tendered amount. Any further deviation beyond this limit upto 1.5 times of tendered amount shall be approved by the authority mentioned in schedule 'F' with recorded reason and in exceptional case, ADG shall have full power to approve the deviation beyond 1.50 times of tendered amount with recorded reason and take suitable corrective action.</p>	<p><b>Deleted</b></p>
<p>No provision</p>	<p><b>The completion cost shall, in no case, exceed 1.5 times the contract amount.</b></p> <p><b>Contractor will devise a system to keep a watch on quantum of work taken up vis-a-vis balance items required to complete defined scope of work and will give the alerts to Engineer-in-Charge before taking up extra items, deviations so that completion cost does not exceed above limit. Work executed beyond above limit will neither be recorded nor be paid.</b></p>

  
 06/11/2023  
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 (EE (Contact))

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CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

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	<p>Engineer-in-Charge will verify and confirm the alerts before assigning deviations and / or extra items to the contractor. If additional work(s) is required to complete defined scope of work beyond above limit then Engineer-in Charge may take up such work(s) separately. The contractor will not have any claims whatsoever on this account.</p>
<p>12.1 The time for completion of the works shall, in the event of any deviations resulting in additional cost over the tendered value sum being ordered, be extended, if requested by the contractor, as follows :</p> <p>i. In the proportion which the additional cost of the altered, additional or substituted work, bears to the original tendered value plus</p> <p>ii. 25% of the time calculated in (i) above or such further additional time as may be considered reasonable by the Engineer-in-Charge</p>	<p>12.1 The time for completion of the works shall, in the event of any deviations <b>and extra items</b> resulting in additional cost over the <b>contract amount</b> will be extended, if requested by the contractor, as follows :</p> <p>i. In the proportion <b>to</b> the additional cost of work, bears to the original <b>contract amount</b> plus</p> <p>ii. 25% of the time calculated in (i) above.</p>
<p><b>12.2 Deviation, Extra Items and Pricing</b></p> <p>In the case of extra item(s) (items which are not available in the contract), the contractor may within fifteen days of the receipt of order or occurrence of the item(s), submit claim for market rate(s), supported with proper analysis of rate and manufacturer's specification for the work, invoices, vouchers, etc. (as applicable), failing which the rate(s) approved later by the Engineer-in-Charge shall be final and binding. Where the contractor submits claim for market rate(s) in the manner prescribed above, the Engineer-in-Charge shall, within 45 days of the receipt of the claims, after giving consideration to the analysis of</p>	<p><b>12.2 Deviation, Extra Items and Pricing</b></p> <p><b>a) Non Schedule Extra Items</b> - The contractor may, within fifteen days of the receipt of order <b>to execute extra item</b> or occurrence of the item(s), submit <b>analysis of rate of extra item(s) based on the rates of materials available in basic rate of Standard Schedule of Rate mentioned in schedule F and market rates of the materials which are not available in standard schedule of rate mentioned in schedule F. For this purpose, the basic rate of materials available in Schedule of Rates mentioned in Schedule F will be enhanced or reduced by the applicable cost index, as the case</b></p>

  
 R.K. JAIN  
 (EE (Contact))

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CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

rates and other documents submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

may be.

**The rates of the materials which are not available in Standard Schedule of Rates, mentioned in Schedule F, shall be based on, tax paid bills for the material as defined in manufacturer's specification.**

**Material rates from Standard Schedules of Rates shall be given priority in the analysis of rates.**

**The rate of extra item will be:-**

- i. Analyzed rates as above multiplied by (tender amount divided by estimated cost put to tender), if tendered amount is below the estimated amount put to tender.
- ii. Analyzed rate, if the tendered amount is above the estimated amount put to tender.

Failing which the rate(s) approved later by the Engineer-in-Charge shall be final and binding.

Where the contractor submits **analysis of rate of extra items** in the manner prescribed above, the Engineer-in-Charge shall, within **60** days of the receipt of the **analysis of rate**, after giving consideration to the analysis of rates and other documents submitted by the contractor, determine the rate(s) of **extra items**. The contractor shall be paid in accordance with the rates so determined.

**However provisional rates on the basis of invoice will be allowed by the Engineer-in-Charge. Invoice shall be accepted only for materials not available in the Standard Schedule of Rates mentioned in Schedule F. The extra items rate shall be finalized only after submission of tax paid bills by**

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 R.K. JAIN  
 (EE (Contact))

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

	the contractor to the Engineer-in-Charge as required above. The Engineer-in-Charge may apply the discount available in the market on the rate of materials taken from tax paid bills.
(b) No Provision	<p>b) Scheduled Extra Items</p> <p>i. For percentage rate tenders, the extra item(s) shall be paid as per the Standard Schedule of Rates, mentioned in Schedule F, enhanced or reduced by the applicable cost index and further enhanced or reduced by percentage above/ below quoted by the contractor on estimated cost put to tender.</p> <p>ii. For item rate tenders, the extra item(s) shall be paid as per the said schedule rate enhanced or reduced by the applicable cost index and multiplied by (tender amount divided by estimated cost put to tender).</p>
The rate(s) of extra items so determined by the Engineer-in-Charge shall be final and binding on the contractor, and shall not be arbitrable.	Deleted

  
 06/14/2013  
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<p><b>Deviation, deviated quantities, Pricing</b></p> <p>In the case of contract items which exceed the limit laid down in Schedule F, the contractor may within fifteen days of the receipt of order or occurrence of the excess, claim revision of the rates, supported with proper analysis of rate and invoices, vouchers, etc. (as applicable), for the quantity in excess of the above-mentioned limit. The Engineer-in-Charge shall within 45 days of receipt of the claims, after giving consideration to the analysis of rates and other documents submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.</p> <p>The rate(s) so determined by the Engineer-in-Charge shall be final and binding on the contractor, and shall not be arbitrable.</p>	<p><b>c) Deviation, deviated quantities, Pricing</b></p> <p>In the case of contract items which exceed the limit laid down in Schedule F, the contractor may within fifteen days of the receipt of order or occurrence of the excess, claim revision of the rates, supported with proper analysis of rates <b>and other documents, as per procedure described in para 12.2(a) or 12.2(b)</b> (as applicable), for the quantities in excess of the above-mentioned limit. The Engineer-in-Charge shall within <b>45 60</b> days of receipt of the claims, after giving consideration to the analysis of rates and other documents submitted by the contractor, determine the rates and the contractor shall be paid in accordance with the rates so determined. <b>In case, the contractor fails to submit his claim for revision of rates within 15 days of the receipt of order or occurrence of the excess, the Engineer-in-Charge shall determine the rate(s) of such items in accordance with para 12.2 (a) and 12.2 (b) without giving any notice to the contractor. The rates so determined by the Engineer-in-Charge shall be final and binding.</b></p> <p>The rate(s) of <b>extra items and deviated items</b> so determined by the Engineer-in-Charge shall be final and binding on the contractor.</p>
<p>12.3 In the case of contract items which exceed the limit laid down in Schedule F, the Engineer-in-Charge shall after giving notice to the contractor within 30 days of submission of that bill by the contractor which contains such item(s), and after taking into consideration any reply received from the contractor within 15 days of the issue of such notice, reduce the rate for quantity in excess of the above-mentioned limit on the basis of market rates, within 30 days of the expiry</p>	<p><b>Deleted</b></p>

  
**R.K. JAIN**  
 (EE (Contact))

<p>of the said period of 15 days, and the contractor shall be paid in accordance with the rates so determined.</p> <p>The rate(s) so determined by the Engineer-in-Charge shall be final and binding on the contractor, and shall not be arbitrable</p>	
<p>12.4 The cost of any operation necessarily ..... admissible for such operations.</p>	<p>12.3 The cost of any operation necessarily ..... admissible for such operations.</p>
<p><b>12.4 No provision</b></p>	<p><b>12.4 Cost index</b>                  Latest available Cost index at the time of beginning of execution of extra item and deviation shall be used in sub-clauses 12.2 (a), 12.2 (b) and 12.2 (c) for calculation of rates of extra items.</p>
<p><b>12.5 No provision</b></p>	<p><b>12.5 Labour rates</b>                  Labour rates will be based on latest available circulars issued by Central Govt. or State Govt. whichever are higher as well as applicable for the work.</p>
<p><b>PROFORMA OF SCHEDULES</b>                  (Separate Performa for Civil, Elect.&amp; Hort. Works in case of Composite Tenders)</p> <p><b>SCHEDULE 'F'</b></p> <p><b>Clause 12</b></p> <p>Authority to decide deviation upto 1.5 time of tendered amount .....</p>	<p><b>PROFORMA OF SCHEDULES</b>                  (Separate Performa for Civil, Elect.&amp; Hort. Works in case of Composite Tenders)</p> <p><b>SCHEDULE 'F'</b></p> <p><b>Clause 12</b></p> <p>Deleted</p>
<p>12.2 &amp; 12.3</p> <p>Deviation Limit beyond which clauses 12.2 &amp; 12.3 shall apply for building work .....</p>	<p>12.2 (c)</p> <p>Deviation Limit beyond which clauses 12.2 (c) shall apply for building work .....</p>

  
 R.K. JAIN  
 (EE (Contract))

<p>12.4</p> <p>(i) Deviation Limit beyond which clauses 12.2 &amp; 12.3 shall apply for foundation work (except items mentioned in earth work subhead in DSR and related items) .....</p> <p>(ii) Deviation Limit for items mentioned in earth work subhead of DSR and related items .....</p>	<p>(i) Deviation Limit beyond which clauses 12.2 (c) shall apply for foundation work (except items mentioned in earth work subhead in DSR and related items) .....</p> <p>(ii) Deviation Limit for items mentioned in earth work subhead of DSR and related items .....</p>
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This OM is applicable for all NITs issued w.e.f. date of issue of this OM. This issues with the approval of DG CPWD.

*[Signature]*  
06.12.2023  
**(V.P. Sahu)**

**Superintending Engineer (C&M)**

Issued from file No. CSQ/CM/17(1)/Construction/2023 e-file no 9163323  
All CPWD and PWD officers for information and necessary action.  
(Through CPWD website.

*[Signature]*  
06/11/2023  
**R.K. JAIN**  
**(EE (Contact))**

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

No. DG/CON/Construction 2023/04

ISSUED BY THE AUTHORITY OF DIRECTOR GENERAL, CPWD

Nirman Bhawan, New Delhi

Dated: 08.12.2023

**Subject: Modifications in Conditions of Contract, Clause 5 and schedule F in clause 5 of GCC 2023 Construction Works**

The following amendments are made in the GCC 2023 for Construction works.

Existing Provision	Modified Provision
<p><b>CONDITIONS OF CONTRACT</b></p> <p><b>Definitions</b></p> <p>2. In the contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:-</p> <p>(i) to (xvii)</p> <p>(xviii) No provision</p>	<p><b>CONDITIONS OF CONTRACT</b></p> <p><b>Definitions</b></p> <p>2. No change:-</p> <p>(i) to (xvii) No Change</p> <p><b>(xviii) Concurrent delay: Concurrent delays are those delays occurring in the work concurrently in any combination or combination of all delay fall under different sub clauses 5.2, 5.3 and 5.5.</b></p>
<p><b>Clause 5 Time and Extension for Delay</b></p> <p>The time allowed for execution of the Works as specified in the Schedule 'F' or the extended time in accordance with these conditions shall be the essence of the Contract. The execution of the work shall commence from such time period as mentioned in schedule 'F' or from the date of handing over of the site, notified by the Engineer-in-Charge, whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid, the performance guarantee shall be forfeited by the Engineer in Charge and shall be absolutely at the disposal of the Government without prejudice to any other right or remedy available in law.</p>	<p><b>Clause 5 Time and Extension for Delay</b></p> <p>The time allowed for execution of the Works as specified in the Schedule 'F' or the extended time in accordance with these conditions shall be the essence of the Contract. The execution of the work shall commence from such time period as mentioned in schedule 'F' or from the date of handing over of the site, notified by the Engineer-in-Charge, whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid <b>and such default continues even after time period specified in the notice in writing by the Engineer-in-Charge</b> then the performance guarantee shall be forfeited by the Engineer-in-Charge and shall be absolutely at the disposal of the Government without prejudice to</p>

21/12/23  
R.K. JAIN  
(EE (Contact))

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CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

	<p>any other right or remedy available in law.  <b>The contract shall stand determined when such decision of forfeiture of the performance guarantee is issued to the contractor.</b></p>
<p>5.1 As soon as possible but within 7 (seven) working days of award of work and in consideration of</p> <p>a. Schedule of handing over of site as specified in the Schedule 'F'</p> <p>b. Schedule of issue of designs as specified in the Schedule 'F',</p> <p>i. the Contractor shall submit a Time and Progress Chart for each mile stone. The Engineer-in-Charge may within 7 (seven) working days thereafter, if required modify, and communicate the program approved to the contractor failing which the program submitted by the contractor shall be deemed to be approved by the Engineer-in-Charge. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the Contract documents.</p> <p>ii. In case of non-submission of construction programme by the contractor, the program approved by the Engineer-in-Charge shall be deemed to be final.</p>	<p>5.1 <b>The contractor</b> as soon as possible but within 7 (seven) days of <b>issue of letter of award of work shall submit a time and progress chart to the Engineer-in-Charge. Such chart shall be made in due</b> consideration of</p> <p>a. Schedule of handing over of site as specified in the Schedule 'F'</p> <p>b. Schedule of issue of design(s) and <b>drawing(s)</b> as specified in the Schedule 'F',</p> <p>i. The Contractor shall submit a Time and Progress Chart for each milestone. The Engineer-in-Charge may within 7 (seven) days of <b>receipt of such chart, make modifications thereafter, if any,</b> and communicate the approved <b>chart</b> to the contractor, failing which the <b>chart</b> submitted by the contractor shall be deemed to be approved by the Engineer-in-Charge. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the Contract documents.</p> <p>ii. In case of non-submission of <b>time and progress chart</b> by the contractor, the <b>chart prepared by the</b> Engineer-in-Charge shall be deemed to be final.</p>

21/11/2023  
 R.K. JAIN  
 (EE (Contact))

<p>iii. The approval by the Engineer-in-Charge of such programme shall not relieve the contractor of any of the obligations under the contract.</p> <p>iv. The contractor shall submit the Time and Progress Chart and progress report using the mutually agreed software or in other format decided by Engineer-in-Charge for the work done during previous month to the Engineer-in-charge on or before 5th day of each month failing which a recovery as per Schedule F to be decided by the NIT approving authority shall be made on per week or part basis in case of delay in submission of the monthly progress report</p> <p>v. <b>No provision</b></p>	<p>iii. The approval by the Engineer-in-Charge of such programme shall not relieve the contractor of any of the obligations under the contract.</p> <p>iv. The contractor shall submit the Time and Progress Chart <b>containing upto date progress of work</b> using the mutually agreed software or in the format decided by Engineer-in-Charge. <b>Such chart shall be submitted by the contractor on or before 5<sup>th</sup> day of each month failing which a recovery as mentioned in Schedule 'F' shall be made at the earliest from running account bill without any notice in this regard.</b></p> <p>v. <b>While recording the hindrances in the progress of the work, due consideration should be given to the cause of hindrance. The hindrances shall be segregated in following categories :</b></p> <p>a) <b>delays due to reasons beyond the control of both parties (sub-clause 5.2)</b></p> <p>b) <b>delays attributable to the Department and concurrent delays (sub-clause 5.3).</b></p> <p>c) <b>delays solely attributable to the contractor (sub-clause 5.5)</b></p>
<p><b>5.2</b></p> <p>If the work(s) be delayed by:-</p> <p>i. force majeure, or</p> <p>ii. abnormally bad weather, or</p> <p>iii. serious loss or damage by fire, or</p> <p>iv. civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or</p> <p>v. delay on the part of other contractors or tradesmen engaged by Engineer-in-Charge in</p>	<p><b>5.2 Delays due to reasons beyond the control of both parties:</b></p> <p>If the work(s) delayed by:-</p> <p>i. force majeure, or</p> <p>ii. abnormally bad weather, or</p> <p>iii. serious loss or damage by fire, or</p> <p>iv. civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or</p> <p>v. delay on the part of other contractors or tradesmen engaged by Engineer-in- Charge in</p>

  
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<p>executing work not forming part of the Contract, or vi. any other cause like above which, in the reasoned opinion of the Engineer-in-Charge is beyond the Contractor's control</p>	<p>executing work not forming part of the Contract, or vi. any other cause like above which, in the reasoned opinion of the Engineer-in-Charge is beyond the Contractor's control.</p>
<p>Then upon the happening of any such event causing delay, the contractor shall immediately give notice thereof in writing to the Engineer-in-Charge but shall nevertheless use constantly his best endeavours to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the works.</p>	<p>Then upon the happening of any such event causing delay, the contractor shall <b>within 03 (three) days</b> give <b>online</b> notice thereof <b>through ERP Portal</b> to the Engineer-in-Charge but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the work(s).</p> <p><b>The contractor shall have no claim on account of any hindrance in case notice(s) are not given by the contractor through ERP portal.</b></p> <p><b>The Engineer-in-Charge, on receipt of such notice(s) after considering the factual ground situation, shall either acknowledge or reject the notice(s)</b></p> <p><b>In case of rejection, the reason(s) for rejection shall be communicated by Engineer-in-Charge to the agency.</b></p> <p><b>The decision of Engineer-in-Charge with regard to nature of event causing delay, its start date and end date, as has been finalized during acknowledgement of notice, shall be final and binding.</b></p> <p><b>The end date of such events shall be recorded by Engineer-in-Charge either during acknowledgment of notice or subsequent to acknowledgement if end date of hindrance is after the date of acknowledgement of notice.</b></p> <p><b>In absence of notice by the contractor, Engineer-in-Charge or his representative(s) may record the events causing delay within 05 (five)</b></p>

  
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CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

	<p><b>days of occurrence of hindrance on ERP portal provided further that not recording of events causing delay by the Engineer-in-Charge does not ipso facto entitle the contractor for any hindrance.</b></p>
<p>The contractor shall have no claim of damages for extension of time granted or rescheduling of milestone/s for events listed in sub clause 5.2.</p>	<p><b>No change.</b></p>
<p><b>5.3</b></p> <p>In case the work is hindered in the opinion of the contractor, by the Department or for any reason / event, for which the Department is responsible, the authority as indicated in Schedule 'F' shall, if justified, give a fair and reasonable extension of time and reschedule the mile stones for completion of work.</p>	<p><b>5.3 Delays attributable to the department</b></p> <p>In case the work is hindered, in the opinion of the contractor, by the Department or for any reason / event, for which the Department is responsible, <b>then upon the happening of such event causing delay, the Contractor shall within 3 (three) days give online notice there of through ERP Portal to the Engineer-in-Charge but shall nevertheless use constantly his best endeavours to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the work.</b></p> <p><b>The contractor shall not be entitled for any hindrance in case notice(s) are not given by the contractor through ERP portal.</b></p> <p><b>The Engineer-in-Charge, on receipt of such notice(s) after considering the factual ground situation, shall either acknowledge or reject the notice(s).</b></p> <p><b>In case of rejection, the reason(s) for rejection shall be communicated by Engineer-in-Charge to the agency.</b></p> <p><b>The decision of Engineer-in-Charge with regard to nature of event causing delay, its start date and end date, as has been finalized during acknowledgement of notice, shall be final and binding.</b></p>

  
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	<p>The end date of such events shall be recorded by Engineer-in-Charge either during acknowledgment of notice or subsequent to acknowledgment if end date of hindrance is after the date of acknowledgement of notice.</p> <p>In absence of notice by the contractor, Engineer-in-Charge or his representative(s) may record the events causing delay within 05 (five) days of occurrence of hindrance on ERP portal provided further that not recording of events causing delay by the Engineer-in-Charge does not ipso facto entitle the contractor for any hindrance.</p>
<p>Such extension of time or rescheduling of milestone/s shall be without prejudice to any other right or remedy of the parties in contract or in law, provided further that for concurrent delays under this sub clause and sub clause 5.2 to the extent the delay is covered under sub clause 5.2 the contractor shall be entitled to only extension of time and no damages.</p>	<p>Such extension of time or rescheduling of milestone(s) shall be without prejudice to any other right or remedy of the parties in contract or in law, provided further that for concurrent delay(s) under this sub clause and sub clause 5.2 to the extent the delay is covered under sub clause 5.2, the contractor shall be entitled to only extension of time and <b>shall have no claim of damages.</b></p>
<p>5.4</p> <p>Request for rescheduling of Mile stones or extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen days of the happening of the event causing delay on the prescribed forms i.e. Form of application by the contractor for seeking rescheduling of milestones or Form of application by the contractor for seeking extension of time (Appendix - XVI) respectively to the authority as indicated in Schedule 'F'. The Contractor shall indicate in such a request the period by which rescheduling of milestone/s or extension of time is desired.</p>	<p><b>5.4 Rescheduling of milestone(s) and 'extended date of completion'</b></p> <p>The request for rescheduling of Milestone(s) and extension of time, shall be made by the Contractor <b>through ERP Portal once in a month on the basis of hindrances accepted by Engineer-in-Charge under sub-clause 5.2 and sub-clause 5.3.</b> The Contractor shall indicate in such a request <b>number of days</b> by which rescheduling of milestone(s) and/or extension of time is desired.</p>
<p>With every request for rescheduling of milestones, or if at any time the actual progress of work falls behind the approved programme by more than 10% of the stipulated period of completion of contract, the contractor shall produce a revised programme without causing any delay in execution</p>	<p><b>Deleted</b></p>

  
**R.K. JAIN**  
 18/04/2023  
 (EE (Contact))

<p>of the work. A recovery as specified in Schedule 'F' shall be made on per day basis in case of delay in submission of the revised programme.</p> <p><b>No provision</b></p>	<p>The authority as indicated in Schedule 'F', after examining the request, shall give a fair and reasonable extension of time for completion of work and simultaneously reschedule the milestone(s), if required so. The authority shall consider all the hindrances accepted as per sub-clauses 5.2, 5.3 and 5.5.</p> <p>The authority shall decide rescheduling of milestone(s) and extension of time within 21 (Twenty One) days of the request submitted by the contractor through ERP portal. In event of no request by the contractor for rescheduling of milestone(s) and extension of time, the authority as indicated in Schedule F, after affording opportunity to the contractor, may give fair and reasonable extension of time based on hindrances accepted by Engineer-in-Charge and reschedule the milestone(s) once in a month. Such justified extension of time shall determine the 'extended date' of completion of work.</p>
<p>5.4.1 In any such case the authority as indicated in Schedule 'F' may give a fair and reasonable extension of time for completion of work or reschedule the mile stones.</p> <p>E-in-C shall finalize/ reschedule a particular mile stone before taking an</p>	<p>5.4.1 Provided that the end date of any event causing delay shall not fall beyond the date of request for extension of time or rescheduling of milestone(s) by the contractor. In case end date of event falls beyond the date of submission of said request, then period for extension up to date of application shall be considered in the said request for events eligible for consideration and remaining period shall be applied in subsequent request of extension of time or rescheduling of milestone(s).</p> <p><b>Engineer-in-Charge</b> shall finalize/ reschedule a particular mile stone</p>

21/11/2023  
 R.K. JAIR  
 (EE (Conta


<p>action against subsequent mile stone. Such extension or rescheduling of the milestones shall be communicated to the Contractor by the authority as indicated in Schedule 'F' in writing, within 21 days of the date of receipt of such request from the Contractor in prescribed form. In event of non-application by the contractor for extension of time E-in-C after affording opportunity to the contractor, may give, supported with a programme (as specified under 5.4 above), a fair and reasonable extension within a reasonable period of occurrence of the event.</p>	<p>before taking an action against subsequent mile stone. Such extension or rescheduling of the milestones shall be communicated to the Contractor by the authority as indicated in 'Schedule 'F' in writing, within 21 <b>(twenty one)</b> days of the date of receipt of such request from the Contractor <b>on ERP Portal.</b></p>
<p>5.5</p> <p>In case the work is delayed by any reasons, in the opinion of the Engineer- in-Charge, by the contractor for reasons beyond the events mentioned in clause 5.2 or clause 5.3 or clause 5.4 and beyond the justified extended date, without prejudice to right to take action under Clause 3, the Engineer-in-Charge may grant extension of time required for completion of work without rescheduling of milestones. The contractor shall be liable for levy of compensation for delay for such extension of time.</p>	<p><b>5.5 Delays attributable solely to the contractor</b></p> <p><b>In case the work is delayed by reasons solely attributable to the contractor, then Engineer-in-Charge or his representative(s) may record the event causing delay within 05 (five) days of occurrence of delay in the ERP portal. Contractor shall take the notice of the same for necessary action. He may submit his version, if any within 05 (Five) days. Engineer-in-Charge, considering the version of the contractor, will take decision on such recording of the event and the decision of the Engineer-in-Charge shall be final and binding.</b></p> <p>The contractor shall be liable for levy of compensation for such delays (i.e. for the period beyond the justified extended date of completion as determined in sub clause 5.4 and this default of contractor shall be dealt in conjunction with clause 2 of the contract.</p> <p>In case the work is delayed, due to hindrances attributable solely to the contractor, beyond the justified extended date (as stated in sub clause 5.4), the authority indicated in Schedule 'F', without prejudice to provisions to take action under Clause 3, may grant extension of</p>

  
**R.K. JAIN**  
 (EE (Contact))

<p><b>PROFORMA OF SCHEDULES</b> (Separate Performa for Civil, Elect.&amp; Hort. Works in case of Composite Tenders)</p> <p><b>SCHEDULE 'F'</b></p> <p><b>Clause 5</b> <b>Authority to decide:</b></p> <p>i. Extension of time ..... (Engineer in Charge or Engineer in Charge of Major Component in case of Composite Contracts, as the case may be)</p> <p>ii. Rescheduling of mile stones ..... (Superintending Engineer/ PM/CPM in Charge or Superintending Engineer/ PM/CPM in Charge of Major Component in case of Composite Contracts, as the case may be)</p> <p>iii. Shifting of date of start in case of delay in handing over of site ..... (Superintending Engineer/ PM/CPM in Charge or Superintending Engineer in Charge of Major Component in case of Composite Contracts, as the case may be)</p>	<p><b>time required for completion of work without rescheduling of milestone(s) and extend the date of completion.</b></p> <p><b>PROFORMA OF SCHEDULES</b> (Separate Performa for Civil, Elect. &amp; Hort. Works in case of Composite Tenders)</p> <p><b>SCHEDULE 'F'</b></p> <p><b>Clause 5</b></p> <p>i. <b>Authority to convey the decision of shifting of milestone and extension of time</b> ..... (Engineer-in-Charge or Engineer-in-Charge of Major Component in case of Composite Contracts, as the case may be)</p> <p>ii. <b>Authority to decide rescheduling of milestone and extension of time</b> ..... (SE/SE&amp;PD/CE/ CE&amp;ED).</p> <p>iii. Shifting of date of start in case of delay in handing over of site ..... (SE/SE&amp;PD/CE/CE&amp;ED).</p>
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This OM is applicable for all NITs uploaded after date of issue of this OM.

This is issued with the approval of DG CPWD.

  
08.12.2023  
(वी. पी. साहू)

अधीक्षण अभियंता (सी.एंड एम.)

Issued from file No. CSQ/CM/17(1)/2023/ Construction e-file 9161772

के.लो.नि.वि. तथा लो.नि.वि. दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु (के.लो.नि.वि.वेबसाईट के माध्यम से)।

  
R.K. JAIN  
(Contact)

Page 9 of 9

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

**No. DG/CON/Construction 2023/05**

ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD

**NIRMAN BHAWAN, NEW DELHI**

**Dated: 08.02.2024**

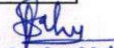
**Subject: Modifications in Conditions of Contract and Clause 19 of GCC 2023 for Construction Works**

The following amendments are made in the GCC 2023 for Construction Works:

<b>Existing provision</b>	<b>Modified provision</b>
<p><b>CONDITIONS OF CONTRACT</b> <b>Definitions</b> 2. In the contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:-</p> <p>(i) to (xviii)</p> <p>(xix) No provision</p> <p>(xx) No provision</p>	<p><b>CONDITIONS OF CONTRACT</b> <b>Definitions</b> 2. In the contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:-</p> <p>(i) to (xviii) No change</p> <p>(xix) Adolescent Person: A person who has completed his/her fourteenth year of age but has not completed his eighteenth year.</p> <p>(xx) Hazardous works: Hazardous process/works are the works as defined in the clause (cb) of the Factory Act, 1948.</p>
<p><b>Clause 19 Labour Laws to be complied by the Contractor</b></p> <p>The contractor shall comply with the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971.</p> <p>The contractor shall also obtain a valid licence under the said Act before the commencement of the work, and continue to have a valid licence until its completion.</p> <p>The contractor shall also comply with provisions of the Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979.</p>	<p><b>Clause 19 Labour Laws to be complied by the Contractor</b></p> <p>No change</p> <p>No change</p> <p>No change</p>

<p>The contractor shall also abide by the provisions of the Child and Adolescent Labour (Prohibition and Regulation) Act, 1986.</p> <p>The contractor shall also comply with the provisions of the building and other Construction Workers (Regulation of Employment &amp; Conditions of Service) Act, 1996 and the building and other Construction Workers Welfare Cess Act, 1996.</p> <p>Any failure to fulfil these requirements shall attract the penal provisions of this contract arising out of the resultant non-execution of the work.</p>	<p>The contractor shall also abide by the provisions of the Child and Adolescent Labour (Prohibition and Regulation) Act, 1986, <b>amended by Amendment Act No. 35 of 2016 and thereafter time to time.</b></p> <p><b>No change</b></p> <p><b>No change</b></p>
<p>Clause 19A</p> <p>No labour below the age of eighteen years shall be employed on the work.</p>	<p>Clause 19A</p> <p>No <b>person</b> below the age of <b>fourteen</b> years shall be employed on the work. <b>However Adolescent Persons can be employed on non-hazardous works/process.</b></p>
<p><b>C.P.W.D. Contractor's Labour Regulations</b> <b>2. DEFINITIONS</b></p> <p>i. (c) Who is an out worker, that is to say, person to whom any article or materials are ..... premises under the control and management of the principal employer.</p> <p>No person below the age of 18 years shall be employed to act as a workman.</p>	<p><b>C.P.W.D. Contractor's Labour Regulations</b> <b>2. DEFINITIONS</b></p> <p>i. (c) No change.</p> <p>No person below the age of <b>fourteen</b> years shall be employed <b>on the work. However Adolescent Persons can be employed on non-hazardous works/process.</b></p>

This issues with the approval of DG CPWD.

  
08.02.2024  
(वी. पी. साहू)

अधीक्षण अभियंता(सी.एंड एम.)

**Issued from file No. CSQ/CM/17(1)/2023/Construction e-file 9169019**  
केलोनवि तथा लोनवि दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु।  
(केलोनवि वेबसाईट के माध्यम से)

**Central Public Works Department  
Office Memorandum**

**No. DG/CON/Construction 2023/06**

ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD 01.03.2024

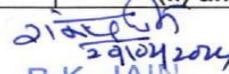
**NIRMAN BHAWAN, NEW DELHI**

**Dated: 20.02.2024**

**Subject: Modifications in Conditions of Contract, Clause 19 and 20 of GCC 2023 for Construction Works**

The following amendments are made in the GCC 2023 for Construction Works:

<b>Existing provision</b>	<b>Modified provision</b>
<p align="center"><b>CONDITIONS OF CONTRACT</b></p> <p><b>Definitions</b>  <b>9. Signing of Contract:-</b> The successful tenderer/contractor, on acceptance of his tender by the Accepting Authority, shall, within 15 days from the stipulated date of start of the work, sign the contract consisting of:-</p> <p>(i) to (iii)</p> <p>No Provision</p>	<p align="center"><b>CONDITIONS OF CONTRACT</b></p> <p><b>Definitions</b>  <b>9. Signing of Contract:-</b> The successful tenderer, on acceptance of his tender by the Accepting Authority, shall, within 15 days from the stipulated date of start of the work, sign the contract consisting of:-</p> <p>(i) to (iii) No change</p> <p><b>In the event of successful tenderer being a firm/company, then the agreement shall be signed by all the partners or directors thereof individually. In the event of the absence of any partner/director, it shall be signed on his behalf by a person holding a power of attorney (duly notarized by notary public or board resolution in case of company) authorizing him to do so.</b></p>
<p align="center"><b>Clause 19 B Payment of Wages</b></p> <p>(i) The contractor shall pay to labour employed by him either directly or through subcontractors, wages not less than fair wages as defined in the C.P.W.D. Contractor's Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.</p>	<p align="center"><b>Clause 19 B Payment of Wages</b></p> <p>(i) The contractor shall pay to labour employed by him either directly or through subcontractors, wages not less than fair wages as defined in the C.P.W.D. Contractor's Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the contract Labour (Regulation and Abolition) Central Rules, 1971 <b>and Gazette Notification 19.01.2017, S.O 188 (E) extra ordinary part 2 – sec. 3 (ii) amended time to time.</b></p>

  
 29/02/2024  
**R.K. JAIN**  
 (EE (Contract))

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

<p>(v) The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits Act, 1961, and the Contractor's Labour (Regulation and Abolition) Act 1970, or the modifications thereof or any other laws relating thereto and the rules made there under from time to time.</p>	<p>Thus higher of the wages either notified by Govt. of India, Ministry of Labour and/or that notified by the local administration of the State Govt. both relevant to the place of work and the period of reckoning shall be paid by the contractor to the labourer .</p> <p>(v) The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits Act, 1961, and the Contractor's Labour (Regulation and Abolition) Act 1970, <b>Gazette Notification 19.01.2017, S.O 188 (E) extra ordinary part 2 – sec. 3 (ii) and</b> or the modifications thereof or any other laws relating thereto and the rules made there under from time to time.</p>
<p><b>Clause 20 Minimum Wages Act to be Complied With</b></p> <p>The contractor shall comply with all the provisions of the Minimum Wages Act, 1948, and Contract Labour (Regulation and Abolition) Act, 1970, amended from time to time and rules framed there under and other labour laws affecting contract labour that may be brought into force from time to time.</p>	<p><b>Clause 20 Minimum Wages Act to be Complied With</b></p> <p>The contractor shall comply with all the provisions of the Minimum Wages Act, 1948, and Contract Labour (Regulation and Abolition) Act, 1970, <b>Gazette Notification 19.01.2017, S.O 188 (E) extra ordinary part 2 – sec. 3 (ii)</b> amended from time to time and rules framed there under and other labour laws affecting contract labour that may be brought into force from time to time.</p>

This issues with the approval of DG CPWD.

*[Signature]* 01.03.2024  
(V.P. Sahu)

Superintending Engineer (C&M)

Issued from file No. CSQ/CM/17(1)/2023 e-file no. 9163323

To all the concerned officers of CPWD/PWD for information and necessary action please. (Through CPWD Website)

*[Signature]*  
R.K. JAIN 24/2/2024  
(C&M)

**Central Public Works Department  
Office Memorandum**

**No. DG/CON/Construction 2023/07**

**ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD**

**NIRMAN BHAWAN, NEW DELHI**

**Dated: 01.03.2024**

**Subject: Modifications in Clause 7 of GCC 2023 for Construction Works**

The following amendments is made in the GCC 2023 for Construction Works :

<b>Existing provision</b>	<b>Modified provision</b>
<p><b>Clause 7 Payment on intermediate certificate to be regarded as Advances</b></p> <p>No payment shall be made for work, estimated to cost Rs. twenty lacs or less till after the whole of the work shall have been completed and certificate of completion given. .... fixed for the same by the Engineer-in-Charge.</p>	<p><b>Clause 7 Payment on intermediate certificate to be regarded as Advances</b></p> <p>No change.</p>
<p>The contractor shall not be entitled to be paid any such interim payment if the gross work done together with net payment/ adjustment of advances for material collected, if any, since the last such payment is less than the amount specified in Schedule 'F', in which case the interim bill shall be prepared on the appointed date of the month after the requisite progress is achieved.</p>	<p>The contractor shall not be paid any such interim payment if the gross work done together with net payment/ adjustment of advances for material collected, if any, since the last such payment is less than the amount specified in Schedule 'F', in which case the interim bill shall be prepared on the appointed date of the month after the requisite progress is achieved.</p>
<p>No provision</p>	<p>However, to expedite the progress of work, Engineer-in-Charge, on the request of contractor, may make interim payment(s) even before the net payment limit specified in schedule 'F' is achieved. In such case(s) no interest / compensation shall be recoverable from contractor.</p> <p>Such payment by Engineer-in-Charge shall not be construed as waiver of limit specified in schedule 'F' for subsequent interim payment(s).</p>

  
**R.K. JAIN**  
 (EE (Contact))

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

Engineer-in-Charge shall arrange to have the bill verified by taking or causing to be taken, ..... prescribed time limit.	<b>No Change</b>
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This issues with the approval of DG CPWD.

*V.P. Sahu*  
01/03/2024  
(V.P. Sahu)

Superintending Engineer (C&M)

Issued from file No. CSQ/CM/17(1)/2023/Const. e-file no. 9135972

To all the concerned officers of CPWD/PWD for information and necessary action please. (Through CPWD Website)

*R.K. Jain*  
01/03/2024  
R.K. JAIN  
(EE (Contact))

**Central Public Works Department  
Office Memorandum**

**No. DG/CON/Construction 2023/08**

ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD

**NIRMAN BHAWAN, NEW DELHI**

**Dated: 05.03.2024**

**Subject: Modifications in Clause 19 of GCC 2023 for Construction Works**

The following amendments are made in the GCC 2023 for Construction Works:

<b>Existing provision</b>	<b>Modified provision</b>
<p><b>Clause 19 Labour Laws to be complied by the Contractor</b></p> <p>The contractor shall comply with the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971.</p> <p>The contractor shall also obtain a valid licence under the said Act before the commencement of the work, and continue to have a valid licence until its completion.</p> <p>The contractor shall also comply with provisions of the Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979.</p> <p>The contractor shall also abide by the provisions of the Child and Adolescent Labour (Prohibition and Regulation) Act, 1986, amended by Amendment Act No. 35 of 2016 and thereafter time to time.</p> <p>The contractor shall also comply with the provisions of the building and other Construction Workers (Regulation of Employment &amp; Conditions of Service) Act, 1996 and the building and other Construction Workers Welfare Cess Act, 1996.</p>	<p><b>Clause 19 Labour Laws to be complied by the Contractor</b></p> <p><b>No change</b></p> <p><b>No change</b></p> <p><b>No change</b></p> <p><b>No change.</b></p> <p><b>No change</b></p>

  
**R.K. JAIN**  
 (EE (Contact))

CORRECTIONS - NIL


OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

<p>No provision</p> <p>Any failure to fulfill these requirements shall attract the penal provisions of this contract arising out of the resultant non-execution of the work.</p>	<p>The contractor shall also comply with the provisions of Sexual Harassment of Women at Workplace (Prevention Prohibition and Redressal) Act, 2013 and amendment thereafter time to time.</p> <p>Any failure to fulfil these requirements shall attract the penal provisions of the relevant act and in this contract</p>
<p><b>Clause 19 M</b></p> <p><b>No Provision</b></p>	<p><b>Clause 19 M Sexual Harassment of Women at Workplace</b></p> <p>The contractor shall comply with all provision(s) and guideline(s) of Sexual Harassment of Women at Workplace (Prevention Prohibition and Redressal) Act, 2013 and amendment thereafter time to time or any other rules framed under any labour law affecting women worker(s).</p>

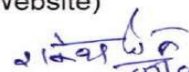
This issues with the approval of DG CPWD.

  
 05.03.2024  
 (V.P. Sahu)

Superintending Engineer (C&M)

Issued from file No. CSQ/CM/17(1)/2023 e-file no. 9163323

To all the concerned officers of CPWD/PWD for information and necessary action please. (Through CPWD Website)

  
 05/03/2024  
**R.K. JAIN**  
 (EE (Contact))

1/2

**Central Public Works Department  
Office Memorandum**

**No. DG/CON/Construction 2023/09**

ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD

**NIRMAN BHAWAN, NEW DELHI**

Dated: 01.04.2024

**Subject: Modifications in Clause 1, 8 and 41 of GCC 2023 for  
Construction Works**

The following amendments are made in the GCC 2023 for Construction Works:

Existing provision	Modified provision
<b>Clause 1 Performance Guarantee</b>	<b>Clause 1 Performance Guarantee</b>
Sl. No. (i) to (iv)	Sl. No. (i) to (iv) <b>No Change</b>
(v) On substantial Completion of any work which has been completed to such an extent that the intended purpose of the work is met and ready to use, then a provisional Completion certificate shall be recorded by the Engineer-in-Charge. The provisional certificate shall have appended with a list of outstanding balance item of work that need to be completed in accordance with the provisions of the contract.	(v) <b>As per requirement of the client or otherwise specified in the contract, part completion certificate may be issued for the building(s)/ infrastructure project for the part(s) which have been completed in all respect and are ready for use. However, statutory approvals, Completion drawing of various services, wherever required, shall be obtained before handing over of building(s)/ part(s) of the project. Scope of the completed part(s) shall be mentioned in such part completion certificate.</b>
This provisional completion certificate shall be recorded by the concerned Engineer-in-charge with the approval of Superintending Engineer /Project Manager / Chief Engineer/ Chief Project Manager, if required. After recording of the provisional Completion Certificate for the work by the competent authority, the 80 % of performance guarantee shall be returned to the contractor, without any interest.	The <b>part completion</b> certificate shall <b>include</b> outstanding balance work that need to be completed in accordance with the provisions of the contract. This <b>part</b> completion certificate shall be recorded by the <b>authority as per contract value of work</b> . After recording of the <b>part</b> Completion Certificate for the work by the competent authority, the <b>proportionate amount of 80%</b> of performance guarantee shall be returned to the contractor, without any interest.
However in case of contracts involving Maintenance of building and services /any other work after construction of same building and services/ other work, then 40% of performance guarantee shall be returned to the contractor, without any interest after recording the provisional Completion certificate.	However in case of contracts involving Maintenance of building and services /any other work after construction of same building and services/ other work, then <b>proportionate amount of 40%</b> of performance guarantee shall be returned to the contractor, without any interest after recording the <b>part</b> Completion certificate.

R.K. JAIN 04/2024  
EE (Contract)

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

22

<p><b>Clause 8 Completion Certificate</b></p> <p>Within ten days of the completion of the work, the contractor shall give notice of such completion to the Engineer-in-Charge and within thirty days of the receipt of such notice, the Engineer-in-Charge shall inspect the work and if there is no defect in the work, shall furnish the contractor with a final certificate of completion, otherwise a provisional certificate of physical completion indicating defects (a) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates, shall be issued.</p>	<p><b>Clause 8 Completion Certificate</b></p> <p>Within ten days of the completion of the work <b>or on part completion of one or more building(s) out of independent building in a project or infrastructure project, as per requirement of client or otherwise specified in schedule F</b>, the contractor shall give notice of such completion to the Engineer-in-Charge and within thirty days of the receipt of such notice, the Engineer-in-Charge shall inspect the work and shall furnish the contractor with a <b>part or final completion certificate as the case may be</b>, indicating defects (a) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates.</p>
<p>But no final certificate ..... sum actually realized by the sale thereof.</p>	<p>No change.</p>
<p><b>Clause 41</b> <b>Release of Security deposit after labour clearance</b> The Security Deposit ..... security deposit and refund the balance amount.</p>	<p><b>Clause 41</b> <b>Release of Security deposit after labour clearance</b> No change.</p>
<p>No Provision</p>	<p><b>In case, if part completion certificate of work is recorded then security deposit shall be released only after recording final completion certificate of the work and after completion of defect liability period whichever is later or specified otherwise in the contract.</b></p>

This issues with the approval of DG CPWD.

*Sahu*  
01.04.2024  
(V.P. Sahu)

Superintending Engineer (C&M)

**Issued from file No. CSQ/CM/17(1)/2023/Construction e-file 9163323**

All CPWD and PWD officers for information and necessary action.(Through CPWD website)

*R.K. JAIN*  
04/2024  
EE (Contract)

**Central Public Works Department  
Office Memorandum**

**No. DG/CON/Construction 2023/10**

ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD

**NIRMAN BHAWAN, NEW DELHI**

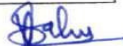
Dated: 03-06-2024

**Subject: Modifications in Clause 36 of GCC 2023 for Construction Works**

The following amendment is made in the Clause 36 of GCC 2023 for Construction Works:

Existing provision	Modified provision
<p><b>Clause 36 If relative working in CPWD then the contractor not allowed to tender</b></p> <p>The contractor shall not be <i>permitted</i> to tender for works in the CPWD circle (<i>Division in case of contractors of Horticulture/Nursery categories</i>) 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 the <i>Superintending Engineer</i> and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working <i>with him in any capacity</i> or are subsequently employed by him and who are near relatives to any <i>Gazetted Officer in the C.P.W.D. or in the Ministry of Housing and Urban Affairs</i>. Any breach of this condition by the contractor would render him liable to be <i>removed from the approved list of contractors of this Department. If however the contractor is registered in any other department, he shall be debarred from tendering in CPWD for any breach of this condition.</i></p>	<p><b>Clause 36 If relative working in CPWD then the contractor is not allowed to participate in the tendering process</b></p> <p>The contractor (<b>enlisted or non-enlisted in CPWD</b>) shall not be <b>allowed to participate in the tender</b> for work(s) in the CPWD Zone/circle /Division/Sub-Division responsible for award and/or execution of contract(s) in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of the <b>Chief Engineer</b> and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working or are subsequently employed by him and who are near relatives to any Officer <b>working</b> in the CPWD. Any breach of this condition by the contractor would render him liable to be <b>debarred for a period upto two years from tendering in CPWD as decided by the accepting authority mentioned in Schedule F and his decision will be excepted from clause 25.</b></p>
<p>NOTE: By the term "near relatives" is meant wife, husband, parents and grandparents, children and grandchildren, brothers and sisters, uncles, aunts and cousins and their corresponding in-laws.</p>	<p>No change.</p>

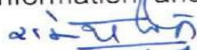
This issues with the approval of DG, CPWD.

  
03.06.2024  
(V.P. Sahu)

Superintending Engineer (C&M)

**Issued from file No. CSQ/CM/17(1)/2023/Construction e-file 9135972**

All CPWD and PWD officers for information and necessary action. (Through CPWD website)

  
R. H. JAIN  
EE (Contract)

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

No. DG/CON/Construction 2023/12  
ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD

**NIRMAN BHAWAN, NEW DELHI**

**Dated: 09.10.2024**

**Subject: Modifications in Clause 10A of GCC 2023 for Construction Works**

The following amendment is made in the Clause 10A of GCC 2023 for Construction Works:

Existing provision	Modified provision
<p><b>Clause 10A Materials to be provided by the contractor</b></p> <p>The contractor shall ..... as specified in Schedule F.</p> <p>No Provision</p>	<p><b>Clause 10A Materials to be provided by the contractor</b></p> <p>(i) No Change</p> <p>(ii) <b>Maintenance of Material at Site (MAS) Register</b></p> <p>(a) MAS register of the key materials including Cement, Steel Bitumen, Paint, Primer, Distemper, Varnishes, Tile Adhesive, Admixture, Anti termite chemical Water proofing compound material and other items as required by Engineer-in-Charge, and shall be maintained as per proforma in Appendix-XX of GCC. All the entries in the MAS registers are made by the designated staff of the contractor and same is reviewed weekly by the authorized representative and fortnightly by the Engineer-in-Charge. However, contractor is responsible for maintenance and safe custody of MAS registers.</p>
<p>(b) No provision</p>	<p>(b) The self-attested copies of tax paid bill of all the materials entered in the MAS register shall be submitted by the contractor at the time of review by representative of Engineer-in-Charge. In case of any doubt, genuineness of the tax paid bills; it can be verified by the representative of the Engineer-in-Charge or the Engineer-in-Charge, however, onus of genuineness of tax paid bills rest with the contractor.</p>

*R K SINGH*  
09.10.24  
R K SINGH  
EE(Manual)

1  
2

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

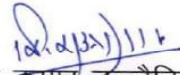
EE/ AE (P)

**Appendix-XX**  
**REGISTER OF MATERIAL AT SITE (MAS)**

1. Division/Sub-division .....
2. Name of Work .....
3. Name of Article/Item .....
4. Estimated Requirements .....

S. No.	Date of Receipts (Details of Challans/ Bills, Specific location where Plants and Materials received/ Vehicle No.	Received from/ Issued to	Quantity Received	Date of issue	Specific location where Plants & Materials Displayed / Delivered / issued	Quantity issued	Balance Quantity	Signature of authorized representative of contractor	Signature of authorized representative of Engineer -in-Charge/ AE/EE/	Remarks
1	2	3	4	5	6	7	8	9	10	

This issues with the approval of DG, CPWD.

  
 (दिनेश कुमार उज्जैनिया)  
 अधीक्षण अभियंता (सी.एंड एम.)

**Issued from file No. CSQ/CM/17(1)/ Construction/2024  
e-file 9184028 (DFA/9301389)**

केलोनिवि तथा लोनिवि दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु।  
(केलोनिवि वेबसाईट के माध्यम से)

  
 09.10.24  
 R K SINGH  
 EE(Manual)

2  
2

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

No. DG/CON/Construction-2023/13

ISSUED BY THE AUTHORITY OF DIRECTOR GENERAL, CPWD

Nirman Bhawan, New Delhi

Dated: 29.10.2024

**Subject: Modifications in Conditions of Contract, Clause 10A of GCC Construction Works 2023.**

Following amendments are made in the GCC Construction Works 2023:-

Existing Provision	Modified Provision
<p><b>Clause 10A: Materials to be provided by the Contractor</b></p> <p>(i) The contractor shall, ..... thereof and in case of default, the Engineer-in-Charge may cause the same to be supplied and all costs which may attend such removal and substitution shall be borne by the Contractor.</p> <p>The contractor shall at his own expense, provide a material testing lab at the site for conducting routine field tests. The lab shall be equipped at least with the testing equipment as specified in schedule F.</p> <p><b>No Provision</b></p>	<p><b>No Change</b></p> <p><b>Field Laboratory:</b> The contractor shall at his own expense, setup a material testing lab equipped with the testing equipment as specified in schedule F at site for conducting routine field test.</p> <p><b>External Laboratory:</b> Letter for submitting sample(s) for testing of material shall be sent through e-mail to the Lab by authorized representative of Engineer-in-Charge or Engineer-in-Charge of the work along with name(s) of test(s) to be done on the material.</p> <p>The contractor shall collect the sample(s) from the site and submit it to the lab; make necessary payment for the testing charges. He will inform on the same day through email to authorized representative of Engineer-in-Charge and Engineer-in-Charge regarding submission of sample (s) and</p>

  
R K SINGH  
EE(Manual)

1

CORRECTIONS - NIL

OMISSIONS - NIL

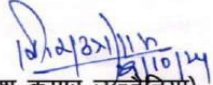
INSERTIONS - NIL

EE/ AE (P)

<b>No Provision</b>	<p>payment made to the lab. If he either fails to collect or submit the sample(s) to the lab within 03 days or in time as prescribed in the specifications, whichever is earlier, the Engineer-in-Charge shall collect and submit the sample(s) and make necessary payment for testing charges to the lab. In such case, Engineer-in-Charge shall make recovery on account of collection and submission of sample(s) to the lab and paid testing charges etc. from the next R/A bill / Final bill of the contractor. This action of Engineer-in-Charge shall be final and binding.</p> <p>If the contractor fails three times in collection and/or submitting sample(s) and/or fails to make payment for testing charges, the contractor shall be debarred from tendering in CPWD for a period of two years.</p>
Sl. no. (ii) (a) and (b)	<b>No change</b>

This OM is applicable for all NITs uploaded after date of issue of this OM.

This is issued with the approval of DG CPWD.

  
 (दिनेश कुमार उज्जैनिया)  
 अधीक्षण अभियंता (सी.एंड एम.)

Issued from file No. CSQ/CM/17(1)/2024/Construction e-file- 9184436 (DFA/9303295)  
 केलोनिवि तथा लोनिवि दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु।  
 (केलोनिवि वेबसाईट के माध्यम से)

  
 29.10.24  
 R K SINGH  
 EE(Manual)

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

No. DG/CON/Construction 2023/14

ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD

**NIRMAN BHAWAN, NEW DELHI**

**Dated: 03.01.2025**

**Subject: Modifications in General Rules and Directions of GCC 2023 for Construction Works.**

The following amendments are made in the General Rules and Directions of GCC 2023 for Construction Works:

Existing provision	Modified provision
<p><b>Applicable for Item Rate Tender only (CPWD - 8)</b> 4 The rates ..... rupee one.</p> <p>In case the lowest tendered amount (worked out on the basis of quoted rate of Individual items) of two or more contractors is same, then such lowest contractors may be asked to submit sealed revised offer quoting rate of each item of the schedule of quantity for all sub sections/sub heads as the case may be, but the revised quoted rate of each item of schedule of quantity for all sub sections/sub heads should not be higher than their respective original rate quoted already at the time of submission of tender. The lowest tender shall be decided on the basis of revised offer.</p> <p>If the revised ..... their tenders. In case of any ..... be forfeited. In case all ..... lowest contractors. Contractor ..... of the work.</p>	<p><b>Applicable for Item Rate Tender only (CPWD - 8)</b> 4 No change</p> <p>In case the lowest tendered amount (worked out on the basis of quoted rate of Individual items) of two or more contractors is same, then such lowest contractors may be asked to submit <b>revised price bid online using e-tender website</b>, quoting rate of each item of the schedule of quantity for all sub sections/sub heads as the case may be, <b>on the revised template which has been sent to them by the Tender Inviting Authority (TIA)</b>, but the revised quoted rate of each item of schedule of quantity for all sub sections/sub heads should not be higher than their respective original rate quoted already at the time of submission of tender. The lowest tender shall be decided on the basis of revised offer.</p> <p>No change</p>
<p><b>Applicable for Percentage Rate Tender only [CPWD- 7]</b> 4B In case the lowest tendered amount (estimated cost <math>\pm</math> amount worked on the basis of percentage above/below) of two or more contractors is same, such lowest contractors will be asked to submit sealed revised offer in the form of letter mentioning percentage above/ below on estimated cost of tender including all sub sections/sub</p>	<p><b>Applicable for Percentage Rate Tender only [CPWD- 7]</b> 4B In case the lowest tendered amount (estimated cost <math>\pm</math> amount worked on the basis of percentage above/below) of two or more contractors is same, such lowest contractors will be asked to submit <b>revised price bid online quoting</b> percentage above/ below on estimated cost of tender including all sub sections/sub heads as the case may</p>

  
R K SINGH  
EE(Manual)

1

CORRECTIONS - NIL

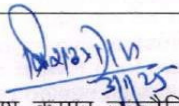
OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

<p>heads as the case may be, but the revised percentage quoted above/below on tendered cost or on each sub section/ sub head should not be higher than the percentage quoted at the time of submission of tender. The lowest tender shall be decided on the basis of revised offers.</p>	<p>be on the revised template which has been sent to them by the Tender Inviting Authority (TIA), but the revised percentage quoted above/below on tendered cost or on each sub section/ sub head should not be higher than the percentage quoted at the time of submission of tender. The lowest tender shall be decided on the basis of revised offers.</p>
<p>In case of any ..... be forfeited. If the revised ..... their tenders. In case all ..... process of the work.</p>	<p>No change</p>

This issues with the approval of DG, CPWD.

  
(दिनेश कुमार उज्जैनिया)  
अधीक्षण अभियंता (सी.एंड एम.)

**Issued from file No. CSQ/CM/17(1)/ Construction/2024  
e-file 9185053 (DFA/9307326)**

केलोनवि तथा लोनवि दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु।  
(केलोनवि वेबसाईट के माध्यम से)

  
R K SINGH  
EE(Manual)

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

**No. DG/CON/ Construction 2023/15**  
**ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD**

**NIRMAN BHAWAN, NEW DELHI**

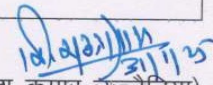
**Dated: 31.01.2025**

**Subject: Modifications in Clause 7A of GCC 2023 for Construction Works.**

The following amendments are made in the Clause 7A of GCC 2023 for Construction Works:

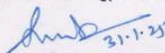
Existing provision	Modified provision
<p><b>Clause 7A</b></p> <p>No Running Account Bill shall be paid for the work till the applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board, whatever applicable are submitted by the contractor to the Engineer-in-Charge.</p>	<p><b>Clause 7A</b></p> <p>(a) No Running Account Bill/<b>Final Bill</b> 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.</p> <p>(b) The following documents shall also be part of the bill submitted by the contractor (these documents shall be owned by the contractor) before making payment:-</p> <ol style="list-style-type: none"> <li>1. Details of person employed with date of their employment up to previous month.</li> <li>2. Documents of payment made to the employees directly into their bank accounts up to previous month.</li> <li>3. Documents of attendance through biometric attendance or other mode up to previous month.</li> <li>4. Documents of deposition of EPF and ESI deductions in the employee's accounts up to previous month.</li> <li>5. Any penalty imposed on the agency for delay in disbursing payment and deposition of EPF and ESI deductions in the employee's accounts up to previous month.</li> <li>6. Any other document(s) required as per statutory requirements and/or as directed by Engineer-in-Charge.</li> </ol> <p>(c) In case, any of the documents submitted by the contractor is found false/forged at a later date, action for debarment of contractor will be taken by the SE/CE concerned.</p>

This issues with the approval of DG, CPWD.

  
(दिनेश कुमार उज्जैनिया)  
अधीक्षण अभियंता (सी.एंड एम.)

**Issued from file No. CSQ/CM/17(1)/2023/Construction e-file 9184028 (DFA/9313089)**

केलोनवि तथा लोनवि दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु।  
(केलोनवि वेबसाईट के माध्यम से)

  
31.1.25  
R K SINGH  
EE(Manual)

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

**No. DG/CON/Construction 2023/16**  
**ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD**

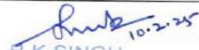
**NIRMAN BHAWAN, NEW DELHI**

**Dated: 10.02.2025**

**Subject: Modifications in Clauses 7, 8, 9 and Schedule F of clause 8 of GCC 2023 for Construction Works.**

The following amendments are made in the Clauses 7, 8, 9 and Schedule F of clause 8 of GCC 2023 for Construction Works:

Existing provision	Modified provision
<p><b>Clause 7</b> Existing provisions</p> <p>No provision</p>	<p><b>Clause 7</b> No change</p> <p><b>In case of correction / rejection / short documents, it will be mandatory for Engineer-in-Charge to give recorded reasons for correction / rejection / submission of additional documents within seven days after submission of running bill by the contractor.</b></p>
<p><b>Clause 8 Completion Certificate (Issued vide OM No. DG/Construction-2023/09 dated 01.04.2024)</b></p> <p>Within ten days of the completion of the work or on part completion of one or more building(s) out of independent building in a project or infrastructure project, as per requirement of client or otherwise specified in schedule F, the contractor shall give notice of such completion to the Engineer-in-Charge and within thirty days of the receipt of such notice, the Engineer-in-Charge shall inspect the work and shall furnish the contractor with a part or final completion certificate as the case may be, indicating defects (a) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates.</p>	<p><b>Clause 8 Completion Certificate</b></p> <p>Within ten days of the completion of the work or on part completion of one or more building(s) out of independent building in a project or infrastructure project, as per requirement of client or otherwise specified in schedule F, the contractor shall give notice of such completion to the Engineer-in-Charge and <b>the Engineer-in-Charge, within seven days of receipt of intimation of completion from contractor will inspect the work and satisfy himself about completion of part /full work, then intimate to the concerned authorities as mentioned in Schedule F for inspection and issuance of part / final completion certificate. The concerned authorities will inspect the work and issue part/final completion certificate within thirty days of the receipt of such intimation. The Engineer-in-Charge shall furnish to the contractor a part / final completion certificate as the case may be, indicating defects (a) to</b></p>

  
R.K SINGH  
EE(Manual)


Page 1 of 3

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

<p>But no final certificate ..... sum actually realized by the sale thereof.</p>	<p>be rectified by the contractor and/or (b) for which payment will be made at reduced rates.</p> <p><b>No change.</b></p>
<p><b>Clause 9 Payment of Final Bill</b></p> <p>The final bill shall be submitted by the contractor in the same manner as specified in interim bills within three months of physical completion of the work or within one month of the date of the final certificate of completion furnished by the Engineer-in-Charge whichever is earlier. No further claims shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payments of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and rates as approved by Engineer-in-Charge, will, as far as possible be made within the period of three months the period being reckoned from the date of receipt of the bill by the Engineer-in-Charge or his authorized Asstt. Engineer, complete with account of materials issued by the Department and dismantled materials.</p> <p style="text-align: right;">   R K SINGH  EE(Manual) </p>	<p><b>Clause 9 Payment of Final Bill</b></p> <ol style="list-style-type: none"> <li>i. The final bill shall be submitted by the contractor <b>to the Engineer-in-Charge</b> in the same manner as specified in interim bills within three months of physical completion of the work or within one month of the date of the final <b>completion</b> certificate furnished by the Engineer-in-Charge whichever is earlier. <b>At the time of submission of the final bill, receipt will be given by the O/o Engineer-in-Charge.</b></li> <li>ii. <b>In case of correction / rejection / short documents, it will be mandatory for Engineer-in-Charge to give recorded reasons for correction / rejection / submission of additional documents within fifteen days after submission of final measurement and/or final bill by the contractor.</b></li> <li>iii. <b>Final bill will be accepted with all pre-requisite documents such as sanctioned copies of extra items and deviation in quantities, escalation statements, recovery statement, theoretical statement, final completion certificate, final extension of time case, mandatory tests statement, dismantled materials account and other documents as mentioned in clause 7A etc.</b></li> <li>iv. <b>An undertaking alongwith the final bill will be submitted by the contractor that "I / we hereby undertake that all the measurements/claims payable under this contract have been included in the final bill and will not submit any other bill/claims in future under this agreement thereafter".</b></li> <li>v. <b>No further claims shall be entertained from the contractor after submission of the final bill and these shall be deemed to have been waived off and extinguished. Payments of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and rates as approved by Engineer in charge will, be made within the</b></li> </ol>

<p>If the final bill is submitted by the contractor within the period specified above and delay in payment of final bills is made by the department after prescribed time limit, a simple interest @ 5 % (five percent) per annum shall be paid to the contractor from the date of expiry of prescribed time limit, provided the final bill submitted by the contractor is found to be in order.</p>	<p>period of three months. The period of <b>three months will be</b> reckoned from the date of receipt of the bill in complete shape after necessary corrections / additional documents, by the Engineer-in-Charge.</p> <p>vi. In case of foreclosure / determination of contract, if the contractor fails to submit the EOT case, final measurement /bills within 30 days of foreclosure/ determination, the EOT case and final bill will be prepared and decided by the department. The final bill shall only be paid after withholding amount equivalent to maximum compensation to be levied on the contractor.</p> <p>vii. If the final bill, in complete shape, is submitted by the contractor within the period specified above and delay in payment of final bill is made by the department after prescribed time limit, a simple interest @5% (five percent) per annum may be paid to the contractor from the date of expiry of prescribed time limit, provided the final bill submitted by the contractor contains all the documents as mentioned in para – (iii) &amp; (iv) above. .</p>
<p><b>Schedule F</b> <b>Clause 8</b>  No Provision</p>	<p><b>Schedule F</b> <b>Clause 8</b> <b>Competent Authorities to inspect and issue part / final completion certificate</b> ..... <b>(To be filled by NIT approving authority).</b></p>

This issues with the approval of DG, CPWD.

10.2.25/114  
10.2.25  
(दिनेश कुमार उज्जैनिया)  
अधीक्षण अभियंता (सी.एंड एम.)

**Issued from file No. CSQ/CM/17(1)/2025/Construction e-file 9190123 (DFA/9315615)**

केलोनवि तथा लोनवि दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु।  
(केलोनवि वेबसाईट के माध्यम से)

10.2.25  
R K SINGH  
EE(Manual)

केन्द्रीय लोक निर्माण विभाग  
कार्यालय ज्ञापन

**No. DG/CON/ Construction 2023/17**  
**ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD**

**NIRMAN BHAWAN, NEW DELHI**

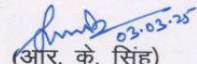
**Dated: 03.03.2025**

**Subject: Modifications in Clause 14 of GCC 2023 for Construction Works 2023.**

The following amendments are made in the Clause 14 of GCC 2023 for Construction Works 2023:

Existing provision	Modified provision
<p><b>Clause 14 Carrying out part work at risk &amp; cost of contractor</b></p> <p>If contractor:</p> <p>(iii) The Engineer- in-Charge without invoking action under clause 3 may, without prejudice to any other right or remedy against the contractor which have either accrued or accrue thereafter to Government, by a notice in writing to take the part work / part incomplete work of any item(s) out of his hands and shall have powers to :</p> <p>(a) Take possession of the site and any materials, constructional plant, implements, stores, etc., thereon; and/or</p> <p>(b) Carry out the part work / part incomplete work of any item(s) by any means at the risk and cost of the contractor.</p>	<p><b>Clause 14 Carrying out part work at risk &amp; cost of contractor</b></p> <p>If contractor:</p> <p>(iii) The Engineer- in-Charge without invoking action under clause 3 may, without prejudice to any other right or remedy against the contractor which have either accrued or accrue thereafter to Government, by a notice in writing to take the part work / part incomplete work of any item(s) out of his hands and shall have powers to :</p> <p>(a) Take possession of the site and any materials, constructional plant, implements, stores, etc., thereon; and/or</p> <p>(b) Carry out the part work / part incomplete work of any item(s) by any means at the risk and cost of the contractor. <b>The contractor, from whom a part work / part incomplete work of any item(s), has been taken out of his hands, shall not be allowed to participate in the tendering/quotation process of part work / part incomplete work of any item(s).</b></p>

This issues with the approval of DG, CPWD.

  
(आर. के. सिंह)  
कार्यपालक अभियन्ता (एम.)

**Issued from file No. CSQ/CM/17(1)/2023/Construction e-file-9184028 (DFA/9319526)**

केलोनवि तथा लोनवि दिल्ली के सभी अधिकारियों को आवश्यक सूचना एवं कार्यवाही हेतु।  
(केलोनवि वेबसाईट के माध्यम से)

R K SINGH  
EE(Manual)

# **PART – B**

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

## PARTICULAR SPECIFICATIONS

### 1.0 General

- 1.1 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, upto the date of receipt of tenders.
- 1.2 Unless otherwise specified in the schedule of quantities, the rates for all items of 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 sources such as rains, floods, sub soil water table being high and/or due to any other cause whatsoever.
- 1.3 The work shall be executed and measured as per metric dimensions given in the Schedule of quantities, drawings etc. (FPS units wherever indicated are for guidance only).
- 2.0 The following modifications to the above specifications and some additional specifications shall however apply.
- 2.1 All stone aggregate and stone ballast shall be of hard stone variety to be obtained from approved quarries at Chandivali / Navi Mumbai or any other source to be got approved by the Engineer-in-charge.
- 2.2 Coarse sand should be obtained from Vaitarana River or any other source to be got approved by the Engineer-in-charge and screened as required. The same shall be clean and sharp angular grit type and shall meet the specifications of IS 383 for concrete and IS 1542 for plaster. If the sand brought to site is dirty it must be washed in clean water fit for construction so as to achieve the above specifications. In case sand of given specifications is not available, the contractor is free to procure M-sand of required specifications for which nothing extra shall be payable.

### 3.0 R.C.C. WORK (DESIGN MIX CONCRETE):-

- 3.1 The RCC work shall be done with Design Mix Concrete. Wherever letter M has been indicated, the same shall imply for the Design Mix Concrete. The Design Mix Concrete will be designated based on the principles given in IS: 456, 10262 & SP 23. The condition and specifications stated herein shall have precedence overall conditions and specifications stated in relevant I.S codes / CPWD specifications. The concrete mix shall be designed for specified target mean compressive strength in order to ensure that the work test results do not fall below the acceptance criteria specified for the concrete mix. The Contractor shall design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. The mix shall be designed with quantities of admixture / plasticizer proposed to achieve required workability & strength. The specifications mentioned here in below shall be followed for Design Mix Concrete.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

- 3.2 The sources of coarse aggregate, fine aggregate & water to be used in concrete work shall be identified by the contractor & he will satisfy himself regarding their conforming to the relevant specification & their availability before getting the same approved by the Engineer-in-Charge.
- 3.3 Coarse Aggregate: - As per CPWD Specifications - 2019 - Vol. I & Vol. II with upto date correction slips.
- 3.4 Fine Aggregate: -As per CPWD Specifications - 2019 - Vol. I & Vol. II with upto date correction slips.
- 3.5 Water: - It shall conform to requirements laid down in IS:456-2000 / CPWD Specifications - 2019 - Vol. I & Vol. II with upto date correction slips.
- 3.6 Cement: -Ordinary Portland Cement(OPC)[conforming to IS: 8112]/Portland Pozzolana Cement (PPC) [conforming to IS: 1489(Part-I)],However, if higher grade of cement is used by the contractor with the prior permission of Engineer-in-charge, nothing extra shall be paid on this account.
- 3.7 Admixtures/Plasticizers: -The admixture shall conform to IS: 9103, wherein required, the admixture of approved quality and approved make only shall be used to attain the required workability. Nothing extra shall be paid for use of admixtures.

3.8 Grade of Concrete: - The compressive strength of various grades of concrete shall be given as below: -

GRADE DESIGNATION	COMPRESSIVE STRENGTH ON 15 cm x 15cm x 15cm CUBES, MIN. 7days (N/mm <sup>2</sup> )	SPECIFIED CHARACTERISTIC COMPRESSIVE STRENGTH AT 28 days (N/mm <sup>2</sup> )	Max. WATER CEMENT RATIO
M-20	As Per Design	20	0.50
M-25	As Per Design	25	0.50
M-30	As Per Design	30	0.45
M-35	As Per Design	35	0.45
M-40	As Per Design	40	0.45

Water cement ratio and slump shall be as per IS: 456-2000

NOTE: -In the designation of a Concrete mix letter M refers to the mix and the number of the specified characteristic compressive strength of 15 cm - Cube at 28 days expressed in N/mm<sup>2</sup>.

Minimum qty. of cement to be used for various design mix shall be as follows & same shall be considered for Theoretical Calculation of cement:

Sr. No.	Grade of Concrete	Qty. of cement in kg / cum.
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CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

1	M:10	220
2	M:15	240
3	M:20	310
4	M:25	330
5	M:30	340
6	M:35	350
7	M:40	360

It is specifically highlighted that in addition to the above requirements, the maximum cement content for any grade shall be limited to 380 kg. / Cubic meter.

The maximum cement content for design mix concrete shall be maintained as per the quantity mentioned above. In case where the quantity of cement required as per Design Mix is lower than the quantity specified above, necessary deduction for less quantity of cement used shall be made from the contractor & Nothing extra shall be paid for using more cement than specified.

- 3.9 The contractor shall engage one of the IIT Mumbai, VJTI Mumbai, NIT or other Govt. Institute approved laboratories/ test house at his own expenses for designing the concrete mix in accordance with relevant IS Codes and to conduct laboratory test to ensure the target strength and workability criteria for a given grade of concrete.

The various ingredients for mix design / laboratory tests shall be sent to the lab / testhouses through the Engineer-in-Charge and the samples of such aggregates sent shall be preserved at site by the department.

- 3.10 In the event, if all the laboratories as mentioned above are unable to carry out the requisite design / testing, the contractor may have it done from any other laboratory with prior approval of the Engineer-in-Charge.

- 3.11 The contractor shall submit the report on design mix from any of above approved laboratories 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 design mix is approved. In case of white Portland cement and the likely use of admixtures in concrete with ordinary Portland/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.

- 3.12 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.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

### 3.13 Trial Batches:-

- 3.13.1 The designed mix proportion shall be checked for target mean compressive strength by means of trial batches.
- 3.13.2 The quantities of materials for each trial mix shall be sufficient for atleast six specimens (cubes) and the concrete required for carrying out workability tests.
- 3.13.3 The workability 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 workability.
- 3.13.4 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 workability.
- 3.13.5 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 + 10 percent of the specified value and tested for their design characteristics.
- 3.14 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 concretemix wherever required and directed by Engineer-in-Charge.

### 3.15 Approval of Design Mix:-

The mix design for a specified grade of concrete shall be done for a target mean compressive strength of  $T_{ck}$  where,

$$T_{ck} = F_{ck} + 1.65 \cdot S$$

Where  $F_{ck}$  = Characteristic compressive strength (N/mm<sup>2</sup>) of concrete at 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 follows:-

GRADE OF CONCRETE	STANDARD DEVIATION(S)
M-10	3.5
M-15	3.5

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

M-20	4.0
M-25	4.0
M-30	5.0
M-35	5.0
M-40	5.0

Minimum three sets of separate preliminary test shall be carried out for each trial batch of concrete mix. Each test shall comprise six specimens and only one test set of six specimens shall be made on any particular day. Out of the six specimens of each set, three shall be tested at seven days and remaining three at 28 days. The preliminary tests at 7 days are intended only to indicate the strength to be attained at 28 days. The design mix shall be approved only on the basis of test strength of 28 days. The design mix shall be considered satisfactory and approved if at least three preliminary test sets individually satisfy the following strength and workability criteria.

The average strength of each test sets is not less than the specified target mean compressive strength ( $T_{ck}$ ).

The strength of any specimen cube is not less than  $0.85 \cdot T_{ck}$ .

The concrete mix is required degree of workability and acceptance concrete finish.

3.16 All cost of mix designing and testing connected therewith including charges payable to the laboratory shall be borne by the Contractor.

3.17 WORK STRENGTH TEST: -

TEST SPECIMEN: -

Work strength test shall be conducted in accordance with IS:516 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.

TEST RESULTS OF SAMPLES: -

The test results 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 variation is more, the test results shall be treated as invalid. 90% of the total tests shall be done at the laboratory established at site by the contractor and remaining 10% in the any Govt. laboratory 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 in accordance with 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 each additional 50 cum or part thereof

NOTE: - At least one sample shall be taken from each shift.

### 3.18 STANDARD OF ACCEPTANCE: -

In case the test results of all the samples are above the characteristic compressive strength, the concrete shall be accepted.

In case the test result of one or more samples fails to meet the requirement (i) above, it shall be accepted if both the following conditions are met: -

- i. Any individual test result is not less than  $(F_{ck} - 4) \text{ N/mm}^2$ .
- ii. The mean of test results from any group of four consecutive samples is more than  $(F_{ck} + 4) \text{ N/mm}^2$ .

Concrete of each grade shall be assessed separately.

Concrete is liable to be rejected, if it is porous or honeycombed, its placing has been interrupted without providing a proper construction joint, the reinforcement has been displaced beyond the tolerances specified, or construction tolerances have not been met.

- 3.19 The contractor has to arrange at site centering and shuttering for as per schedule F, within one month from date of start of work. Only steel 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 in exceptional cases as per site requirement may be used on specific request from contractor as approved by the Engineer-in-Charge.
- 3.20 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.
- 3.21 As per general engineering practice, level of floors in toilet / bath, balconies, shall be kept 25 mm lower than general floors and the shuttering should be adjusted accordingly and slabs should be laid with slope towards the drainage point. Nothing extra is payable on this account.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

### 3.22 Production of Concrete

3.22.1 The contractor shall engage Ready Mix Concrete (RMC) producing plants to supply RMC for the work. The RMC plant proposed to be engaged by the contractor shall fulfill the following requirements:

- i) It shall be fully computerized
- ii) It should have supplied RMC for Government/ Public undertaking/ Local bodies projects of similar magnitude.
- iii) It should have facility for providing printed dispatch slips showing ingredients of concrete carried by each mixer.

3.22.2 The contractor shall within 15 days of award of the work, submit list of at least three RMC plant companies of repute along with details of such plants including details of transit mixer, pumps etc. to be deployed indicating name of owner company, its location, capacity, technical establishment, past experience and text of M.O.U. proposed to be entered between purchaser (the contractor) and supplier (R.M.C. plant) to the Engineer-in-charge who shall give approval in writing (subject to drawl of M.O.U.). The contractor shall draw M.O.U. with approved R.M.C. Plant owner and submit to Engineer-in-charge within a week of such approval. The contractor will not be allowed to purchase ready mix concrete without completion of above stated formalities for use in this 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, transportation and placement etc.

The Engineer-in-charge or his representative Engineer will reserve the right to inspect the plant at any stage and reject the concrete if he is not satisfied about quality of product. The contractor should therefore, draw M.O.U / agreement with R.M.C owner/ company very carefully keeping all terms and conditions/ specifications forming a part of this tender document.

3.22.3 The Engineer-in-charge reserves the right to cancel the approval of plant with or without assigning any reason.

3.22.4 The Engineer-in-charge reserve the right to exercise control over the:-

- i) Ingredients, water and admixtures purchased, stored and to be used in the concrete including conducting of tests for checking quality of materials, recordings of test results and declaring the materials fit or unfit for use in production of mix.
- ii) Calibration check of the R.M.C.
- ii) Weight, quality and quantity check on the ingredients, water and admixtures added in batch mixing.
- iv) Time of mixing of concrete.

v) Testing of fresh concrete, recordings of results and declaring the mix fit or unfit for use. This will include continuous control on the workability during production and taking corrective action.

For exercising such control, the Engineer-in-charge shall periodically depute his authorized representative at the RMC plant. It shall be responsibility of the contractor to ensure that free access and all necessary equipment, manpower & facilities are made available to Engineer-in-charge/ his representative at R.M.C. plant.

3.22.5 Ingredients, admixtures & water declared unfit for use in production of mix shall not be used. A batch mix found unfit for use shall not be loaded into the truck for transportation.

3.22.6 All required relevant records of R.M.C. shall be made available to the Engineer-in-charge or his authorized representative. Engineer-in-charge shall, as required, specify guidelines & additional procedures for quality control & other parameters in respect of materials & production and transportation of concrete mix which shall be binding on the contractor & the R.M.C. plant.

### 3.23 QUALITY CONTROL OF READY – MIXED CONCRETE

It shall be the responsibility of the contractor to ensure that the RMC producer provides all necessary testing equipments and takes all necessary measures to ensure quality control of ready-mixed concrete.

#### **In General the required measures shall be :-**

##### (i) CONTROL OF PURCHASED MATERIAL QUALITY

R.M.C. producer shall ensure that all the materials purchased and used in the production of concrete conform to the stipulation of the relevant agreed standards with the materials supplier and the requirements of the products, mix design and quality control procedures. This shall be accomplished by visual checks, sampling and testing, certification from material supplier and information/ data for material supplier. Necessary equipment for the testing of all material shall be provided and maintained in calibrated condition at the plant by the R.M.C. producer.

##### (ii) CONTROL OF MATERIAL STORAGE

Adequate and effective storage arrangement shall be provided by RMC producer at RMC plant for prevention of contamination, reliable transfer and feed systems, drainage of aggregates, prevention of freezing or excessive solar heating of aggregate etc.

##### (iii) COMPUTER PRINT OUTS OF EACH TRUCK LOAD

Each truckload transit mixer dispatched to site shall carry computer printout of the ingredients of the concrete it is carrying. The printout shall be produced to Engineer-in-charge or his representative at site before R.M.C. is used in work.

(iv) **TRANSFER AND WEIGHING EQUIPMENT**

R.M.C. producer shall ensure that a documented calibration is in place. Proper calibration records shall be made available indicating date of next calibration due, corrective action taken etc. RMC producer shall ensure additional calibration checks whenever required by Engineer-in-charge in writing to contractor. R.M.C. producer shall also maintain a daily production record including details of customers to whom R.M.C. was supplied including details of mixes supplied. Record shall also be maintained of what materials were used for the day's production including water and admixtures.

The accuracy of measuring devices shall fall within the following limits.

Measurement of cement	+/- 2% of quantity of cement in each batch
Measurement of water	+/- 3% of quantity of water in each batch
Measurement of aggregate	+/- 3% of quantity of aggregate in each batch
Measurement of admixture	+/- 3% of quantity of admixture in each batch

The RMC plant shall have the provision of adjusting the plus / minus quantity of various ingredients in the next batch so that there is no variation in quantity of ingredients from design mix in a lot consisting of 5 to 6 batches.

**4.0 SHUTTERING / FORM WORK:-**

- 4.1 The work shall be done in accordance with CPWD Specifications - 2019 - Vol.I&Vol.II with upto date correction slips.
- 4.2 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 completing the shuttering panels. Dented, broken, cracked, twisted or rusted shuttering plates shall not be allowed to be used on the work.
- 4.3 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 shutter plates in the requisite quantity before assembly of steel reinforcement.
- 4.4 The joint filler shall be resilient closed cell expanded polyethene and non-tainting as manufactured by Supreme Industries Ltd. or equivalent manufacturer.
- 4.5 The shuttering joints must be made water tight by providing brown tape.
- 4.6 Providing joint filler of required thickness in position to substrate using either double-sided foam adhesive tape or neoprene synthetic rubber adhesive. When forming expansion joint with the Board in in-situ concrete, joint sealing slots can be readily formed in the following manner-

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

Before installing, simply cut off a strip of the required depth. Then install the filler flush with the finished surface.

Prior to sealing, the top strip can then be pulled easily from the joint to provide an uncontaminated sealing slot ready for preparation and sealing.

## 5.0 REINFORCEMENT: -

- 5.1 The reinforcement shall be done as per CPWD Specifications - 2019 - Vol.I& Vol. II with upto date correction slips. Only Corrosion Resistant Steel (Alloy Steel) as per Amendment 2 of IS:1786 shall be used in the works, unless allowed otherwise by Engineer-in-Charge.
- 5.2 The reinforcement of RCC work includes all operations including straightening, cutting, bending and **binding with annealed steel** wire and placing in position at all the floors with all leads and lift complete.
- 5.3 To avoid displacement of bars in any direction and to ensure proper cover, only factory-made round type/rectangular cover blocks shall be used by the contractor. Nothing extra shall be payable on this account.

## 6.0 FLOORING & DADO

- 6.1 The work in general shall be carried out as per the CPWD Specifications, as per the architectural drawings and as per the direction of Engineer-in-Charge.
- 6.2 The Engineer-in-Charge or his representative may, if required, visit the source of supply of the various stones to assess the quality as well as availability of the material in the required quantities. The department shall bear the cost of such visits of the officers of the Department.
- 6.3 Based on the samples approved by the Engineer-in-Charge for various flooring and dado / cladding materials as specified hereinafter, the contractor shall prepare mock up(s) at site of work as specified under relevant flooring and dado / cladding items, for approval of quality of workmanship and material specified. If the quality of the workmanship and the material is as per the required standards and approved by the Engineer-in- Charge, the mock up shall be allowed as part of the work and measured for payment. Otherwise, it shall be dismantled by the contractor as directed by the Engineer-in-Charge and taken away from the site of the work at his own cost. The mock up(s) so made shall be kept till completion of respective works for reference. Nothing extra shall be payable on this account.
- 6.4 The stones / tiles shall be transported to site well packed in boxes or otherwise. These shall be handled carefully to prevent any damage. The various types of stones and tiles, procured shall be free of any surface defect or any edge damage. The damaged stones and tiles shall not be allowed to be used in the work. So, the contractor shall procure additional quantity of the stone and tiles to cover such contingencies. However, nothing extra shall be payable on this account.

- 6.5 For the enclosures with circular or curved profile, only the actual area of the flooring shall be measured for payment and nothing extra shall be payable for labour, material, wastages and any other incidental charges.
- 6.6 For the skirting in the enclosures with curvilinear profiles, the tiles / stones shall be cut to the required size and the shape to match the profile and/ or the joints as per the architectural drawings. Similarly, the skirting shall be fixed in a manner as to flush or project from the finished face of the wall as per the architectural drawings and as directed by the Engineer-in-charge. Any chasing of the C.C masonry blocks required for such fixing is deemed to be included in the cost of masonry. Nothing extra shall be payable on this account.
- 6.7 For flooring work, the joints between the different types of flooring shall be located as per the architectural drawings. Also, the Contractor shall maintain the uniform level of the finished flooring of the different types unless specifically mentioned on the architectural drawings. Nothing extra shall be payable on these accounts.
- 6.8 All the flooring works specified under this sub -head shall be adequately protected by **a layer of plaster of paris which shall be laid over a 400-micron PVC film**. The protective layer shall be maintained throughout the execution of works and removed just before handing over of the site for which nothing extra shall be payable.
- 6.9 At the time of handing over, flooring & dado / cladding shall be free of any scratches, stains etc. The flooring & dado / cladding shall be properly cleaned before handing over. However, abrasive cleaners shall not be used to clean the marks and other scratches.

#### **GRANITE / ITALIAN MARBLE STONE WORK**

- 6.10 The Contractor shall procure and submit the samples of different types of stones, for the approval of the Engineer-in-charge prior to the execution of the item.
- 6.11 The entire supply for each type of stone slab shall be procured from one location (in one quarry), and supplied preferably, in one lot to keep variations to the minimum. The Contractor shall also segregate and sort the slabs according to colour, shade, texture and size of grains etc. to keep variation(s) in stones used at any one location to the minimum. Any slab with variation in the colour, shade, texture and size of grains etc., not acceptable to the Engineer -in-Charge, shall not be used in the work and shall be removed and replaced by the Contractor. Nothing extra shall be payable on these accounts. Also, no claim of any kind shall be entertained from the Contractor on this account.
- 6.12 Stone slabs shall be pre-polished (**mirror polished**) or given any other surfacetreatment as per the Architectural drawings and as directed by the Engineer-in- Charge.Nothingextra shall be payable on this account.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

- 6.13 Machine polishing and cutting to required size shall be done with water (as lubricant) only. Sawing shall also be done preferably with water as lubricant but as a special case, the Engineer-in -Charge may permit, at his discretion, oil or kerosene as lubricant subject to all kerosene or oil in the body and surface of tileslabs being thoroughly dried in ovens. Tiles / slabs with stains or patches due to the use of oil or otherwise, either before or after installation, shall be rejected and shall be replaced by the Contractor at his own cost. Nothing extra shall be payable on this account.
- 6.14 The stone work may be required to be carried out in patterns, design and / or in combination with stones of different colour and shade with or without borders and in combination of different stone slabs / tiles for which nothing extra shall be payable. The stones shall be provided in sizes and shapes as per the architectural drawings and wastages and incidental costs, if any, shall be deemed to be covered in the cost of the relevant items. Nothing extra shall be payable on this account.
- 6.15 For the flooring portions curved in plan or for in-lay work, the stone slabs (at the edge) shall be cut to the required profile and shape as per the architectural drawings.Nothing extra shall be payable on this account.
- 6.16 The stone slabs used for providing and fixing in the sills, soffits and jambs of doors, windows, ventilators and similar locations shall be in single piece unless otherwise directed by the Engineer-in-Charge. Wherever stone slab other than in single piece is allowed to be fixed, the joints shall be provided as per the architectural drawings and as per the directions of the Engineer -in-Charge. In the cabin areas, the joints in sillsshall preferably be provided in line with the partition wall. Depending on the number of joints, as far as possible, the stone slabs shall be procured and fixed in slabs of equal lengths as per the architectural drawings and as directed by Engineer-in-Charge.

#### **VITRIFIED AND CERAMIC TILES WORK**

- 6.17 The contractor shall procure and submit the samples of approved make, shade and thickness of different types of vitrified and ceramic tiles, for the approval of the Engineer-in-charge prior to the execution of the item.
- 6.18 The mock up (one each) shall be prepared for flooring and dado, for vitrified tiles etc.
- 6.19 The entire supply for each type of tiles shall be procured from one manufacturer / authorized dealer, preferably, in one lot to keep variations to the minimum.
- 6.20 The tiling work may be required to be carried out in patterns, design and / or in combination with tiles of different colour and shade and in combination of different stone slabs / tiles for which nothing extra shall be payable. The tiles shall be provided as per the architectural drawings.
- 6.21 For the flooring portions curved in plan, the tiles (at the edge) shall be cut to the required profile and shape as per the architectural drawings. Nothing extra shall be payable on this account.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

- 6.22 The Contractor shall obtain and submit to the Engineer-in-charge the manufacturer's test certificate for compliance of various parameters for the material as per the manufacturer's specifications, with each lot of material received at site.
- 6.23 The flooring and dado / cladding should be set out such that the perimeter/ corner tiles are in excess of half a tile so that the edge panels on both the sides are of equal sizes, as far as possible. The tiles shall be cut to required size and shape in a workman like manner but with all precautions, as per the manufacturer's specifications.
- 6.24 For dado / cladding / skirting work, the tiles shall be chamfered at the meeting edges on the corners in a manner that butt edges are not visible. It shall be ensured that the edges shall be ground / filed to chamfer the edges so that the glazing layer at the edges of the tiles is not chipped off otherwise the work shall be rejected and redone by the Contractor at his own cost.
- 6.25 The proper gradient shall be given to flooring for toilets, verandah, kitchen, court yard, etc. as per the directions of Engineer-in-Charge. For this there may be extra thickness of dry mortar below the tiles/stone slabs. These gradients should be insured in the shuttering itself. Nothing extra shall be paid on this account.

## **7.0 SANITARY INSTALLATIONS/ WATER SUPPLY/ DRAINAGE**

- 7.1 The work in general shall be carried out as per CPWD Specifications- 2009 Vol.-I & Vol.-II with upto date correction slips. Rate shall include all materials, labour and all the operations mentioned in the respective item unless and otherwise specifically mentioned.
- 7.2 The contractor shall be responsible for 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.
- 7.3 The contractor shall ensure that senior and experienced plumbers are assigned exclusively for this work. Such plumber(s) should have valid license from the local authorities. For quality control & monitoring of workmanship, contractor shall assign at least one engineer who would be exclusively responsible for ensuring strict quality control, adherence to specifications and ensuring top class workmanship for the installation.
- 7.4 The contractor shall obtain all permits/ licenses and pay for any and all fees required for the inspection, approval and commissioning of their installation for which nothing extra shall be payable to the contractor.
- 7.5 The contractor shall examine all architectural, structural, plumbing, electrical and other services drawings and check the as-built works before starting the work, report to the Engineer In-Charge any discrepancies and obtain clarification. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Engineer In-Charge without additional cost to the department.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

- 7.6 All the shop drawings shall be prepared on computer through AutoCAD System based on Architectural Drawings and site measurements. Within two months of the awardofthecontract, contractor shall furnish, for the approval of Engineer- In-Charge, the two sets of detailed shop drawings of complete work and materials including layouts for Plant room, Pump room, Typical toilets drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc; external insulation details for pipe insulation etc.
- 7.7 Shop drawings shall be submitted for approval four weeks in advance of planned delivery and installation of any material to allow the Engineer In-Charge ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.
- 7.8 Samples of all materials like valves, pipes and fittings etc. shall be submitted to the Engineer-in-Charge prior to procurement for approval and retention by Engineer-in-Charge and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed a mockup or sample installation shall be carried out for approval before proceeding for further installation without any extra cost.
- 7.9 Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.
- 7.10 All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be in conformity with list of approved manufacturers as per schedule of quantity & approved list and samples.
- 7.11 Balancing of all water systems and all tests as called for the CPWD Specifications shall be carried out by the contractor through a specialist group, in accordance with the Specifications and Standards. The installation shall be tested and shall be commissioned only after approval by the Engineer In-Charge. All tests shall be carried out in the presence of the representatives of the Engineer In-Charge and without additional cost to the department.**No plumbing work shall be covered up before testing and acceptance of the test results by the Engineer-in-charge for which one week time is allotted. No hinderance shall be given upto 1 week. Subsequently, contractor shall claim hinderance only if he demonstrates that his work was held up due to delay on part of the Engineer-in-charge.**
- 7.12 The contractor shall submit completion plans for water supply, internal sanitary installations and building drainage work within 15 days of the date of completion. These drawings shall be submitted in the form of two sets of CD's and four portfolios (300 x 450 mm) each containing complete set of drawings on approved scale indicating the work as installed. These drawings shall clearly indicate complete plant room layouts, piping layouts and sequencing of automatic controls, location of all concealed piping, valves,

controls and other services. In case the contractor fails to submit the completion plans as aforesaid, security deposit shall not be released and these shall be got prepared at his risk and cost.

- 7.13 Porcelain sanitary ware shall be glazed vitreous china of first quality free from warps, cracks and glazing defects and shall conform to relevant BIS codes. Colour of sanitary ware, shall be specified or as selected by the Engineer-in-Charge. All sanitarywares & / or sanitary faucets shall be of any of approved brand. Nothing extra shall be payable on this account.
- 7.14 The chasing, cutting and making holes in the masonry and / or cement concrete and / or RCC works shall be done carefully without causing any damage to the structure. As far as possible, mechanical cutters & core cutting machines shall be used in a workman like manner, for concealing the pipelines and fittings. The chases / holes, so made, shall be made good with the cement mortar of mix 1: 3 (1cement: 3 fine sand) after testing of the pipe lines for leakage. The cost of cutting cores in RCC, cutting holes in masonry & making good the same shall be inclusive in the respective item of water supply / sanitary lines. Nothing extra shall be payable on this account.
- 7.15 All vertical Sanitary & water supply pipes shall be fixed to galvanized M.S supporting frame with "U" shaped G.I bolts, threaded at both ends, as specified, with GI nuts, GI washers, GI cleats etc. as approved by the Engineer-in-charge. Supporting frame shall be fixed with approved anchor fasteners / plumbing nails as directed by the Engineer-in-charge. In all cases, pipelines shall be fixed, minimum 50 mm away from the finished wall face and shall not be fixed directly to the walls. The cost of providing and fixing GI supporting frame, "U" bolts, GI nuts, GI washer, anchor fastener etc., for clamping the pipes to the supporting frame shall be paid for separately under relevant item.
- 7.16 All horizontal pipes shall be fixed to the soffit of beams / slabs etc. with G.I. hanger rods & clamps as directed by the Engineer-in-charge. Cost of hanger rods, anchor fasteners and U clamps at all levels and locations shall be paid for separately under relevant item.
- 7.17 Water supply pipes on the terrace shall be fixed to the walls with GI clamps or by supporting on masonry / plain cement concrete piers cast on slabs as approved by the Engineer-in-charge. The cost for providing and fixing G.I. clamps & Plain cement concrete piers etc. shall be included in the cost of water supply pipes.
- 7.18 Water tanks, taps, sanitary, water supply and drainage pipes, fittings and accessories should conform to bye-laws and specifications of the local Body / Corporation where CPWD Specifications are not available. The work of water supply, internal sanitary installation and drainage etc. shall be carried out as per local Municipal Corporation or such local body bye-laws. The contractor shall get the materials (fixtures/fittings) tested by the local body/Corporation authorities wherever required at his own cost and after completion of work shall produce necessary completion certificates from such authorities.

## 8.0 False Ceilings

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

- 8.1 The work in general shall be carried out as per the CPWD specifications, as per the manufacturer's specifications, as per architectural drawings and as per directions of Engineer-in-Charge.
- 8.2 Various false ceiling shall be done in different levels in linear and curvilinear pattern in plan and elevation and in combination with other types of false ceiling as specified in brief specifications & as per the architectural drawings.
- 8.3 The tiles and the suspension system shall be as specified in the item nomenclature. The contractor shall procure and submit the samples of tiles and grid system of approved make, for the approval of the Engineer-in-charge prior to execution of the item.
- 8.4 The Contractor shall prepare the mock-up at site for approval of material and quality of workmanship by the Engineer-in-Charge. Only after the approval of Mock-up, the Contractor shall start the mass work. If the quality of the workmanship and the material is as per the required standards and approved by the Engineer-in- Charge, the mock up shall be allowed as part of the work and measured for payment. Otherwise, it shall be dismantled by the contractor as directed by the Engineer-in-Charge and taken away from the site of the work at his own cost. The mock up(s) so made shall be kept till completion of respective works for reference.
- 8.5 Once the material and mock up are approved, the entire material (tiles as well as grid system) shall be procured from the approved manufacturer or its authorized dealer.
- 8.6 The installation shall be got done through an experienced installer, executing similar works.
- 8.7 The material shall be transported to site well packed. The ceiling material procured shall be free of any surface defect, edge damage and any other such defects. The contractor shall ensure careful handling and storage and prevent any rough handling, rolling of cartons or dropping cartons to prevent any edge damage or breakage. The defective/damaged material shall not be allowed to be used in the work. So, the contractor shall procure additional quantity of material to cover such contingencies. However, nothing extra shall be payable on this account.
- 8.8 Adequate care shall be taken before installation as well as afterwards till completion of the work. It shall be protected from rains, excessive humidity, chemical fumes, vibrations, dust etc. Any tile with edge damaged or crack etc. shall not be allowed to be used in the work and shall be replaced by the contractor at his own cost. Similarly, adequate care shall be taken by the contractor while placing or removing and handling the tiles so as not to cause any damage. The ceiling shall be cleaned as per manufacturer's specifications. Abrasive cleaners shall not be used to clean the marks.
- 8.9 The Contractor shall obtain and submit to the Department the manufacturer's test certificate / report for compliance of the material to the relevant standards along with each lot of material supplied for the work.
- 8.10 The suspension system for various types of false ceiling shall be as per manufacturer's specifications. The false ceiling tiles shall be fixed on to coordinated suspension ceiling system with supporting grids

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

system that fully integrates with the ceiling tiles as per manufacturer's specifications. It shall be ensured that the suspension system shall be suitable to take all designed dead, imposed and all incidentals loads efficiently and shall not sag. The true line and levels for false ceiling work shall be maintained.

- 8.11 The luminaries, air grills / diffusers, signages etc. shall be as far as possible independently supported to avoid any over loading of the ceiling system which may result in excessive deflection or twisting of grids. Any strengthening of grid system by providing additional hangers, fasteners, runners, cross tees etc. or providing additional bracing may be carried out as required for any specific locations or for specific purpose for which nothing extra shall be payable.

Various false ceiling systems shall include cost of all inputs of labour, materials, wastage if any, T&P, scaffolding, staging or any other temporary enabling structure / services etc. and all other incidental charges including making necessary cut outs for A.C diffusers, Light fittings, grills, Fire detection, alarm, sprinklers devices and fittings etc. No deduction in the area shall be made for openings nor anything extra shall be payable for making the openings. Also, nothing extra shall be payable on account of any wastage in materials. Also, nothing extra shall be payable on account of any strengthening of the supporting suspension system for the false ceiling, around the openings in the false ceiling by using additional hangers, fasteners, runners, cross tees, cross channels, etc.

## **9. PARTICULAR SPECIFICATIONS FOR STEEL FABRICATION WORKS FOR STEEL STRUCTURE.**

- 9.1. Specification for steel fabrication works for steel structures
- 9.1.1 The work in general shall be carried out as per CPWD specifications and the relevant Indian Standards a list of which are mentioned in the particular specifications.
- 9.1.2 The fabrication and erection of the steel members shall be as per General Specification IS : 800 and stipulations contained in the other relevant standards.
- 9.1.3 The contractor shall prepare and submit the fabrication drawings, indicating the complete details of all members, detail of joints, weld sizes, length of welds, cleats holes etc. The fabrication work shall be commenced only after the fabrication's drawings are approved. A scheme for fabrication and erection of the various members shall also be furnished and got approved. However, such approval shall not absolve the contractor for the safety of the structure and its components during fabrication, erection and service.
- 9.1.4 The contractor shall submit manufacturer's test certificate for all the material procured by him indicating clearly the identification marks etc. The Engineer-in-charge may get samples of the materials tested for their conformity to the standards. No payments shall be made for the materials, which are used for testing.
- 9.1.5 The fabrication shop of the contractor, shall have all facilities required for carrying

out the fabrication work.

- 9.1.6 The material shall conform to the following specifications.
- 9.1.6.1 Structural steel rolled sections: IS 2062-2011, Grade as specified in item
- 9.1.6.2 Pipes for handrails etc. : IS 1161/1239/IS 4923
- 9.1.6.3 Chequered plates : IS 3502
- 9.1.7 Steel sections from the main manufacturers such as SAIL, TISCO, JINDAL, RINL only shall be permitted to be used. The steel members shall be in single piece end to end without any intermediate joints unless specifically approved by the Engineer-in-charge. The contractor shall get the name of manufacturer approved before placing the order. The material should be free from defects. If any defect is noticed at the time of Manufacturing the same should be rejected. Re-rolled material shall not be permitted.
- 9.1.8 **Welding electrode / materials shall confirm to IS : 814 & AWS E-6013 for thickness upto 20 mm and MWSE-7018 above 20 mm.**
- 9.1.9 Bolts and nuts shall be as per IS: 1363 & IS : 1367. Washers shall be as per IS: 2016, IS: 5372 and IS : 5374. All codes referred shall be latest version with upto date amendments.
- 9.1.10 The bending of plates and sections shall be carried out on appropriate machines.
- 9.1.11 Cutting may be affected by sheering, cropping, sawing or by gas cutting by mechanically controlled torch. Gas cutting by hand and electric arc cutting shall not be permitted.
- 9.1.12 All cut edges shall be ground before they are welded.
- 9.1.13 The accuracy at contact surfaces and tolerances shall be as per relevant IS standards.
- 9.1.14 Bolt – holes shall be drilled. Enlarging the holes by filling, hand drilling using flame etc. are not permitted.
- 9.1.15 The welders qualified as per procedure given in the IS standards shall only be engaged for doing the welding work.
- 9.1.16 The welding should be of Submerged Arc Welding for Steel Structure elements and CO<sub>2</sub> welding for other auxiliary members. The welding procedure proposed by the contractor shall be got approved in advance from the Engineer-in-charge.
- 9.1.17 The welds shall be subjected to visual examination, mechanical tests on samples, dye penetration tests, other non-destructive tests like radiographic/ ultrasonic tests etc.
- 9.1.18 The following are the minimum requirements of tests on welds.
- A Visual examination :100%
- B Dye penetration test : 50 % after back gouging and after final finish.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

- C Mechanical test :1 test each on a column and beam members.
- D Radiography test : 2% of butt welds **(Only if butt welds are used)**
- 9.1.19 Where radiography test is not possible ultrasonic test shall be carried out. The acceptance criteria shall be as per IS specifications and as decided by the Engineer-in-charge.
- 9.1.20 Internal surfaces of boxed / back-to-back members should be treated with primer.
- 9.1.21 The edges of chequered plate shall be made smooth and no burrs or jagged ends shall be left.
- 9.1.22 List of some of the important codes connected with steel work are given below. However, the applicable standards shall not be limited to the list give below:
- |    |           |   |
|----|-----------|---|
| 1  | IS : 228  | Methods of chemical analysis of steel   |
| 2  | IS : 800  | Code of practice for general construction in steel.   |
| 3  | IS : 808  | Dimensions for hot rolled steel beam, column, channel and anglesections                         |
| 4  | IS : 812  | Glossary of terms relating to welding and cutting of metals.                                    |
| 5  | IS : 813  | Scheme of symbols for welding   |
| 6  | IS : 814  | Covered electrodes for manual metal arc welding of carbon and carbon manganese steel.           |
| 7  | IS : 816  | Code of practice for manual metal arc welding of carbon and carbon manganese steel              |
| 8  | IS : 817  | Code of practice for training and testing of metal arc welders.                                 |
| 9  | IS : 822  | Code of practice for inspection of welds.   |
| 10 | IS : 875  | Code of practice for design loads   |
| 11 | IS : 1161 | Structural tubes for structural purposes.   |
| 12 | IS : 1182 | Recommended practice for radiographic examination of fusion welded butt joints in steel plates. |
| 13 | IS : 1599 | Method of bend tests.   |
| 14 | IS : 1608 | Method of tensile testing of steel products.  |
| 15 | IS : 1852 | Rolling and cutting tolerances for hot rolled steel products.                                   |
| 16 | IS : 2062 | Steel for general structural purposes.  |
| 17 | IS : 2595 | Code of practice for radiographic testing.  |
| 18 | IS : 3613 | Acceptance tests for wire flux combination for submerged arc welding.                           |
| 19 | IS : 3658 | Code of practice for liquid penetration flaw detection.   |

20	IS : 3664	Code of practice for ultrasonic pulse echo testing by contact and immersion methods.
21	IS : 3696	Safety code of scaffolds and ladders.
22	IS : 4353	Recommendations for submerged arc welding and of mild steel and low alloy steels.
23	IS : 5334	Code of practice for magnetic particle flaw detection of welds.
24	IS : 5624	Foundation bolts.
25	IS : 7205	Safety code for erection of steel work.
26	IS : 7215	Tolerances for fabrication of steel structures.
27	IS : 7318	Approval test for welders when welding procedure is not required.
28	IS : 9595	Code of practice for manual metal and welding of mild steel.
29	IS : 10842	Testing and evaluation procedure for Y groove crack ability test.
30	SP : 6	ISI handbook for structural engineer (Part 1 to 7)

9.1.23 Apart from the IS Codes mentioned above, all other relevant codes such as American standards (AISC, MBMA, AISI & AWS specifications) related to the specific job under consideration and / or referred to in the above-mentioned codes may be followed wherever applicable, if the specifications for the same are not available in the relevant IS codes.

9.1.24 The structural steel required conforming to IS : 2062-2011 shall be procured from the main steel producers viz. TATA, SAIL, JSW and RINL (Vizag).

9.1.25 In case of difficulties in getting required quantities of materials from the main producers, permission may be given as a special case to procure the materials from the secondary producers having ISI registration by the tender accepting authority if the contractors approach the Engineer-in-charge with the efforts made by them in getting the materials with full justification details.

9.1.26 Fabricated structural members viz., columns, beams and purlins along with the base plates and cleats etc. shall be provided with epoxy primer coating after fabrication.

9.1.27 The quantity of the steel for structural members for the purpose of payment shall be worked out by adopting the unit weight given in the relevant IS code for angles, channels, flats and plates. If the actual weight of the member is less than that specified in the code beyond the minus tolerance permissible then the materials shall be rejected.

## **9.2 Polyurethane Painting on steel members (Only Aliphatic PU Paint to be used)**

### **9.2.1 GENERAL**

9.2.1.1 The Polyurethane painting being a specialized and skilled job the work shall be got done through specialized agencies employing skilled labourers for this purpose and in approved factories. The contractor should employ qualified supervisory staff in the

factory to achieve the required quality of the work.

- 9.2.1.2 The contractor shall extend full cooperation to the inspection team of the Engineer-in-charge to take samples and test during the period of application of paint. The contractor shall also arrange for all the instruments required for ensuring the quality in the factory and in the field viz. Instruments for taking temperature, ambient hygrometry and surface moisture, instruments for checking the blasting nozzle pressure, instruments for measuring roughness of prepared surface, instruments for checking paint coat thickness and porosity.
- 9.2.1.3 The contractor shall submit the detailed program of the painting work proposed to be done and quality assurance plan to the Engineer-in-charge i.e. Executive Engineer, Mumbai-I, CPWD, Mumbai well in advance to enable him them to inspect the painting work done during the application. The contractor shall send weekly report of the work done and problems faced and way to solve them to the Engineer-in-charge.
- 9.2.1.4 The contractor shall also maintain day to day data sheets indicating the details such as of the date, quantity and quality of the surface preparation done, abrasive materials used in surface preparation, primer and painting work done, day to day accounts of the painting materials received and used in the painting work, and details of the tests done on the materials. The contractor should arrange to measure and record all parameters stipulated for surface preparation and application of primer and paint coats such as humidity temperature, roughness of surface etc. They should produce the same to the Engineer-in-charge as and when called for. At the time of application, the supervisory staff must be in possession of the application technical data sheet.
- 9.2.1.5 The work not done as per specifications as per the inspection report of the Engineer-in-charge or his authorized representative shall stand rejected and shall not be permitted to be used in the work.

## **9.2.2 MATERIALS :**

- 9.2.2.1 The materials required for Polyurethane painting shall be obtained from the approved reputed manufacturers and shall be brought in sealed containers indicating the date of manufacture and expiry date and properly accounted for receipts and issue. The contractor shall get the prior approval of the Engineer-in-charge before placing the supply orders on the manufacturers.
- 9.2.2.2 All paints and thinner containers shall be kept closed before use and stored under shelter free from direct sunlight and in ventilated area.
- 9.2.2.3 Any paint, which has gelled or settled during storage, shall not be used.
- 9.2.2.4 Any paint for which the shelf life has expired shall not be used.
- 9.2.2.5 Adequate firefighting materials (dry powder fire extinguisher to IS 2171) should be close to storage area.
- 9.2.2.6 There should not be any fire producing operations, like cutting welding close to areas where paints are stored or while application is in progress.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

9.2.2.7 Do not use a grinding wheel to open the paint drums. Simple hand tools like a cutting lever and a hammer is sufficient. Keep the tins tightly closed immediately after use.

9.2.2.8 The empty containers shall not be disposed off unless inspected and cleared by the representatives of the Engineer-in-charge.

**9.2.3 PRIMER :**

9.2.3.1 Two pack epoxy primer coating of approved make will only be accepted.

9.2.3.2 The primer shall have :

- 1 Volume solids 80% and Dry Film Thickness (DFT) of 100 microns
- 2 The primer shall withstand salt spray test conducted as per ASTM B 117 for 2000 hours at 100 microns (without top coat), if required by Engineer-in-charge.
- 3 The primer shall also withstand humidity test conducted as per IS 101 for 2500 hours at 100 microns without top coat, if required by Engineer-in-charge.

**9.2.4 POLYURETHANE PAINT:**

9.2.4.1 Two pack polyurethane paint coating of approved make will only be accepted.

9.2.4.2 The paint shall have:

- 1 Volume of solids 80%. The Dry Film Thickness (DFT) of the PU paint coat shall be minimum 50 microns and its adhesion to the primed surface shall be minimum 150 microns.
- 2 The paint shall withstand salt spray test conducted as per ASTM B 117 for 2000 hours at 150 microns, if required by Engineer-in-charge.
- 3 The paint shall also withstand humidity test conducted as per IS 101 for 2500 hours at 150 microns, if required by Engineer-in-charge.

**9.2.5 SURFACE PREPARATION:**

9.2.5.1 All rough edges cuts and welds, weld spatters, indentations, all surfaces and protrusions must be ground, to smooth out the contours before the surface is prepared for painting.

9.2.5.2 All bolt holes shall be drilled and blunted before blasting.

9.2.5.3 Prior to surface preparation, the surface shall be inspected for spotting oil and grease deposits or pollution on the surface. If any, the deposits of oil or grease shall be removed from the surface by solvent cleaning prior to surface preparation.

9.2.5.4 The surface shall be cleaned to the standard of Sa 2.5 of the ISO standard ISO 8501-1 or near white metal blast cleaning to SSPC SP-10 or NACE No. 2 near white metal blast.

9.2.5.5 All surface shall be blast cleaned to obtain a total angular roughness of 35-40

microns.

- 9.2.5.6 Only dry blasting techniques are allowed. Compressed air for abrasive blasting shall not contain any trace of oil or water. Blasting nozzle pressure shall not be less than 6.5 kg / sq.cm. The primer coat should be done within 3-4 hours of surface preparation.
- 9.2.5.7 Surface preparation by dry blasting techniques shall not be performed if :
- (i) The surface is likely to be humid after surface preparation and before painting.
  - (ii) The surface temperature is less than 3 degree centigrade above the surrounding air's dew point
  - (iii) The air's relative humidity is greater than 85%

### 9.2.6 COATS :

- 9.2.6.1 The damaged area during transit and the area affected by site welding shall be painted with one coat of EPILUX Superblid STGF coating or equivalent to a dry film thickness of 100 microns followed by one coat of polyurethane paint to a dry film thickness of 100 microns.

### 9.2.7 APPLICATIONS :

#### Mixing :

- 9.2.7.1 All ingredients in each container should be mixed homogeneously.
- 9.2.7.2 Base to catalyst shall be mixed in appropriate proportions as specified in manufacturer's data sheet. Thinner addition shall be restricted to the bare minimum.
- 9.2.7.3 Thinners and paints shall be from a single manufacturer and the respective thinners for the paints should be used. Refer the technical data sheet of the manufacturer.
- 9.2.7.4 Once the base and catalyst is mixed the paint should be used before expiry of pot life, which is mentioned in the technical literature otherwise the paint will gel and cannot be used.

### 9.3 Erection Stage

- 9.3.1 Erection of all structural works roofing, cladding, framed openings etc., for all heights including supply of all materials, labour, supervision, plant, tools and tackles etc., shall be carried out by the Contractor/Agency.
- 9.3.2 Erection of Pre-Engineered Building shall be done as per standard engineering practices. The agency has to take all requisite safety and security measures for the assembly erection and installation of Steel Structure.
- 9.3.3 Foundation Bolts and the base plate for Steel structure stanchions shall be fixed along with RCC foundation. **The Main agency/specialized agency shall be responsible for correct positioning, alignment and levels. The threaded anchor bolt projecting above base plate shall be protected from any damage by putting GI pipe sleeve of suitable length with end cap over it. Nothing extra will be paid on this account**

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

## 10. PARTICULAR SPECIFICATIONS OF POLY VINYL CHLORIDE (PVC) FLOORING.

10.1 This section covers the technical requirements, methods of sampling and testing of antiskid quality of flexible Poly Vinyl chloride (PVC) flooring sheets to be used as floor.

### 10.2 MATERIAL

10.2.1 Poly Vinyl Chloride (PVC) shall be suitably compounded so as to conform to the requirements of this schedule.

10.2.2 The flooring shall be homogeneous single layer or heterogeneous as per definitions given below. **The flooring to be provided shall be as per nomenclature of the item.**

#### a) Homogeneous single layer

Material consisting of a single sheet or layer manufactured directly to its final thickness (except for a possible sanding down) from a mixture of uniform composition. The sheet composition shall be composed of pure PVC and silicon carbide particles or any other anti-skid property enhancing material. Same composition, colour and pattern will extend throughout the thickness.

#### b) Heterogeneous

Material consisting of single layer sheet or two layers sheet with antiskid property of minimum 1.1mm thick wear layer. The wear layer shall be composed of pure PVC. chips and silicon carbide or any other anti-skid property enhancing material. Other layers should be homogeneous and have a combined thickness of maximum 1.0mm. The composition of each layer will be uniform and homogeneous throughout its thickness. Between wear layer and bottom layer, glass fibre web (Glass Scrims) should be provided as reinforcement.

### 10.2.3 Dimension & Tolerances

10.2.3.1 The length & width of the rolls/sheets shall be as specified by the purchasing authority. The tolerance in length shall not be less than the nominal value specified. Tolerance in width shall be 10/-0 mm. The nominal thickness shall be 2 mm or as specified by the purchaser. The variation between any two measurements at different places on the same roll/sheet shall not exceed 0.15 mm. The method of test of thickness & width shall be as per Clause 3 of IS: 3464.

### 10. 2.4 Colour and Surface Characteristics

10.2.4.1 The flooring shall have a uniform wearing characteristics and antiskid property throughout the thickness in case of homogeneous single layer and throughout the wear layer thickness in case of heterogeneous PVC flooring. The colour, pattern, marbling or mottling, if present, shall extend throughout the full thickness in case of homogeneous single layer and throughout wear layer thickness in case of

heterogeneous PVC flooring. The colour and pattern shall be similar to samples approved by Engineer-in-charge or that is agreed upon by purchaser and manufacturer.

In case of chip design flooring, the chip density on top of wear layer shall be 100-160 chips per 100 cm<sup>2</sup> and shall be calculated by taking a sample piece of size 10cm x 10cm from any place from offered roll.

## 10.2.5 Workmanship and Finish

10.2.5.1 The top surface shall be smooth, free from pinholes, blisters, porosity, blow holes lamination and other visual defects. The bottom surface should be suitable for enhancing sub floor adhesion.

## 10.2.6 Weldability and Shear strength

### 10.2.6.1 Weldability

10.2.6.1.1 The flooring shall be welded by 'V' butt weld joint as per procedure given in IS. 8002. The weld joint shall be capable of withstanding a minimum tensile load of 24 kg per 30 mm (Minimum value of tensile load for any test piece shall be 18 kg per 30 mm)

### 10.2.6.2 Shear strength

10.2.6.2.1 The flooring shall be pasted with adhesive on cement concrete / screed concrete surface. The dry shear strength with cement concrete surface shall not be less than 25kg/6.25 sq.cm (average). The wet shear strength shall not be less than 25kg/6.25 sq.cm. in case of pasted with adhesive on cement concrete surface.

## 10.2.7 Supply of PVC welding electrodes

It shall be obligatory on the part of supplier of PVC flooring to supply electrodes for welding of PVC. The supplier shall workout the quantity of electrodes required and shall separately quote for this item while submitting the tender. The purchaser may however, amend the quantity of electrodes depending on his requirement.

## 10.2.8 Properties of the material

### 10.2.8.1 Tests

10.2.8.1.1 The agency shall be submitted manufacture test certificate as per the methods indicated for the respective tests and shall conform to the following requirements: -

TABLE-1

S.No.	Property	Value	Methods of tests
1	Sound absorption (Minimum)	4dB	ISO-140-8
2	Weight	3000 gm/m <sup>2</sup> Max.	EN 430
3	Total thickness	2mm +0.2mm	IS: 3464

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

4	Abrasion: Loss of thickness*		<0.12mm	EN: 660 Part-II
5	Tensile strength at 1% elongation (Minimum)		<ul style="list-style-type: none"> <li>• Along the machine direction-10 kgs</li> <li>• Perpendicular direction -10 kgs</li> </ul>	Annexure-I
6	Tear strength (Minimum)		a) Along the machine direction-40N/mm b) Transverse direction 50N/mm	ISO-34-1 method A
7	Curling (Maximum)		0.75mm	Clause 8 of IS: 3464
8	Indentation (mm)	a) At 27 + 2° C	To pass the test	Annexure-II
		b) At 27 + 2° C	To pass the test	Annexure-II
9	Residual Indentation (Maximum)		0.05mm	Clause 10 of IS 3464
10	Flexibility		Shall not break, crack or show any other sign of failure	Appendix 'A' of IS: 3462
11	Heat ageing and exudation		No exudation of plasticizer shall be apparent nor shall there be any change in appearance. The mandrel test shall not produce surface cracking	Appendix 'C' of IS:3462
12	Moisture movement (%) change in linear dimensions Maximum		0.4	Appendix 'B' of IS: 3462
13	Dimensional stability		Change in any linear dimension shall not exceed 0.25%. After the test, the specimen shall not show any signs of curling	Clause -5 of IS: 3464
14	Colour fastness to daylight		Not less than standard 7	Para 5.3 of IS 9766-92
15	Abrasion resistance (with H18 abrasion wheel, 1000 gms load and 1000 cycles with tabor equipment) (Volume loss max. in cubic cm)		0.25 cm <sup>3</sup>	ISO: 9352
16	Wear layer thickness (Minimum)		(a) 2 mm for Homogeneous single layer b) 1.1mm for Heterogeneous	EN 429
17	Homogeneity		To pass the test	Annexure-III

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

18	Ply adhesion (KN/m) Minimum (For each layer of laminated product)	1.05 or no separation	Clause 12 of IS: 3464
19	Elongation at break (percentage) Minimum	150	Appendix 'D' of IS: 3462
20	Slip Resistance (Minimum)	R-10	DIN: 51130
21	Resistance to spread of flame	Class A	Appendix 12 of UIC-564-2 OR
22	Deterioration of visibility due to smoke (Minimum)	Class B	Appendix 15 of UIC-564-2 OR
23	Limiting Oxygen Index (Minimum)	35	IS: 13501
24	Toxicity	Less than 1	NCD-1409

\*Abrasion resistance shall be measured in terms of mass loss. Volume loss shall be calculated by dividing mass loss by the density.

The contractor shall supply the Manufacturer's Test Certificates (MTC). Engineer-in-Charge may also ask for third party testing

### 10.3. WARRANTY

10.3.1 The PVC supplied shall be deemed to bear a warranty against defective materials/workmanship and performance for a **minimum a period of 6 years from the date of supply to site or 5 years from the date of fitment whichever is earlier**. The product shall be warranted against any cracking, discolouring/fading and deformation during service. The thickness of PVC flooring should not decrease by more than 10% of original thickness in every year of service of 5 years. In case, the material shows any defect/fails within the warranty period, it shall be replaced by new one without any cost.

### 11. PARTICULAR SPECIFICATIONS OF ALUMINIUM WORK FOR DOORS, WINDOWS AND PARTITIONS.

11.1 The material for the work shall be procured from the approved manufacturer as per the list attached with the tender documents. The Contractor shall procure and submit samples of various materials to be used in the work for the approval of Engineer-in-Charge and no work shall commence before such samples are approved. Samples of un-anodized as well as anodized aluminum sections, neoprene gaskets, glass, stainless steel screws, anchor fasteners, hardware and any other material or components requiring approval of samples, in opinion of Engineer-in-Charge, shall be submitted for the approval as mentioned above. The above samples shall be retained as standards of materials and workmanship. The cost of the above samples shall be borne by the Contractor.

11.2 The Contractor shall prepare the shop drawings for the aluminum windows giving details of the various aluminum sections, neoprene gaskets, cleats, anchor fasteners, hardware, sealants, glass etc. and submit the same for the approval of Engineer-in-Charge. Nothing extra shall be payable on this account.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

- 11.3 Only after the approval of the samples and the shop drawings by the Engineer-in-Charge, the Contractor shall procure the material for the work. All materials brought to the site by the Contractor, for use in the work, as well as fabricated components shall be subject to inspection and approval by Engineer-in-Charge. The Contractor shall, if required by the Engineer-in-Charge, produce manufacturer's test certificates for any material or particular batch of materials supplied by him.
- 11.4 The Contractor shall prepare a finished sample of the aluminum window along with glazing panel and fittings etc. for approval of workmanship and material. Nothing extra shall be payable on this account.
- 11.5 The Contractor shall get the necessary tests carried out in an approved laboratory, as specified. The tests carried out shall be as per relevant specifications / Standard Codes. One test for each lot of anodized aluminum section of each type shall be carried out. However, this is subject to at least one test for every 1,000 Kg or part thereof, for each type of section.
- 11.6.1 Aluminum sections to be used for doors, windows, ventilators and fixed glazing, partitions, false ceiling etc. shall be appropriate to meet technical, structural, functional and aesthetic considerations. The anodizing shall be carried out in an approved factory / workshop as specified in the tender documents.
- 11.6.2 The aluminum extruded sections shall conform to I.S. Designations HEIWP / HVIWP alloy, with chemical composition and technical properties as per I.S. 733 and I.S. 12195.
- 11.7 FABRICATION**
- 11.7.1 All joints shall be accurately fabricated and be hairline in appearance. The finished surface shall be free from visible defects.
- 11.7.2 Taking into consideration varying profiles of aluminium sections being extruded by approved manufacturers, the Contractor shall prepare detailed shop drawings of his proposal using suitable sections based on architectural design / drawings, adequate to meet the requirements / specifications laid down and as proposed by the manufacturer and these detailed shop drawings shall be subject to approval of the Engineer – in – Charge.
- 11.7.3 All hardware used shall conform to the relevant specifications and as per samples approved by the Engineer-in-Charge. Design, quality, type, number and fixing of hardware shall be generally in accordance with architectural drawings and as approved by the Engineer-in-Charge before use.
- 11.7.4 All doors, windows, ventilators and glazing etc. shall be made water tight with neoprene gaskets and weather silicone sealants to the satisfaction of the Engineer-in-Charge, for which nothing extra shall be payable.
- 11.7.5 The frames shall be strictly as per Architectural drawings; the corners of the frame being fabricated to the true right angles. Both the fixed frames and openable shutter frames shall be fabricated out of sections cut to required length, mitered and mechanically jointed for satisfactory performance. All members shall

be accurately machine milled and fitted to form hairline joints. The jointing accessories such as aluminum cleats, stainless steel screws etc. shall not to cause any bi-metallic reaction by providing separators, wherever required. Nothing extra shall be payable for jointing accessories.

- 11.7.6 Mitered joints of the doors, windows, ventilators shutters and frames shall be either corner crimped or fixed with self tapping stainless steel screws of approved make and quality to heavy duty extruded aluminium cleats and sealed with weather silicone sealant, for which nothing extra shall be payable.
- 11.7.7 Vertical members of the aluminium frame work shall be embedded in the floors, wherever required, by cutting and making good of the floor. Nothing extra shall be payable on this account.

#### **11.8.1 FIXING OF ALUMINIUM FRAME WORK**

- 11.8.1 The screws used for fixing fixed aluminium frames of the aluminium windows to masonry walls / RCC members and aluminium members to other aluminium members shall be of stainless steel of approved make and quality and of stainless-steel grade 304. Threads of machine screws used shall conform to requirement of I.S. 42119.
- 11.8.2 The aluminium frames of the gypsum board partition and the wooden rafter ceiling shall be fixed to masonry walls / RCC members using stainless steel anchor fasteners of grade 316, of Kundan or Arrow make and aluminium members to other aluminium members shall be fixed using stainless steel screws of approved make and quality and of stainless-steel grade 304.
- 11.8.3 For the aluminium windows, the gap between the aluminium frames and the R.C.C / Masonry and also any gaps in the various sections shall be filled with weather silicone sealant DC 795 of Dow Corning or equivalent in the required bite size, to ensure water tightness including providing and fixing backer rod, wherever required. The weather silicone sealant shall be of such approved colour and composition that it would not stain or streak the masonry / R.C.C. work. It should not sag or flow and shall not set hard or dry out under any conditions of weather and shall be tooled properly. The weather silicone sealant shall be used as per the manufacturer's specifications and shall be of approved colour and shade. Any excess sealant shall be removed / cleared. Nothing extra shall be payable for the above.
- 11.8.4 Fixing of glass panes shall be designed in such a way that replacing damaged / broken glass panes is easily possible without having to remove or damage any members or interior finishing materials.

#### **11.9 ANODIZING**

- 11.9.1 Aluminium sections shall be anodized as per I.S. 701919 – 1973. Anodizing to be as per grade AC 15 and not less than 15 microns thick when measured as per I.S. 6012, in colour and shade as approved by the Engineer-in-charge.

- 11.9.2 The anodic coating shall be properly sealed by steam or dipping in de-ionized water as per I.S. 119619-19192 and / or I.S. 6057. Sealing quality shall be tested in accordance with the relevant standards. Nothing extra shall be payable on this account.
- 11.9.3 The Contractor shall satisfy himself by checking in the factory that the thickness of the anodic coating is found to be minimum 15 microns and sealing quality is appropriate everywhere. The testing shall be done in an approved laboratory by EDDY CURRENT METHOD as per I.S. 6012 for thickness. For testing the thickness of anodic coating of the anodized aluminium sections, the calibration shall be done on bare ( un-anodized )aluminium sections of same type. If any material is found sub-standard, it shall be rejected.
- 11.9.4 All anodized aluminium works shall conform to relevant I.S. Codes relating to materials, workmanship, fabrications, finishing, erection, installations etc. In this connection I.S. Codes including I.S. 119619 – 19192, I.S. 733 – 19193, I.S. 19419-1961, I.S. 701919-1973, I.S. 6012-1970, I.S. 12195 – 1975, I.S. 740-1975 are considered relevant and applicable.
- 11.9.5 The exposed surface of the aluminium sections shall be protected against surface damage, dents, scratches etc. It shall, therefore, be provided with protective tape. After fixing and assuring of proper functioning of doors, windows, frame work for partitions / false ceiling etc. such protective tape shall be cleaned out / removed as per the directions of Engineer-in-Charge. Nothing extra shall be payable for above.

## **11.10 GLAZING**

- 11.10.1 All glass panes shall be retained within aluminium framing by use of exterior grade neoprene gaskets. Use of glazing or caulking compounds around the perimeter of glass will not be permitted. There shall be no whistling or rattling. Before installation of glass, Contractor shall ensure the following:
- a) All glazing rebates shall be square, to plumb, true to plane, dry and free from dust.
  - b) Glass edge shall be clean and cut to exact size and grounded
- 11.10.2 Annealed float glass in doors, windows, ventilators and fixed glazing etc. shall be of approved make and standard quality conforming to C.P.W.D. Specifications.
- 11.10.3 4.0 mm thick glass panes shall be provided for openings not exceeding 0.5 sqm. For openings exceeding 0.5 sqm in area, 5.0 mm thick glass panes shall be provided unless specified otherwise.

## **11.11 PROTECTIONS AND CLEANING:**

- 11.11.1 After erection and removal of protective layer, all aluminium works including glass panes shall be moist cleaned with a de-ionized water to clean all marks, stains and blemishes.

## **11.12 MEASUREMENT AND RATES:**

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

- 11.12.1 For aluminium frame work, the length of each member of the frame shall be measured correct to half a centimetre. The weight shall then be calculated on the basis of unit weight specified in the manufacturer's catalogue.
- 11.12.2 The actual weight per metre of the respective aluminium sections shall be measured for three random samples collected for each type of aluminium section used in the work, cut to require lengths and weighed and average weight calculated and recorded. The average weight for each type of aluminium section shall be taken as the actual weight per metre for that aluminium section. The decision of the Engineer-in-Charge as regards the random samples and average weight shall be final and binding on the Contractor and no claim of any kind shall be entertained from the Contractor in this regard.
- 11.12.3 The quantity of the aluminium, to be paid for, shall be the least of the two weights calculated on the basis of above two paras 19.12.1 and 19.12.2
- 11.12.4 For glazing, the actual area of the glass panels excluding the portion in the beading shall be measured in sqm up to two decimal places, for payment.
- 11.12.5 Stainless steel adjustable friction hinges and the aluminium handles for the openable side-hung windows shall be of "Earl Bihari", make or equivalent as approved by the Engineer-in-Charge. 2 nos. friction hinges shall be provided per shutter.
- 11.12.6 The cost of designing and preparation of shop drawings, all the samples, mock up of window etc. is deemed to be included in the cost of the relevant items. Nothing extra shall be payable on this account.
- 11.12.7 The item for aluminium for fixed portions for aluminium windows, frame work for partitions and wooden rafter ceiling shall include cost of all inputs of labour, material (anodized aluminium sections, including cleats, other fixtures, weather silicone sealants, stainless steel screws, nuts, bolts, rawl plugs, backer rods, polyethylene tapes etc. which shall be required for fabrication and erection of aluminium work) T & P, all incidental charges, wastages etc. involved in the work. However, for the purpose of payment, the weight of aluminium sections for the fixed window frame, frame work for partitions and wooden rafter ceiling, shall be measured in Kg. The aluminium cleats, stainless steel screws, nuts, bolts, separators etc. shall not be measured separately for payment and their cost is deemed to be included in the cost of this item. The item for aluminium for frame work for fixed partitions and wooden rafter ceiling shall also include cost of providing and fixing stainless steel anchor fasteners as required.
- 11.12.8 The item of aluminium for the openable aluminium shutters for windows and doors etc., shall include cost of all inputs of labour, material (anodized aluminium sections, including such as cleats / angles, other fixtures, stainless steel screws nuts, bolts, stainless steel hinges, weather silicone sealant etc. which shall be required for fabrication of aluminium work) T & P, all incidental charges, wastages etc. involved in the work. However, for the purpose of payment, the weight of aluminium sections for the window

shutter (sash frame) shall be measured in Kg. The aluminium cleats, stainless steel anchor fasteners, screws, nuts, bolts, separators, stainless steel hinges, etc. shall not be measured separately for payment and their cost is deemed to be included in the cost of this item. The anodized aluminium snap beading for fixing glass panels in the openable shutters of the windows shall be measured separately ( on weight basis) and paid under this item of aluminium frame work for window shutters.

11.12.9 The glass shall be paid for separately under relevant item. The cost providing and fixing neoprene gasket, felt etc. is included in the cost of this item and shall not be measured separately for payment.

11.12.10 The item for the aluminium frame work includes cost of making provision for fixing fittings, wherever required, as per the item description (The cost for providing fitting (handle and buffer) shall be paid for separately under relevant item).

## 12. PARTICULAR SPECIFICATIONS OF GLASS FIBRE REINFORCED CONCRETE (GFRC)

### A) MATERIAL SPECIFICATIONS

#### Alkali Resistant Glass Fibres:

- Glass Fibres shall be alkali resistant glass fibre developed and formulated to have high strength retention in hydraulic cement environments.
- The Producer shall provide certification from the Supplier of AR fibres to establish that the AR glass fibres for use in GRC are procured from approved suppliers only and conform to the requirements of EN 15422, EN 14649 category B, or other equivalent national standards. (e.g. ASTM C1666).
- AR Glass Fibre shall have a minimum zirconium dioxide (ZrO<sub>2</sub>) content of 16%.
- **The approved manufacturers are Nippon Electric Glass, Vertrotex (Saint Gobain) and Owens Corning.**

Table 1: Properties of Alkali Resistant Glass Fibre

Property	Standard	Approximate Value
Thermal Expansion	ASTMC 1666	$9 \times 10^{-6} / ^\circ C$
Softening Point		830 °C
Density		2.65- 2.80 g/m <sup>3</sup>
Tensile Strength		1000–1700 MPa
Young's Modulus		72-74 GPa
Strain to Failure		2%

(REF.: GRCA tech NOTE NOVEMBER -2019.)

**In special cases where the quantity is large, the above parameters may also be required to be tested, on a case to case basis.**

White Cement

- White Portland Cement shall be supplied by a manufacturer of assessed capability, made to recognised standards such as EN 197, ASTM C150 or other equivalent national standards and supported by suitable certification.
- Cement shall be correctly stored and kept dry to avoid deterioration.

Silica Sand

- Silica Sand shall be washed to remove soluble matter and dried to permit accurate control of the water/cement ratio. Sands with moisture content may be used provided the moisture content is known and the mix design is altered accordingly.
- The fine fraction, i.e. sand passing a 150-micron sieve, shall be less than 10% of the total weight of sand.

Water

- Potable Water shall be used.
- This shall be clean and free from deleterious matter. (See EN 1008, Mixing water for concrete, or other equivalent national codes).

Admixtures

- Admixtures are permitted and their use is encouraged as they can enhance the properties of GRC.
- They shall always be used strictly in accordance with the Suppliers' recommendations and the Producer shall ensure that their use has no adverse effect on the product.
- Admixtures shall comply with the requirements of EN 934 or other equivalent national standards.
- Calcium chloride-based admixtures shall not be used if the GRC component contains steel reinforcement, fixing sockets or other cast-in devices.

**B) Process Specifications**Mix design

- The mix design must be such that the physical properties of the GRC as per specification are achieved.
- The mix designs in Table 3 are intended as a guide, indicating typical figures.

Table 2: Guidemix designs—Grade 8, 10, 18

Premix Grade	Grade 8	Grade 10	Grade 18
Description	General purpose premix	Sprayed premix or High quality cast premix	Direct sprayed GRC
Aggregate/cement ratio	0.5 -1.50	0.5 -1.50	0.5 -1.5
Water/cement ratio	0.30-0.40	0.30-0.38	0.30-0.38
AR Glass fibre content (% by weight of total mix)	2.0 -3.0%	2.0 -3.5%	4.0 -5.5%
Polymer solids content (% by weight of cement)	Nil	Nil	Nil
Extreme dimensional variations mm/m	0.6 – 1.2	0.6 – 1.2	0.6 – 1.2
Water Absorption	5– 11%	5– 11%	5– 11%
Minimum bulk dry density kg/m <sup>3</sup>	1800	1800	1800
Minimum bulk wet density kg/m <sup>3</sup>	2000	2000	2000

(Ref : Specification for the Manufacture, Curing and Testing of Glass Fibre Reinforced Concrete, The International Glass fibre Reinforced Concrete Association (GRCA), Feb-2021 Rev.)

- The GFRC jali / panel shall be manufactured by Simultaneous Spray Method.
- Dry ingredients shall be batched by weight using calibrated weighing equipment capable of an accuracy of  $\pm 2\%$  of the stated batch weight.
- The cementitious slurry shall be mixed in a high speed, high shear type mixer or equivalent designed for the purpose of preparing mixes for GRC manufacture.
- Simultaneous spraying shall be carried out using specialist equipment that allows the simultaneous deposition of known quantities of cementitious slurry and chopped AR glass fibre.
- The spray equipment shall be calibrated to measure the deposition rates of the AR glass fibre and cementitious slurry and ensure that the specified glass fibre percentage is achieved.
- A mist coat without fibre may be sprayed and shall be followed immediately by the first GRC spray.
- The sprayed GRC shall be compacted using a flexible hand roller before spraying the next layer.
- After the final layer has been sprayed the thickness of the GRC shall be checked using a template or depth gauge and compared to the design thickness.
- After checking the thickness, any areas of under- thickness shall be re-sprayed and areas of over-thickness removed and the material discarded.

- The face of GFRC component facing the mould is referred as the 'fair' face and the other face is called 'rough' face. Putty finish of rough face may be required in some cases.

Storage before demoulding

- Filled moulds shall be stored at temperatures between 5° C and 40° C.
- Moulds shall be stored on a level surface and supported in such a manner that they will not bow or twist.
- Once the initial set has taken place the mould shall be covered with a sheet of polythene and shall not be moved until demoulding.

Demoulding [including lifting and fixing]

- The GRC component shall not be demoulded until it has gained sufficient strength. The time required will be temperature dependent.
- Demoulding shall be carried out in such a manner that no damage occurs to the component.

Curing

- Curing shall be done at manufacture's premises so as to attain the required properties.
- Products shall not be exposed to drying winds or excessive heat for a minimum of two days after production.

Storage, handling and transport

GRC components shall be stored, handled and transported in such a way that:

- No part of the component is overstressed.
- Bowing or twisting is not induced in the component.
- No damage is caused to any part of the component, particularly edges and corners.
- No permanent staining or discoloration is caused either by the storage conditions or the stacking/protection material.

**C) Quality Assurance / Quality Control Protocol: –**

MTC may be collected from vendor /Contractor, for compliance w.r.t relevant standards and factory / on-site inspection may be undertaken as warranted. 3rd party testing can also be opted from approved NABL accredited Labs by Engineer in charge as per extant manual /SOP provisions on case to case basis. No testing is required by 3<sup>rd</sup> party for quantities upto 100 sqm for each item. Workmanship in during execution of work shall be ensured through conduct of onsite testing, continuous supervision in line with DSR Specifications for similar items or as per best industry practices wherever applicable.

Testing

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

The following tests shall be carried out and therequired properties shall be as shown in Table 3 and Table 4.

- *ARglass fibrecontent:*
  - (i) Wash Out test for Glass Fibre content at factory in accordance with “GRCA Methods of Testing Glass fibre Reinforced Concrete (GRC) Material Part-1” OR BS EN 1170:1998 Part 2 OR equivalent national standards.
  - (ii) Manufacturer’s Test Certificate shall be provided from AR glass fibre manufacturer for each lot procured & used for supply of GFRC panels.
- *Limit of proportionality [LOP] and Modulusofrupture[MOR]*
  - (i) TheLOP andMOR shall bedeterminedat7 and/or14and/or28daysinaccordancewitheither the “GRCA Methods of Testing GlassfibreReinforced Concrete (GRC) Material Part-3” OREN 1170 Part-5 OR equivalent national standards.
  - (ii) 7and 14 day results shallonly be acceptable ifthey already exceeddesignrequirements, otherwise 28 day strength shall be reported.
  - (iii) The minimum LOP and MOR testing frequencyshallbe twice per week orevery 10 tonnes of GRC produced, whichever isthegreater.

Table 3:Minimumstrengths

GRADE	8 or8P	10or10P	18or18P
LOPMPa			
Meanof4consecutive testboardmeans	7.25	8.00	8.00
Minimum forindividual testboardmean	5.75	6.00	6.00
MORMPa			
Meanof4consecutivetes tboardmeans	9.50	12.00	21.00
Minimum forindividual testboardmean	7.50	8.50	15.00

(Ref : Specification for the Manufacture, Curing and Testing of Glass Fibre Reinforced Concrete, The InternationalGlassfibre Reinforced Concrete Association (GRCA), Feb-2021 Rev.)

#### References

- EN 1170 Part 2- Wash Out test for measuring the fibre content in fresh GRC.
- EN 1170 Part 3- Fibre content of sprayed GRC.
- EN 1170 Part 6- Water Absorption determination.
- EN 1170 Part 5- Complete bending test

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

**D) Additional specifications :-***Examination*

- Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Architect and wait for written instructions before proceeding.

*Preparation*

- Clean soiled GFRC surfaces with detergent and water, if necessary, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.
- Prepare surfaces using the methods recommended by the manufacturer for achieving the best results for the substrate under the project conditions.
- Install supplementary temporary and permanent supports as required for proper installation.

*Installation*

- Install in accordance with applicable code and manufacturer's recommendations, plumb and true to line.

*Protection*

- Protect installed products until completion of project.
- Touch-up, repair or replace damaged products before substantial completion.
- Repairs will be permitted provided the structural adequacy of the GFRC panel is not impaired. Repairs shall be consistent with the color, texture and appearance of adjacent surfaces.
- The surfaces should be dry for 48 to 72 hours and clean prior to applying finish.

**13. PARTICULAR SPECIFICATIONS FOR PRE-APPLIED FULLY BONDED, HDPE MEMBRANE (As per IS Code 16471:2017)****i) Material specifications and Process specification:****a) Surface Preparation**

- The concrete surface should be float finished and free from cavities and projecting ribs. All surfaces shall be dry and free from frost, contaminations like flaky materials, oil & grease, etc. Standing water must be removed, if any. Grout around all penetrations such as utility conduits, etc. for stability. Large gaps and voids must be pre-filled with cement mortar before the installation of membrane.

**b) Horizontal Substrates**

- Place the membrane with adhesive side facing the concrete pour and HDPE film side facing the substrate.
- End laps should be staggered to avoid a buildup of layers. Accurately position succeeding sheets to overlap the previous sheet by 75 mm along the marked selvedge or as per manufacturer's specifications.
- Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
- Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.

**c) Roll Ends and Cut Edges**

- Overlap all roll ends and cut edges by a minimum of 75 mm and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. The membrane overlaps should be thermo-fused by hot air welding with double seam welding machine to ensure seamless joints. The membrane shall be terminated 50 mm below RCC raft thickness, as per manufacturer's specifications, for proper seaming with the vertical

external waterproofing system. All overlaps and joints should be firmly rolled to ensure complete adhesion between layers

**d)Corners**

- internal and external corners should be formed as per manufacturer's specifications returning the membrane a minimum of 100 mm. Ensure that the apex of the corner is covered and sealed with tape and roll firmly. Cease and fold the membrane to ensure a close fit to the substrate profile and avoid hollows.

**e) Storage**

- Store in a dry condition, store indoors or under cover on pallets. Do not double stack pallets. Material shall be kept away from direct sunlight / UV resistance.

**14.PARTICULAR SPECIFICATIONS FOR SBS MODIFIED SELF ADHESIVE WATERPROOFING MEMBRANE TOPPED WITH HDPE VALERON FILM As per IS Code 16471:2017)**

**i) Material specifications and Process specification:**

**a) Surface Preparation**

- The concrete surface should be float finished and free from cavities and projecting ribs. All surfaces shall be dry and free from frost, contaminations like flaky materials, oil & grease, etc. Standing water must be removed, if any. Grout around all penetrations such as utility conduits, etc. for stability. Large gaps and voids must be pre-filled with cement mortar before the installation of membrane. Masonry surface must be flush pointed.

**b)Priming**

- The surface shall be primed with approved primer @ 5 sqm per litre. Ensure coverage and allow to dry. Only prime an area to which the SBS membrane can be applied the same day.
- Very porous surface may require more than one coat of primer.
- as the viscosity of the primer is very low, it easily penetrates into the concrete pores which promote the adhesion between the membrane and the concrete surface.

**c) Application**

- Start the installation of all the membrane plies from the low point, so that the flow of water is over or parallel to the plies, but never against the laps. Begin membrane application by unrolling the roll of membrane and aligning the side laps.
- Peel of the release film from the self-adhesive side and start unrolling the membrane and press it to the surface. Smoothen the membrane from the center to the edges with a wooden press in order to remove entrapped air. Furthermore, an iron roll shall be used for rolling on top of the applied membrane to ensure a proper and strong adhesion of the bitumen compound with the base surface.
- Side overlaps shall be a minimum of 75 mm on the selvedge and end overlaps 100 mm.

**d)Corners**

- internal and external corners should be formed as per manufacturer's specifications returning the membrane a minimum of 100 mm.

**e) Protection**

- The membrane shall be protected immediately after application from damage, due to ongoing site activities or from sharp aggregates during backfilling.

**e) Storage**

- Store in a dry condition, store indoors or under cover on pallets. Do not double stack pallets. Material shall be kept away from direct sunlight / UV resistance.

**15. PARTICULAR SPECIFICATIONS FOR SMC PANEL TANK**

15.1 Material specification and properties: Shall be as per IS Code 14399 Part-1.

15.2 Assembly, Installation and Testing : Shall be as per IS Code 14399 part-2.

**15.3 Leakage test:** After assembling, the tank shall be filled with water upto the overflow level and after 48 hours there shall be no visible sign of leakage. If the initial test fails, the leaks shall be stopped in accordance with the tank manufacturers recommendations and further test carried out.

**16. PARTICULAR SPECIFICATIONS FOR HYBRID POLY UREA WATERPROOFING TREATMENT**

**16.1 Material technical Properties :-**

PROPERTY	STANDARD	VALUE
Min Elongation	ASTM D 412	>400 %
Tensile Strength	ASTM D 412	>10 MPa
Tear Strength	ASTM D 624C	Min 45 N/mm

**16.2 Surface preparation:-**

The surface needs to be clean, dry and sound, free of any contamination, which may harmfully affect the adhesion of the membrane. Maximum moisture content should not exceed 5%. Substrate compressive strength should be at least 25 MPa, cohesive bond strength at least 1.5 MPa. New concrete structures need to dry for at least 28 days. Old, loose coatings, dirt, fats, oils, organic substances and dust need to be removed by a grinding machine. Possible surface irregularities need to be smoothed. Any loose surface pieces and grinding dust need to be thoroughly removed.

Cracks on the substrate (wider than 1 mm) required to be open in V-groove manner ( 5mm x 10mm size ) by using mechanical cutter, clean the same and seal with the Polyurethane sealant before overcoating with waterproofing membrane.

The careful sealing of existing cracks and joints before the application is extremely important. Clean concrete cracks and hairline cracks, of dust, residue or other contamination. Prime with epoxy Primer PU allow 2-3 hours to dry. Fill all prepared cracks with PU sealant.

Note :- Do not wash surface with water.

**16.3 Priming:-**

Once the surface preparation is completed (moisture content <5% before priming), the surface should be primed with Epoxy Primer with a min consumption of 200 gms per sqm. If the surface is highly porous (dry patches visible post application primer), second coat of primer will be required.

**16.4 Water Proofing Membrane:-**

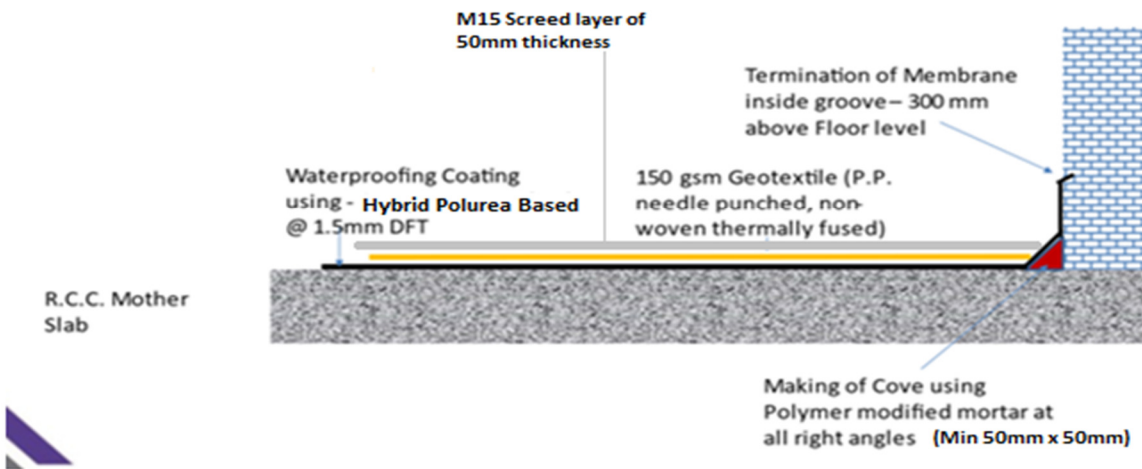
- Apply minimum 1.5 mm DFT waterproof spray membrane in all areas to be waterproofed.
- The Spray applied a two component 100% volume solids fast setting hybrid polyurea will be applied using plural component, high temperature / high pressure proportionating unit, fitted with mechanically purge impingement mix spray gun on concrete surfaces on primed surface.
- Waterproofing spray applied membrane will be terminated minimum 300 mm above the Floor area by making groove of minimum 5mm x 5 mm and waterproofing coating to be terminated inside the groove. After waterproofing coating is completely dry and groove will be sealed using Polyurethane based sealant, flushing with the surface finish. the top edge of retaining wall

### 16.5 Protection Screed:-

Spread minimum 120 gsm geotextile over cured hybrid polyurea as separation layer, before concrete screed is laid. Protect the liquid applied membrane in maximum 10 days of application using min M15 grade concrete screed of min 50 mm thickness in desired slope to protect the membrane from extended UV exposure and/or from mechanical damages and fill the saw cut joints using PU Sealant.

### 16.6 Quality Assurance :-

- Water Pond test will be carried out for Horizontal surfaces by ponding water as per ASTM D 5957 Standards for Minimum 72 hours
- The DFT of Waterproof Coating will be checked at minimum 3 locations for every 200 sqm or thereof.
- Pull out Adhesion Test will be carried out at minimum three locations for every 400 sqm or part thereof as per ASTM D 4541 standards.
- All materials delivered at project site will have MTC submitted for every batch delivered.



## 17. SPECIFICATION OF POLYCARBONATE ROOFING SYSTEM

### 17.1 Material

17.1.1 Poly carbonate sheet : The multi wall polycarbonate sheet having two or more layers, co-extruded with UV protection coating at external surface with or without standing vertical seam at both the ends for connectible

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

modular polycarbonate. The light transmission percentage through the polycarbonate sheet shall be ranging from 15-85% depending upon transparency, colour and thickness of sheet which shall be decided as per the direction of Engineer-in-charge.

17.1.2 PC Connector Polycarbonate connector profiles are mainly used as connectors between multiwall/multilayer standing seam polycarbonate panels

### 17.1.3 Tapo

17.1.3.1 Anti- dust tape : Anti dust tape for polycarbonate panels prevent dust, dirt and insects from entering the ends of the panels Usually, it is aluminum impermeable tape and used at all ends/ edges of the polycarbonate panels except the upper edge/ side of inclined slope roof where breather tape should be used.

17.1.3.2 Breather Tape: Usually, this tape is used on the upper edges/side of the polycarbonate panel on a sloped surface. It is aluminum ventilator tape. The breathable nature of the tape allows moisture to evaporate from the flutes of the polycarbonate sheet, while preventing dust, dirt and insect from entering (Soe fig No-1)

17.1.4 Dimension: Length of polycarbonate sheet is defined as parallel to the ribs, while width is perpendicular to the ribs (See fig No-2)

## 17.2. Properties:

17.2.1 Physical: The polycarbonate sheet shall be tested for Dart drop impact test as per IS 14443-97 and its value shall be more than 60 Jules and for yellowness Index as per ASTM E313 (D 1925) or ASTM D 2244 and confirms the following :

	ASTM E313 (D 1925)	ASTM D 2244
After 5000 Hours of exposure of UV / sun light	Less than 10 Units	Less than 6 Units

The Polycarbonate sheet shall have flame retardancy of UL. 94HB category for horizontal surface and 94V-0 category for vertical surface when tested as per IS 14434:2023 or comply the BS1D0 classification as per EN 13501 or conform to VO and HB as per ASTM D 635-18.

When cold-bending the multiwall polycarbonate, the flutes (ribs or channels) should follow the curve of the sheet and sheet should be bend longitudinally but never across the sheet width. The sheet shall be allowed to use within a temperature between - 64 °C to 100 °C (See flag No-3)

- Bending the sheet lengthwise to maintain its sheet strength and ensures proper drainage.
- Avoid over tensing the sheet or install sheets at the point of buckling. (See fig No-14)

Note: Sheets installed in extreme cold or hot weather conditions (even if the holes are pre-drilled) may crack or warp when the temperature fluctuates between the seasons

17.2.2 Multi wall Polycarbonate sheet without standing seam for various thicknesses shall satisfy following:

Thickness and layers	Thickness (in mm)	Weight (Kg/sqm)	U-Valve W/m <sup>2</sup> K	Min Bending Radius (in mm)
10mm 2- layered	10mm	1.70	3.02	1750
12mm 2-layered	12mm	2.10	2.60	2800

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

17.2.3 Multi wall polycarbonate sheet with standing seam for various thicknesses shall satisfy following:

Sl. No.	Thickness	U-value ( in W/m <sup>2</sup> K ) Note more than	Weight not less than (kg / sqm)	Minimum Cold bending radius (in mm)
1	12 mm	2.50 W/m <sup>2</sup> K	2.25	2800
2	16 mm	2.10 W/m <sup>2</sup> K	2.75	3100
3	18 mm	2.00 W/m <sup>2</sup> K	3.10	3400
4	20 mm	1.85 W/m <sup>2</sup> K	3.25	3600
5	22 mm	1.75 W/m <sup>2</sup> K	3.50	4000

#### 17.2.4 Chemical properties

Multiwall polycarbonate sheets shall not be affected by acids, alcohols, glycols, mineral oil, animal and vegetable fats, kerosene, and non-abrasive cleaners but affected by benzene, petrol, ketones, acetone, phenols, chlorinated and aromatize hydrocarbons. petroleum-based paints, abrasive cleaners and solvents, acetaldehyde, acetate acid, acetone acrylonitrile, ammonia, hydrogen sulphide, benzene, benzoate acid, benzoate alcohol calcium nitrate, bromoxynil, phenol, carbon disulfide, carbon tetrachloride, 5% potassium hydroxide, 5% hydroxide solutions, caustic soda, chlorobenzoate, chloroform, cresol, cyclohexanone, cyclohexene, dimethyl formamide, dioxathion, ethylamine, ethyl ether. 2-ethylene chlorohydrin, gasoline, methyl methacrylate, nitrobenzene, benzoate methylglyoxal, trichloroacetic acid, xylene, ammonia hydroxide. methylethylketone, dichloromethane, polyvinyl chloride, potassium hydroxide. sodium hydroxide and nitric acid Therefore, it may be checked with the manufacturer prior to use or exposure to chemical.

#### 17.3. Fabrication Tools

Multiwall sheets shall be fabricated on site and require table, circular saw with a fine-tooth blade, clamps, drill with a 6mm bit, tape measure, safety glasses, utility knife straight edge, sawhorses and a ladder which shall be arranged by the contractor

#### 17.4. Slope: -

The minimum slope of roof shall be kept 5° degrees.

#### 17.5 Laying: -

17.5.1 Rafters, the vertical sloping beams that make up the main framework of a roof shall run from the roof peak to the eaves and its size shall be decided for specific loading requirement and stresses due to wind and snow loads as per IS: 875. (See fig No-4)

17.5.2 Purlins, the horizontal framing members that span over rafters shall provide additional structural support for the roof and its maximum spacing shall be 1.00 m and it shall be fixed at 75 mm to 115 mm away from the apex of the terrace.

17.5.3 The detailed working drawings shall be submitted by the contractor to the Engineer-in-Charge before procurement of the material.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

17.5.4 Maximum unsupported projection of polycarbonate panel should not be more than 150 mm from the purlin.

## 17.6 Cutting

Polycarbonate sheets shall be cut with common power or manual tools depending on the length of the cut, the width of the panel, and the type of cut. To avoid melting of the plastic, a fine-tooth blade with at least 10 teeth per inch shall be used to cut at a high speed but a low advance rate (See fig No-5)

## 17.7 Installation procedure

17.7.1 Polycarbonate sheet without standing seam:

The multi wall polycarbonate sheet shall be fixed on purlins with 25 micron thick anodized Aluminium Alcox Section of size 60x18x2 mm top and bottom or any other section as per manufacturers specification along with Weather proof Neoprene / EPDM rubber gasket at both the sides of joint so that sheets are held rigidly together & sealed with silicon sealant to make the joint fully water proof. The weight of each Aluminium Section shall be not less than 462 gm/m (See fig No-6)

The open overhead ends of Polycarbonate sheet shall be fixed/caped with Anodized Aluminium channel section of thickness not less than 1.5 mm, of appropriate size as per sheet thickness, tightly gripping the sheet. The aluminium profile shall be fixed with MS purlin with the help of self-taping & self-drilling 55/65 mm long minimum 5 mm dia. steel screws at 300mm Centre to Centre spacing

### 17.7.1.1 Fastening

17.7.1.1.1 Self-tapping and self-drilling 5 mm dia and 55/65 mm long stainless steel screws with 12mm dia neoprene/EPDM washer with stainless steel washer whichever is higher in specification or as per direction of Polycarbonate manufacture may be used (See fig No-7)

17.7.1.1.2 The PC sheet up to 1.20 m width should be fastened to purlin/support at all four corners, and at points 150mm in from the edges of each purlin support and sheets beyond 1.20 m to 2 10 m with an additional screw in the center of each purlin support (See fig No-8)

17.7.1.1.3 The fasteners should be fixed perpendicular to the multiwall sheet as inclined insertion shall damage the sheet and or result in leakage and screws should not be over tightened which may cause the sheet to dimple, premature failure and buckle. A correctly installed fastener will sit flush against the sheet (See fig No-9)

An electric screwdriver with an adjustable clutch should be used to tighten the screws Avoid excess over tightening, which might induce undue internal stresses

### 17.7.1.2 Edge Treatment

17.7.1.2.1 Tape: The edge shall be sealed with sealing tape on both ends of a multiwall sheet to prevent dust, bugs, and excess moisture from entering the flutes. A solid aluminium foil-coated tape with an all-weather adhesive may be used to seal off the top of a multiwall sheet and vented aluminium foil coated tap to seal the bottom of sheet. Vent tape provides moisture-control and helps to maintain sheet clarity. (See fig No-1)

17.7.1.2.2 A polycarbonate U-channel/ anodized aluminium channel of 1.5 mm thick may be used to cap off the top and bottom of a multiwall sheet, preventing debris from accumulating within the walls. Drill weep holes at every 300mm in U-channel to ensure proper moisture drainage. (See fig No-10) pull out load requirement for wind load needed for wind speeds up to 50 m/sec per IS:875 tested.

It shall be designed separately for extreme wind speed for coastal areas where cyclone winds are predominating

**Note : For coastal areas, drawings/system shall be designed as per wind pressure of the region.**

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

17.7.2.5 Groove shall be cut in standing seam for fixing minimum 1mm thick aluminium channel/U-Profile after cleaning the edges of panel and mounting anti-dust breather tape on the edge of panels. (fig- 27, 28, 29)

#### 17.7.1.3 Drilling

Pre-drill holes 1.60mm larger than the screw's diameter shall be provided in the sheet to provide additional fasteners in sheet more than 1.20 m wide using low speed drilling to allow for thermal expansion which will provide enough space for seasonal

temperature fluctuation Drilling should not be done within 25-35 mm from edge of the multi wall sheet. (See fig No-11)

#### 17.7.1.4 Sealants

After installing polycarbonate sheet profiles and protective masking is removed, points where the sheet meets the building's exterior walls may be sealed with a thin bead of 100% silicon sealant to keep away the air, moisture and debris (See fig No-12) However silicon sealant should be compatible with polycarbonate sheet as per IS 11433-1994

#### 17.7.2 Polycarbonate sheet with standing seam:

17.7.2.1 Length of the panel shall be as per length required at site to avoid any joints/overlapping in longitudinal direction. In some unavoidable circumstances where lapping is required, purlin at that location is fixed in two levels so that there will be a difference of 75 to 80 mm in elevation (see fig No -15). At this location there will be minimum overlapping of panels, of 150 mm (in longitudinal direction). Pre-coated GI sheet of "Z" shape of thickness not less than 0.5mm shall be fixed in this overlapping portion as shown in Fig-15 to avoid any water leakage

17.7.2.2 For any other shape of roofing like dome, pyramid etc. the panel should be cut down as per required shape, as per manufacturer's specification and as per direction of Engineer-In Charge. A special protection shall be taken on the cutting edges to avoid breakage/ cracks on the panel. Thus, experienced fabricators approved by Engineer-in-charge should be deployed for the work. (Fig No.16 to 27)

17.7.2.3 Ridge & gutter may be provided with pre-coated galvanized sheet of approved specification

17.7.2.4 The sheet shall be fixed on purlins with grip lock double tooth locking mechanism and interlocking connector along the length, fixed with SS 304, 1 mm thick fastener /cleat with minimum base 35 mm and top holding of min 50 mm or any other cleat arrangement as per manufacture recommendations on standing seam secured with minimum 2 numbers of self-drilling screws of stainless steel of size 5mm dia and 25mm long having min 20 TPI to ensure the pull-out load requirement. The ends of polycarbonate connector shall be fixed with end cap. (See fig No-30, 31, and 32) The joining system of sheets with MS Structure and cleat shall be designed to with stand the Frequency of testing:

Lot size (Area of sheet in sqm)	No of samples
250-1000	1
1001-2000	2
2001-5000	3
5001 and above	4

#### 17.8. Peeling off Protective Film

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

Multiwall sheets come with a protective film. This film protects the sheets from scratches and provides important product information. Keep the film on until the sheets are fully installed. If needed for cutting, taping, and/or fastening, remove approximately two (2) inches of film from the top and bottom edges of the sheet. The film in the center of the sheet should remain attached while installing the sheet. Remove the remaining film after the installation of the sheet is complete.

### **17.9. Precaution**

Multiwall sheets shall be installed with the UV-protected side up or facing the sun and in sheets with only one UV-protected side, the protective film indicates protected side.

- (i) Sheets shall be with the flutes (ribs or channels) running vertical (downward) to allow for proper drainage.
- (ii) Sheets should be installed with the rib channels sloping downwards (Figs. 1a, 1c, 2) so that orientation will reduce accumulation of dirt inside the sheet and ease gravity drainage of condensation moisture.

### **17.10. Guarantee/ warranty**

The contractor should undertake to provide a guarantee/warranty bond of minimum 10 years against any manufacturing defect of the polycarbonate panels.

### **17.11. Mandatory Test**

- a) Dart Drop impact test as per IS 14443-1997
- b) Flammability as per IS 14434:2023/EN 13501/ASTM D635-18
- c) Yellowness Index as per ASTM E-313 (D1025) or ASTM (D2244)

### **17.12. Measurement**

17.1 Length and breadth shall be measured correct to a cm and the area shall be calculated in square meters correct to two places of decimal.

17.2 The superficial area of roof covering shall be measured on the flat without any allowance for laps. Portions of roof covering, overlapping the ridge or hips etc shall be included in the measurements of the roof.

17.3 No deductions in measurements shall be made for openings up to 0.4 sqm and nothing extra shall be allowed for forming such opening. For any opening exceeding 0.40 sqm in area, deduction in measurement for full opening shall be made and in such cases the labour involved in making these openings shall be paid for separately.

### **17.13. Rate**

The rate shall include the cost of all the materials and labour involved in all the operations described above except otherwise stated. This includes the cost of polycarbonate panels, SS fastener, Aluminium U profile, polycarbonate connector, anti-dust tape, breather tape, self-drilling screws, wafer head screw, hoisting and fixing, scaffolding, T&P and cost of safety precautions etc. but excludes the cost of pre-coated galvanized material like ridge, gutter purlin etc. (if required, these are to be paid separately).

## **18. TESTING CHARGES TO BE BORNE BY CONTRACTOR**

**18.1 All expenditure to be incurred for testing of samples e.g., packaging, sealing, transportation, loading, unloading, etc. including testing charges shall be borne by contractor**

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

19. **Notwithstanding anything mentioned elsewhere in the document, the water supply fittings shall be provided with aerators as per DG OM No. 59/1/2019/WI/DG/43. Model/ make shall be get approved by enginner-in-charge.**

**SPECIAL CONDITIONS**

1. The order of precedence in case of any confusion/dispute will be as follows:
  - i. Nomenclature of items given in the schedule of quantities in the tender.
  - ii. Particular Specifications
  - iii. Special conditions
  - iv. Drawings
  - v. CPWD Specifications as mentioned in clause 11 under Schedule-F and any other Specifications mentioned therein with upto-date correction slips.
  - vi. Relevant I.S. Codes or International Codes, in that order.
  - vii. Directions of Engineer-in-charge shall be applicable where none of the above is available.

A reference made to any Indian Standard Specifications in these documents, shall imply to the latest version of that standard, including such revisions / amendments as issued by the Bureau of Indian Standards upto last date of receipt of tenders. The Contractor shall keep at his own cost all such publications of relevant Indian Standard applicable to the work at site.

2.0 The contractor will have to work according to the programme of work, decided by the Engineer-in-charge for which purpose the contractor should submit a tentative program of the work within one month from the date of start of the work. 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 payment due at agreement rates will be entertained from the Contractor on this account.

3.0 The contractor shall take instructions from the Engineer in charge for stacking of materials in any place. No excavated earth or building material shall be stacked on areas where other buildings, roads, services or compound walls are to be constructed.

4.0 The work shall be carried out in accordance with the Architectural drawings and structural drawings. The structural and architectural drawings shall have to be properly correlated before executing the work. In case of any difference noticed between architectural and structural drawings, final decision, in writing, of the Engineer-in-charge shall be obtained by the contractor. In case of any discrepancy in the item given in the schedule of quantities appended with the tender and architectural drawings related to the relevant items, the former shall prevail unless and otherwise given in writing by the Engineer in charge. Samples shall be prepared before starting particular items of work for prior approval of the Engineer in charge and nothing extra shall be payable on this account.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

5.0 All the material to be used on works shall bear ISI certification mark unless otherwise the make is specified in the item or special conditions appended with this tender document. In case ISI mark materials or the materials mentioned in the tender documents are not available, as per opinion of Engineer-in-charge, which shall be final and binding, the material to be used shall conform to CPWD specifications applicable in this tender or IS Code. In such cases Engineer-in-charge shall satisfy himself about the quality of such materials and give his approval in writing. Only articles classified as first quality by the manufacturers shall be used unless otherwise specified. All material not having ISI mark shall be tested as per relevant ISI specification. The Engineer in charge may relax the condition regarding testing if the quantity of the materials required for the work is small. In all cases of use of ISI marked materials proper proof of procurement of materials from authentic manufacturers shall be provided by the contractor to the entire satisfaction of Engineer in charge.

6.0 All materials equivalent to the one specified should be got approved by the Engineer- in- Charge before using the said materials in the work.

7.0 The contractor shall comply with the provision of any Government acts which relate to the work and to the regulations and laws of any local authorities. The contractor shall give all notices required by the said acts, laws etc. and pay all fees payable to such authorities and allow for those contingencies, cost of restorations etc. and all other fees payable to the local authorities.

8.0 The contractor shall comply with proper and legal orders and directions of the local or public authority or municipality and abide by the rules and regulations and pay all fees and charges which he may be liable.

9.0 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.

#### 10.0 BRIEF WORDING OF ITEMS:

10.1 For the purpose of recording measurements and preparing running account bills, the underlined portions of the nomenclature of items included in the Schedule of Quantities shall be adopted as the abbreviated nomenclature of the particular item. The abbreviated nomenclature shall be taken to cover all the materials and operations as per the complete nomenclature of the relevant item in the agreement and relevant specifications. In the case of items for which abbreviated nomenclature is not indicated in the Schedule of Quantities, the full nomenclature shall be reproduced while recording measurements and preparing the bills. Also following abbreviations may be adopted.

- A) P/L for: Providing and Laying
- B) P/F for: Providing and Fixing.
- C) C.C. for: Cement Concrete.
- D) C.M. for: Cement Mortar.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

- 11.0 In case of extra/substituted items of work for which brief wording is not provided in the agreement, the full nomenclature of the item shall be reproduced in the measurement books and bill forms of running bills.
- 12.0 The full nomenclature of the items shall be adopted in preparing abstract of final bill in the measurement books and also in the forms for final bills.
- 13.0 The agency shall construct suitable site office, laboratory & display room for samplestobeused at work.
- 14.0 Agency shall make his own arrangement of water, electricity & generator to be used in work. Department will not provide the above facility.
- 15.0 Samples including brand / quality of materials and fittings to be used in the work shall be got approved from the technical sanctioning authority, well in advance of actual execution and shall be preserved till the completion of the work.
- 16.0 The cost of work shall be 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.
- 17.0 The work shall be executed and measured as per metric dimensions given in the Scheduleof quantities, drawings etc. (F.P.S. units wherever indicated are for guidance only).

18.0The following modifications to the above specifications shall however apply:

All stone aggregate and stone ballast shall be of hard stone variety to be obtained from source approved by the Engineer-in-charge.

Coarse sand should be obtained from source approved by the Engineer-in-charge. The coarse sand shall be screened before using, if required. The same shall be clean and sharp angular grit type. If the sand brought to site is dirty, it must be washed in clean water to bring the sand to the required specifications. Nothing extra shall be payable on this account.

Fine sand should be obtained from source approved by the Engineer-in-charge. The fine sand shall be screened, if required. The same shall be clean and sharp angular grit type. If the sand brought to site is dirty, it must be washed in clean water to bring the sand to the required specifications. Nothing extra shall be payable on this account.

The precast AAC blocks confirming to BIS 2185 part-III 1984 of approved size shall be used. The blocksshall be obtained from approved manufacturer by the Engineer-in-charge.

19. Unless otherwise specified in the schedule of quantities, the rates tendered by the contractor shall be inclusive of all cost & taxes and shall apply to all leads and lifts and nothing extra shall be payable on this account.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

20. The rates for all items of work shall, unless clearly specified otherwise, include cost of all labour, material, tools and plants and other inputs involved in the execution of the item.
21. The foundation trenches shall be kept free from water while works below ground level are in progress.
22. No foreign exchange shall be made available by the Department for importing (purchase) of equipment, 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.
23. All ancillary and incidental facilities required for execution of work like labour camp, stores, fabrication yard, offices for Contractor, watch and ward, temporary ramp required to be made for working at the basement level, temporary structure for plants and machineries, temporary barricading as per rules of local body all around the working sites, water storage tanks, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates, completion certificates from local bodies etc., protection works, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts. Before start of the work, the Contractor shall submit to the Engineer-in-Charge, a site / construction yard layout, specifying areas for construction, site office, positioning of machinery, material yard, cement & other storage, fabrication yard, site laboratory, water tank etc.
24. 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, notwithstanding the fact that the Contractor may have to pay extra amounts for any reason, to the labours 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.
25. All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.
26. Any legal or financial implications resulting out of carriage of earth from outside or disposal of earth shall be sole responsibility of the contractor. Nothing extra shall be paid on this account.
27. The work should be planned in a systematic manner so that chase cuttings in the walls, ceilings and floors are minimized. Wherever absolutely essential, the chase shall be cut using chase cutting machines. Chases will not be allowed to be cut using hammer / chisel. The electrical boxes should be fixed in walls simultaneously while raising the masonry work / partitions. The contractor shall ensure proper coordination of various disciplines viz. sanitary & water supply, electrical, fire-fighting and any other services.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

28. All the hidden items such as water supply lines, drainage pipes, conduits, sewers etc. are to be properly tested as per the design conditions submitted before covering.

## **29. Quality Assurance**

29.1 The contractor shall ensure quality control measures on different aspects of construction including materials, workmanship and correct construction methodologies to be adopted.

29.2 The contractor shall get the source of various raw materials namely aggregate, cement, sand, steel, water etc. to be used on the work, approved from the Engineer-in-Charge and trial mixes for controlled concrete shall be done using the approved materials. The contractor shall stick to the approved source unless it is absolutely unavoidable. Any change shall be done with the prior approval of the Engineer-in-Charge for which tests etc. shall be done by the contractor at his own cost.

29.3 Similarly, the contractor shall submit brand/make of various materials to be used for the approval of the Engineer-in-Charge along with samples and once approved, he shall stick to it. Any change will have to be got approved from engineer in charge in advance.

29.4 The contractor shall submit shop drawings of staging and shuttering arrangement, stone cladding and other works including mock work as desired by Engineer-in-Charge for his approval before execution. The contractor shall also submit bar bending schedule for approval of Engineer-in-Charge before execution.

29.5 The contractor shall depute Quality Manager exclusively for enforcement of quality control. Such Quality Manager should be a qualified engineer with minimum 8 years of similar experience. For all staff to be deployed for quality assurance, the contractor may refer to clause 32 under schedule "F" attached.

## **30. Safety Precautions:**

Contractor shall within two weeks of award of work, submit to the Engineer-in-Charge for his approval, list of measures for maintaining safety of manpower deployed for construction and avoidance of accidents.

## **31. Scaffolding:**

For facia work, outer finishing and other RCC works etc. double steel scaffolding having two sets of vertical supports with steel staircase for inspection of works by engineer in charge shall be used. The supports shall be sound and strong, tied together with horizontal piece over which scaffolding planks shall be fixed.

## **32. SAMPLES FOR TESTING: -**

32.1 Samples of all materials required for testing is included in the cost of work. Similarly, all testing in house or through external lab shall be borne by the contractor.

32.2 If any load testing or special testing is to be done for any sample whose strength is doubtful, the cost of the same shall also be borne by the contractor.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

32.3 In case there is any discrepancy in frequency of testing as given in list of mandatory tests and that in individual sub-heads of work as per CPWD Specifications, higher of the two frequencies of testing shall be followed.

32.4 The contractor has to establish field laboratory at site as specified in CPWD Specifications including all necessary equipment for field tests at his own cost within one month from the award of work. The items in the field laboratory shall be provided and taken away only with the written permission of the Engineer-in-charge.

32.5 The contractor shall arrange to conduct field test **at site** for, Dry Film Thickness (DFT) and Adhesion for the material of painting work items. The tests shall be done in the presence of technical representative of the manufacturer from whom the paint has been procured. The test frequency shall be as follows :

**i) For Dry Film Thickness (DFT):** One location for every 100 m<sup>2</sup> and 10 tests at each location. The probe used shall be the one for picking DFT values from mortar / concrete surface. The record shall mention the name & make of instrument used.

**ii) For Adhesion test:** One location for every 200 m<sup>2</sup> and **one** test at each location. The probe used shall be the one for picking DFT values from mortar / concrete surface. The record shall mention the name & make of instrument used.

33. The contractor should submit for approval of Engineer-in-Charge, samples of the work to be performed under the specified items of work before actually commencing the mass execution of the work under the item. The contractor shall also submit **shop drawings** for structural steel work (including the details of lugs, fillets and such supports, type and size of weld, welding electrode proposed to be used, and any other details sought by Engineer-in-Charge), plumbing work, electrical conduiting work, etc. wherever required by Engineer-in-Charge of Civil and / or Electrical stream.

#### **34. Maintenance of Register of Tests**

All the registers of tests carried out at construction site or in outside laboratories shall be maintained by the contractor which shall be issued to the contractor by Engineer-in-Charge in the same manner as being issued to CPWD field staff.

All samples of materials including cement concrete cubes shall be taken jointly with contractor by JE and out of this at least 50% samples shall be taken in presence of AE in charge. If there is no JE, all samples of materials including cement concrete cubes shall be taken by AE jointly with contractor. All the necessary assistance shall be provided by the contractor. Cost of sampling & testing are to be borne by the contractor and he shall be responsible for safe custody of samples to be tested at site/ outside laboratory.

All the tests in field lab at construction site shall be carried out by the Engineering staff deployed by the contractor and shall be witnessed by the representative of Engineer in charge

All the entries in the registers will be made by the designated Engineering Staff of the contractor and same should be regularly reviewed by JE/AE/EE cum SM/CE cum ED.

Contractor shall be responsible for safe custody of all the test registers.

Submission of copy of all test registers and Material at site register along with each alternate Running Account Bill and Final Bill shall be mandatory. These registers should be duly checked by Assistant Engineer in division office and receipts of registers should also be acknowledged by Accounts Officer.

If all test registers are not submitted along with alternate R/A Bill & Final Bill, no payment will be released to the contractor.

**35. Maintenance of Material at Site (MAS) Register-**

- i. All the MAS Registers including cement and Steel Registers which shall be issued to the contractor by Engineer-in-Charge, shall be got issued by Engineer-in-Charge and maintained by Contractor at site and shall be open for inspection by the Department.
  - ii. All material brought at site shall be entered in MAS/ other than items in small quantity exempted by Engineer-in-charge in writing.
  - iii. GST paid bill of all materials entered in MAS register shall be maintained in Guard file. A copy of any bill, as demanded by Engineer-in-charge shall be made available to him. For materials not entered in MAS also, Engineer-in-Charge may ask for GST paid bills, which the contractor shall provide to him.
36. Some restrictions may be imposed by the district administration/client on the working and on movement of labour, materials etc in the campus. The contractor shall be bound to follow all such restrictions / instructions. Executive Engineer-in-charge of work will issue the identity cards to all persons authorized by him to do work / visit the work site and no claim whatsoever shall on this account will be entertained.
37. The contractor shall submit to the Engineer-in-charge on the 7th day of each month, 2 hard copies and one on soft copy (CD) of monthly progress report of work. Such progress report will include the project progress, summary, work progress (planned vs actual), CPM chart, status of financial progress and achievement of milestone, manpower deployment status, and inventory of materials and photographs of important activities.
38. The contractor(s) shall inform/issue notices to the Municipality, police and other authorities that may be required as per law and obtain all requisite permission/ licenses for temporary obstructions, enclosures etc. Contractor(s) shall pay all fee, taxes and charges which may be levied on account of these operations in executing the contract. He shall make good any damage to the property whether public or private and shall supply and maintain lights either for illumination or for cautioning the public at night. The contractor(s) shall do the barricading enclosing the area as per direction of Engineer-in-charge, and nothing extra will be payable on this account.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

39. The Contractor(s) shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night, speed limit board, red flags, red lights and providing barriers. He shall be responsible for all damages and accidents caused to existing/new work due to negligence on his part. No hindrances shall be caused to traffic during the execution of the work. In case of any accident of labours / contractual staff's the entire responsibility will rest on the part of the contractor and any compensation under such circumstances if becomes payable the same shall be entirely borne by the contractor and department shall have no role on this account.
40. The contractor(s) shall take instructions from the Engineer-in-Charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall be stacked on areas where roads, services and compound walls are to be constructed. The stacking shall take place as per stacking plan. However, if any change is required, the same shall be done with the approval of Engineer-in-Charge.
41. Contractor(s) shall provide permanent bench marks, flag tops and other reference points for the proper execution of work and these shall be preserved till the end of the work. All such reference points shall be in relation to the levels and locations, given in the Architectural and plumbing drawings.
42. Contractor at his cost put up the barricading all around the building site through suitable method for segregating the construction site and also to control the dust pollution. Entry to site shall be control for proper security of man and materials and to avoid accidents.
43. On completion of work, the Contractor(s) shall submit at his own cost four prints of "**as built**" drawings to the Engineer-in-Charge. These drawings shall have the following information.
- Run off all piping and their diameters including soil waste pipes and vertical stacks.
- Ground and invert levels of all drainage pipes together with locations of all manholes and connections, upto outfall.
- Run off all water supply line with diameters, locations of control valves, access panels etc.
44. Water tanks, taps, sanitary, water supply and drainages pipes, fittings and accessories should conform to the specifications provided in bidding documents, if CPWD Specifications are not available, NBC – 2016, IS codes shall be follows. The contractor(s) should engage approved, licensed plumbers for the work and get the materials (fixtures/fittings) tested, by the municipal Body/Corporation authorities wherever required at his own cost. The Contractor(s) shall submit for the approval of the Engineer-in-Charge the name of the plumbing agency proposed to be engaged by him.
45. The contractor shall give performance test of the entire installation(s) as per the specifications & codes in the presence of the Engineer-in-charge or his authorized representative before the work is finally accepted and nothing extra what-so-ever shall be payable to the contractor for the test.

46. Any cement slurry added over base surface for continuation of concreting for better bond is deemed to have been built in the items and nothing extra shall be payable and no extra cement considered in consumption on this account.
47. The Contractor shall bear all incidental charges for cartage, storage and safe custody of materials issued by department/arranged by the contractor.
48. The work shall be carried out in accordance with the Architectural drawings and structural drawings, to be prepared and submitted by architectural/structural consultants engaged by the contractor, duly vetted and approved by the Engineer-in-Charge. Before commencement of any item of work the contractor shall correlate all the relevant architectural and structural drawings, nomenclature of items and specifications etc. issued for the work and satisfy himself that the information available there from is complete and unambiguous. The figure and written dimension of the drawings shall be superseding the measurement by scale. The discrepancy, if any, shall be brought to the notice of the Engineer-in-charge before execution of the work. The contractor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and or incomplete information and no claim whatsoever shall be entertained on this account.
49. Other agencies/sub contractor will also simultaneously execute and install the works of other specialized nature as indicated in bid document, lifts, fire-fighting, HVAC etc. of this work and the contractor shall extend necessary facilities for the same. The contractor shall leave such recesses, holes, opening etc. as may be required for the electric pipes, sanitary & water supply lines and other related works and nothing extra shall be payable on this account.
50. The contractor shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other contractor(s) or by the Engineer-in-Charge and shall as far as possible arrange his work and shall place and dispose off the materials being used or removed, so as not to interfere with the operations of other contractor simultaneously working or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of others.

#### 51. **PROGRAMME CHART**

The Contractor shall prepare an integrated program chart in **Primavera software OR MS Project OR any other form like PERT Chart / Bar Chart**, etc. as approved by the Engineer-in-charge, for the execution of work, showing clearly all activities from the start of work to completion, with details of manpower, equipment and machinery required for the fulfillment of the program within the stipulated period or earlier and submit the same for approval to the Engineer-in-Charge within ten days of award of the contract.

The program chart should include the following:

Descriptive note explaining sequence of the various activities.

Network (PERT/CPM/BAR CHART) in Primavera Software

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

Program for procurement of materials by the contractor.

If at any time, it appears to the Engineer-in-Charge that the actual progress of work does not confirm to the approved program referred above, the contractor shall produce a revised program showing the modifications to the approved program to ensure completion of the work. The modified schedule of program shall be approved by the Engineer-in-Charge. Non-submission of such revised program shall attract the recoveries as per relevant clauses of GCC 2023 for construction.

The submission for approval by the Engineer-in-Charge of such program or the furnishing of such particulars shall not relieve the contractor of any of the duties or responsibilities under the contract. This is without prejudice to the right of Engineer-in-Charge to act against the contractor as per terms and conditions of the agreement.

52. If the work is carried out in more than one shift or during night, no claim on this account shall be entertained. Normally contractor shall not allow executing the RCC, electrical and finishing work at night. Work at night shall, however, be allowed if the site conditions/circumstances so demand. However, if the work is carried out in more than one shift or at night, no claim on this account shall be entertained. The contractor has to take permission from the police authorities etc. if required in such situation the contractor shall make available to the department, proper means of communications such as Vehicle etc. at his own cost.

53. Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar service encountered in the course of the execution of work shall be protected against the damage by the contractor at his own expense. In case the same are to be removed and diverted. The same shall be payable to the contractor. The contractor shall work out the cost and the same shall be approved by Engineer-in-Charge. The contractor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services.

54. The contractor shall be responsible for the watch and ward / guard of the buildings safety, fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the department. No extra payment shall be made on this account.

### **SAMPLE OF MATERIALS**

55. BIS/ISI marked materials except otherwise specified shall be subjected to quality test at the discretion of the Engineer-in-Charge besides testing of other materials as per the specifications described for the item/material. Wherever BIS/ISI marked materials are brought to the site of work, the contractor shall, if required, by the Engineer-in-Charge furnish manufacturer's test certificate or test certificate from approved testing laboratory to establish that the material / procured by the contractor for incorporation in the work satisfies the provisions of specifications/BIS codes relevant to the material and / or the work done.

For certain items, if frequency of tests not mentioned in the CPWD Specifications and then relevant IS code shall be followed and tests shall be carried out as per the frequency specified therein.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

56. The contractor shall render all help and assistance in documenting the total sequence of this project by way of photography, slides; audio-video recording etc. nothing extra shall be payable to the contractor on this account. Cost of photographs, slides, audio-videograph etc. shall be borne by the contractor.
57. The contractor shall be fully responsible for the safe custody of materials brought by him/issued to him even though the materials may be under double lock and key system.
58. The contractor shall procure the required materials in advance so that there is sufficient time for testing of the materials and approval of the same before use in the work. The contractor shall provide at his own cost suitable weighing and measuring arrangements at site for checking the weight / dimensions as may be necessary for execution of work. The sealed samples are to be handed over to the testing lab by contractor in the presence of Junior Engineer/Assistant Engineer-in-Charge of work.
59. Malba, rubbish & other waste materials shall be disposed off to recycling agents. No deduction on this account shall be made from the agency.

**60.0 Approval From local Authorities:**

- 60.1 The Architectural drawings and structural drawings have been prepared. The contractor shall submit the same to applicable Local body for approval and pursue for getting approval. He must submit interaction evidences with local bodies.
- 60.2 The agency shall take all necessary statutory approval from all local authorities including Local authority as applicable, CFO, DGCA, Pollution Control Board, CRZ, Environmental, MSEB/TATA/BEST/Reliance, AAI clearances or any other agency as applicable.
- 60.3 The agency shall take all necessary statutory approval of Occupancy Certificate and 'Completion Plan' from all local authorities including CFO, DGCA, Pollution Control Board, Environmental buildings after completion of construction work.
- 60.4 The payment to local bodies for approval will be made by the contractor which will be reimbursed to him without any CP&OH on production of original receipts. The amount shall not form part of the total work done. No other payment shall be made to the contractor in this regard. The requisite payment modes like Bank guarantees/Demand drafts shall be drawn on behalf of **Executive Engineer, MCD-I, CPWD, Mumbai-20.**
- 60.5 All the demolition work shall be carried out as per local bdy norms. Regulations laid by Maharashtra Pollution control Board shall be duly followed. Nothing extra shall be paid for the same.

**61. DEFECT LIABILITY PERIOD (REFUND OF SECURITY DEPOSIT) :**

- 61.1 The defect liability / maintenance period shall be 12 months after the date of completion of work for this contract agreement. The Security Deposit shall be released after the defect liability period of 12 months after completion of work and for this, the contractor shall have to produce a certificate stating that no defects are pending for rectification from the Engineer-in-charge, but subject to other provisions specified elsewhere in the contract agreement.

61.2 In case the contractor does not rectify the defects after getting notice from the Engineer-in-charge, the defect liability period shall get extended without further notice and remain extended till the defects are removed by the contractor.

61.3 All statutory payments required for these approvals from local authorities shall be made by the Engineer-in-charge. For saving of time if the payment is required to be made urgently the contractor/consultant should make the payment and the amount will be reimbursed by the department after production of original voucher & receipts.

## **62 SAFETY MEASURES:**

62.1 The issue of construction safety & standards has gained utmost importance in recent times. This subject is to be dealt with in an integrated manner with an approach to developing and establishing a safety culture at work sites. Broadly, its components are:

62.1.1 Creating awareness.

62.1.2 Education.

62.1.3 Training.

62.1.4 Implementation.

62.1.5 Enforcement measures.

All workers of contractor and associate agencies, invariably and at all the times, must follow all safety norms, adopt safe construction practices and use all required safety gadgets in their working throughout the project duration.

62.2 The Contractor shall monitor and achieve the objectives of construction safety continuously, progressively and through affirmative action, and shall oversee implementation of safety program over the entire construction period through a dedicated & qualified safety manger. Nothing extra shall be paid on this account.

62.3 The contractor will abide all local body byelaws during the currency of work.

62.4 Nothing extra shall be payable to the contractor for complying with all the special conditions and additional specifications unless specifically mentioned in the above paras

## **63. Warning / Caution Boards :**

All temporary warning / caution boards / glow signage display such as "Construction Work in Progress", "Keep Away", "No Parking", Diversions & protective Barricades etc. shall be provided and displayed during day time by the Contractor, wherever required and as directed by the Engineer-in-Charge. These glow signage and red lights shall be suitably illuminated during night also. The Contractor shall be solely responsible for damage and accident caused, if any, due to negligence on his part. Also, he shall ensure that no hindrance, as far as possible, is caused to general traffic during execution of the work. This signage shall be dismantled & taken away by the Contractor after the completion of work, only after approval of the Engineer – in – Charge. Nothing extra shall be payable on this account.

## **64. Sign Boards :**

- i. 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, Associate contractors and specialized agencies. Nothing extra shall be payable on this account.
- ii. A display board shall be kept at site which would list the names of workers, teams and agencies following safety program in the best manner. This would be updated weekly.
- iii. Necessary protective and safety equipment shall be provided to the Site Engineer, Supervisory staff, labour and technical staff of the contractor by the Contractor at his own cost and used at site.
- iv. 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.

**65. Barricading of site :**

The entire site is to be barricading with colour coated GI sheets of height 3 m from Road level. The barricading should be rigid enough to withstand Gusty winds. The Barricading shall be taken away by the contractor after completion of work. No separate payment will be made for erection of such barricading around the site.

**66. SPECIAL CONDITION FOR HARDWARE AND SANITARY WARES :**

- a. Engineer-in-Charge will take a decision regarding model numbers of equivalent Door/window hard ware/ sanitary ware at the time of execution, in case the material, from the manufacturer whose model number is mentioned, is not available. However, in case, the equivalent model so approved, is cheaper than the model already mentioned in item/approved makes list, the price adjustment will be made based on the difference in market rate. In case, the rate of subsequently approved model is more, no extra payment will be made on this account.”
- b. The following procedure should be followed in case of removal of rejected/sub-standard materials from the site of work.
  - i) Whenever any material brought by the contractor to the site of work is rejected, entry thereof should invariably be made in the site order book under the signature of the AE/AEE giving approximate quantity of such materials.
  - ii) As soon as the material is removed, a certificate to that effect may be recorded by the AE/AEE against the original entry, giving the date of removal, mode of removal i.e. whether by truck, carts or by manual labour. If removal is by truck, the registration number of the truck should be recorded.

**67. INSPECTION OF WORKS :**

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

- a. In addition to the provisions of relevant clauses of the contract, the work shall also be open to inspection by the Chief Engineer, Mumbai-I, CPWD and other senior officers of CPWD in addition of the Engineer-in-charge, his authorized representatives. The contractor shall at times during the usual working hours and at all times at which reasonable notices of the intention of the Engineer-in-charge or other officers as stated above to visit the works shall have been given to the contractor, either himself be present to receive the orders and instructions or have a responsible representative duly accredited in writing, to be present for that purpose.
- b. Senior Officers of CPWD, Dignitaries from Central Ministry / Department, IACS Authorities shall be inspecting the on-going work at site at any time with or without prior intimation. The contractor shall, therefore, keep updated the following requirements and detailing: -
- c. Display Board showing detail of work, weekly progress achieved with respect to targets, reason of shortfall, status of manpower, wages being paid for different categories of workers.
- D. Entrance and area surrounding to be kept cleaned.
- E. Display layout plan key plan, building drawings including plans, elevations and sections
- F. Upto date displays of programme chart (Bar charts).
- G. Keep details of quantities executed, balance quantities, deviations, possible Extra item, substituted Item etc.
- H. Keep plastic / cloth mounted one sets of building drawings.
- I. Set of Helmets and safety shoes for safety

**68. DE-WATERING :**

- a. De-watering required, if any, shall be done conforming to BIS Code IS: 9759 (guide lines for de-watering during construction) and / or as per the specifications approved by the Engineer-in-Charge. Design of an appropriate and suitable dewatering system shall be the Contractor's responsibility. Such scheme shall be modified / augmented as the work proceeds based on fresh information discovered during the progress of work, at no extra cost. At all times during the construction work, efficient drainage of the site shall be carried out by the Contractor and especially during the laying of plain cement concrete, taking levels etc. The Contractor shall also ensure that there is no danger to the nearby properties and installations on account of such lowering of water table. If needed, suitable precautionary measures shall be taken by the Contractor. Also the scheme of dewatering adopted shall have adequate built in arrangement to serve as stand-bye to attend to repair of pumps etc. and disruption of power / fuel supply. Nothing extra shall be payable for all the operations described in this para.
- b. In trenches where surface water is likely to get into cut / trench during monsoons, a ring bund of puddle clay or by any other means shall be formed outside, to the required height, and maintained by the

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

Contractor. Also, suitable steps shall be taken by the Contractor to prevent back flow of pumped water into the trench. Nothing extra shall be payable on this account.

- i. For works below ground level the contractor shall keep that area free from water. If dewatering or bailing out of water is required the contractor shall do the same at his own cost and nothing extra shall be paid except otherwise provided in the items of Schedule of Quantities.
- ii. The Contractor shall make all necessary arrangements for protecting from rains, fog or likewise extreme weather conditions, the work already executed and for carrying out further work, during monsoon including providing and fixing temporary shelters, protections etc. Nothing extra shall be payable on this account and also no claims for hindrance shall be entertained on this account.
- iii. 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 notwithstanding any other provisions elsewhere in the contract agreement. Also, the Contractor shall make good, at his own cost, the damages caused, if any. Further, no claims for hindrance shall be entertained on this account.
- iv. The contractor will take reasonable precautions to prevent his workman and employees from removing and damaging any flora (plant/vegetation) from the project area.

**69. ROAD :**

- a. The contractor shall at his own expense and risk arrange land for accommodation of labour, workmen, and supervisors, setting up of office, the storage of materials, erection of temporary workshops, construction of approach roads to the site of the work including land required for carrying out of all jobs connected with the execution & completion of the work. If during construction, it becomes necessary to remove or shift the stored materials shed workshop, access roads, etc, to facilitate execution of any other work by any other agency, the contractor shall carry out the removal of shifting as directed by the Engineer – in – charge and no claim whatsoever, shall be entertained on this account.
- b. The site shall be handed over as on basis and it shall be deemed that the contractor has satisfied himself as to the nature and location of the work, transport facilities, availability of land for setting up of camp, etc. the department will bear no responsibility for lack of such knowledge & the consequences thereof.
- c. Contractor should provide his plan for labour huts as per his requirement and get it approved from the Engineer-in-Charge. The contractor will be provided limited space for hutments of security personal / watchmen inside the campus. The contractor shall make his own arrangement for housing all construction workers & labour at his own cost and nothing extra shall be payable on this account.

**70.0. SPECIALCONDITIONS FOR CEMENT: -**

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

- 70.1 The contractor shall procure Ordinary Portland Cement (OPC) [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 List of Approved Make or from any other reputed cement Manufacturer. Chief Engineer / CPM / ADG / SDG may change the brand of cement depending upon availability in local market but confirming to grade mentioned in NIT and only with the ISI mark, if warranted. The name of the manufacturers should be finalized after taking into consideration the availability and cost factor.
- 70.2 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 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.
- 70.3 Use of PPC (Portland Pozzolana Cement) shall be used in RCC structures in accordance with the circular issued by the Directorate General of Works vide No.CDO/SE(RR)/Fly Ash (Main)/102 dt.09.04.2009. The use of PPC shall be regulated as per the conditions stipulated in the circular dt.09.04.2009.
- 70.4 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.
- 70.5 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.
- 70.6. 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 trails.
- 70.7 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.
- 70.8 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.
- 70.9 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.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

- 70.10 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.
- 70.11 While using PPC for structural concrete work, no further admixing of flyash shall be permitted.
- 70.12 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 the NIT approving authority, in case less than 100MT cement is required for the work, shall be constructed by the contractor at the 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.
- 70.13 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.
- 70.14 The cement shall be got tested by Engineer-in-charge and shall be used on 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 shall be borne by the contractor.
- 70.15 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 38 of the contract and shall be governed by conditions therein. In case Cement consumption is less than theoretical consumption including permissible variation, work is to be rejected & in case of excess consumption, no adjustment needs to be made.
- 70.16 Cement brought to site and cement remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-charge.
- 70.17 Damaged cement shall be removed from site immediately by the contractor on receipt of notice in writing from the Engineer-in-charge. If he does not do so within three days of receipt of such notice, the Engineer-in-charge shall get it removed at the cost of the contractor.
- 70.18 Cement should be kept in godowns under double locks and keys and its consumption account invariably maintained, whether the cement is supplied departmentally or arranged by the contractor. A register should be maintained at the site of each work costing above Rs.20,000.00. This register should contain the columns as shown in Appendix-30. (CPWD Works Manual 2022, SOP No. 3/14). The pages of the register should be machine numbered and each page initialed by the EE. The cement godown and the register are required to be checked by the AE/EE in-charge of the work as per following schedule.
- At least weekly or fortnightly, respectively in case of works at the Headquarters of AE/EE. Whenever they visit the site of work in case of works located outside the Sub-Divisional/Divisional Head Quarters.

## 71.0 SPECIAL CONDITIONS FOR STEEL

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

71.1 Only ISI marked (IS:1786) Corrossion Resistant TMT Bars of various grades shall be procured from Steel manufacturer as per the following guidelines:

The Special Director General (Project Region / Region) / ADG (Project Region / Region) of respective regions shall approve the steel manufacturers subject to the guidelines for eligibility criteria and other technical parameters given below.

71.2 Credentials for eligibility criteria & other technical parameters for steel manufacturers:

A) The manufacturer should meet the following eligibility criteria:

The Steel manufacturer 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 sufficiently 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) Steel produced must be ISI marked (IS 2830:2012)

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)
- iii) Raw material laboratory: Arrangement for testing Carbon, Sulphur & Phosphorous etc.
- v) other testing facilities as specified in IS: 1786:2008 & IS: 2830:2012

- 71.3 SDGs / ADGs are also authorized to approve particular steel manufacturer on suomotto in case they are satisfied with the eligibility criteria and other technical parameters of that manufacturer.
- 71.4 The steel reinforcement bars shall be brought at site in bulk supply of 10 MT or more or as decided by the Engineer in charge. The steel reinforcement bars shall be stored by the contractor at site of work in such a way as to prevent distortion & corrosion & nothing extra shall be paid on his account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting & checking.
- 71.5 The contractor shall have to obtain and furnish test certificates to the Engineer-in-charge in respect of all supplies of steel brought by him to the site of work. 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 of written orders from the Engineer-in-Charge to do so.
- 71.6 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 that specified below:

SIZE OF BAR	FOR CONSIGNMENT BELOW 100 MT	FOR CONSIGNMENT ABOVE 100 MT
Under 10 mm dia, bar	One sample for each 25 MT or part there of	One sample for each 40 MT or part there of
10 mm to 16 mm dia. bar	One sample for each 35 MT or part there of	One sample for each 45 MT or part there of
Over 16 mm dia. bar	One sample for each 45 MT or part there of	One sample for each 50 MT or part there of

- 71.7 The contractor shall supply free of charge the steel required for testing including its transportation to testing laboratories. The cost of tests shall be borne by the contractor.
- 71.8 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 than theoretical consumption including permissible variations, recovery at the rate as prescribed shall be made. In case of excess consumption, no adjustment need to be made.
- 71.9 The Steel brought to site and remaining unused shall not be removed from site without the written permission of Engineer-in-Charge.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

The following procedure should be followed in case of removal of rejected/sub-standard materials from the site of work.

Whenever any material brought by the contractor to the site of work is rejected, entry thereof should invariably be made in the site order book under the signature of the AE/AEE giving approximate quantity of such materials.

As soon as the material is removed, a certificate to that effect may be recorded by the AE/AEE against the original entry, giving the date of removal a mode of removal i.e. whether by truck, carts or by manual labour. If removal is by truck, the registration number of the truck should be recorded.

When it is not possible for the AE/AEE to be present at the site of work at the time of actual removal of the rejected/sub-standard materials from the site the required certificate should be recorded by the Junior Engineer and the AE/AEE should countersign the certificate recorded by the Junior Engineer.

### **73.0 SPECIAL CONDITION FOR WATER PROOFING TREATMENT**

73.1 Work shall be executed as per CPWD Specifications, 2019 Vol I & II with upto date correction slips.

73.2 The contractor shall associate himself with the specialized firm, to be approved by the Chief Engineer Mumbai – I, CPWD, Mumbai.

#### **73.3 GUARANTEE FOR WATER PROOFING TREATMENT**

Ten years guarantee in prescribed form attached must be given by the contractor for the water proofing treatment. In addition, 10% (ten percent) of the cost of these items would be retained as guarantee to watch the performance of the work executed. However, half of this amount (withheld) would be released after two monsoon seasons after the date of completion of the work, if the performance of the waterproofing works is satisfactory. The remaining withheld amount can be released after completion of ten monsoon seasons after the date of completion of work, if the performance of the waterproofing work is satisfactory. If any defect is noticed during the guarantee period, it should be rectified by the contractor within seven days and, if not attended to, the same shall be got done by other agency at the risk and cost of the contractor. In any case the guaranteeing firms during the guarantee period should inspect and examine the treatment once in every year and make good any defect observed. However, the security deposit can be released in full, if bank guarantee of equivalent amount for ten (10) years is produced and deposited with the department.

### **74.0 VARIATION IN CONSUMPTION OF MATERIALS**

74.1 The variation in consumption of material shall be governed as per CPWD specification and clauses of the contract to the extent applicable. The following specific clauses shall govern the variation in consumption of pig lead.

i) The pig lead for caulking of joints of SCI pipes shall be issued as per theoretical consumption for SCI pipes of size 100mm, 75mm, 50mm at 0.98 kg., 0.88 kg, 0.77 kg per joint respectively.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

ii) Over and above the theoretical quantities of lead as worked out a variation of 5% shall be allowed for wastage etc. Any difference between the actual consumption of pig lead and theoretical consumption worked out on the above basis including the authorised variation shall be recovered at the rate mentioned under schedule "F". Where the pig lead is arranged by the contractor, variation of 5% will be allowed. In case variation is on the higher side 5% will be allowed. In case the variation is on the lower side, the quantity of the pig lead less used shall be recovered from the contractor at market rate to be determined by the Engineer-in-charge whose decision in the matter will be final and binding.

#### **75.0 Materials obtained from dismantle:**

75.1 The contractors in course of their work should understand that all materials (e.g. stone and other materials) obtained in the work of dismantling excavation etc. will be considered Government property and may be issued to the contractor if required for use in this work at rates approved by the Engineer-in-charge, if credit items of dismantled items are not taken in schedule of quantity.

#### **76.0 Materials brought by the contractor.**

76.1 The contractors shall have to deposit the approved paints of required color and shade as per actual requirements of the work to be done, with the Engineer-in- Charge at his departmental stores at the site of work.

- a. The paint will be issued to the contractor from time to time according to his requirements
- b. The work in the same manner as the issue of materials stipulated to be issued departmentally.
- c. Similar procedure shall be followed for water proofing compound.
- d. The day-to-day receipt and issue quantity account of water proofing compound, paints etc. shall be maintained by the Junior Engineer and signed daily by the contractor or his authorised agent.
- e. Empty containers should not be removed without the written permission of the Engineer-in-charge.

#### **77.0 LIST OF SPECIALISED ITEMS:**

- i. Water proofing treatment work (SBS/HDPE/PU waterproofing system).
- ii. Aluminum composite panel & structural glazing.
- iii. Stainless-steel railing
- iv. SMC panel water tank
- v. Polycarbonate sheet roofing
- vi. Demolition of existing structure
- vii. Any other item decided by Engineer-in-charge

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

### **77.1 Procedure for Execution of the Specialized Items:**

Such items should be got executed only through associated agencies specialized in these fields. The contractor shall indicate the name(s) of his associated specialized agencies those fulfilling the conditions described in SOP No. 4/7 of CPWD Works Manual-2019 as early as possible and within one month of award of work to Engineer-in-Charge for approval of competent authority.

Specialized Agencies for works shall be approved by the competent authority. The contractor shall quote the rates after careful study of contract conditions, specifications, drawings & schedule of quantities.

It shall be the responsibility of main contractor to sort out any dispute / litigation with the Specialized Agencies without any time & cost overrun to the Department. The main contractor shall be solely responsible for settling any dispute / litigation arising out of his agreement with the Specialized Agencies. The contractor shall ensure that the work shall not suffer on account of litigation/ dispute between him and the specialized agencies / sub-contractor(s). No claim of hindrance in the work shall be entertained from the Contractor on this account. No extension of time shall be granted and no claim what so ever, of any kind, shall be entertained from the Contractor on account of delay attributable to the selection/rejection of the Specialized Agencies.

For specialized items, the main contractor cannot work as a specialized agency unless his name is already included in the list of approved specialized agencies for these items. The contractor shall get these items executed through the specialized agencies as approved by competent authority.

### **78.0 SPECIAL CONDITION FOR DEMOLITION WORK**

78.1 Work shall be executed as per CPWD Specifications, 2019 Vol I & II with upto date correction slips.

78.2 The contractor shall associate himself with the specialized firm, to be approved by the Chief Engineer Mumbai – I, CPWD, Mumbai.

78.3 Form I to V as enclosed in this NIT shall required to be submitted of the associated agency before execution of demolition work.

**79.0** “Not withstanding anything contained elsewhere, in case of any conflicting provisions / specifications / conditions in these documents, the more stringent provisions / specifications / conditions shall be applicable.

**80.0 Structural drawings are available in the office of the Executive Engineer, MCD-I. Bidders may visit the office for reference, if required.**

**GUARANTEE TO BE EXECUTED BY CONTRACTOR**  
**FOR REMOVAL OF DEFECTS**  
**AFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS.**

This agreement made this \_\_\_\_\_ day of \_\_\_\_\_ Two Thousand \_\_\_\_\_ between \_\_\_\_\_ son of \_\_\_\_\_ (hereinafter called the guaranter on one part) and President of India (hereinafter called Government on the other part).

WHEREAS THIS agreement is supplementary to a contract (hereinafter called the contract) dated \_\_\_\_\_ and made between the GUARANTER OF THE ONE part and the GOVERNMENT of the other part, where by the contractor, interalia, undertook to render to buildings and structures in the said contract recited completely water and leak proof.

AND WHEREAS THE GUARANTER agreed to give a guarantee to the effect that the said structures will remain water and leak - proof for **TENYEARS** from the date of giving the water proofing treatment.

NOW THE GUARANTER hereby guarantees that water proofing treatment given by him will render the structures completely leak - proof and the minimum life of such water proofing treatment shall be **TEN YEARS** to be reckoned from the date after the maintenance period prescribed in the contract.

Provided that the guaranter will not be responsible for leakage caused by earthquakes or structural defects or misuse of roof or alterations and for such purpose :

- a) misuse of roof shall mean any operation which will damage proofing treatment, like chopping of firewood and things of the same nature which might causedamage to the roof,
- b) alteration shall mean construction of an additional storey or a part or construction adjoining to existing roof, where by water-proofing treatment is removed in parts :
- c) the decision of the Engineer-in-Charge with regard to cause of leakage shall be final.

During this period of guarantee the guaranter shall make good all defects and in case of any defects being found, render the building water proof to the satisfaction of Engineer-in-Charge at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from 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 GUARANTER'S cost and risk. The decision of the Engineer-in-Charge as to the cost, payable by the Guaranter shall be final and binding.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

That if Guaranter fails to execute the water proofing or commits breach thereunder, then the Guarantor will indemnify the principal and his successors against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of GUARANTER 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 of the parties.

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

SIGNED, sealed and Delivered by (OBLIGOR) in the presence of :

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

SIGNED FOR AND ON BEHALF OF THE PRESIDENT OF INDIA by \_\_\_\_\_ in the presence of :

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

**GUARANTEE TO BE EXECUTED BY CONTRACTORS FOR REMOVAL OF DEFECTS AFTER COMPLETION  
IN RESPECT OF PREMIUM ACRYLIC EMULSION PAINT OF INTERIOR WORKS.**

This agreement made this ----- day of ----- -----Two thousand and -----  
between ----- son of ----- of -----(hereinafter called  
the Guarantor of the part) and the PRESIDENT OF INDIA (hereinafter called the Government of the other Part)

WHEREAS THIS AGREEMENT is supplementary to the contract (hereinafter called for Contract) dated ----  
----- and made between the GUARANTOR of the one part and the GOVERNMENT of the other part, hereby  
the Contractor interalia, under took that the acrylic painting work done on building will remain non-flaking and  
uniform colouring without patches and **shall adhere to all specification that form part of the contract.**

AND WHEREAS THE GUARANTOR agreed to give a guarantee to affect that the said Premium Acrylic  
painting will remain non-flaking and uniform colouring without patches for **FIVE YEARS** from the date of  
completion of work.

NOW THE GURANTOR hereby guarantee that Premium Acrylic painting done by him will remain non-  
flaking and uniform colouring without patches and the minimum guarantee period of such painting shall be **FIVE  
YEARS** to be reckoned form the date of the completion of workof the contract.

Provided that the guarantor will not be responsible for damage caused due to force majeure events like  
earthquake etc. or misuse of buildings or alteration and for such purpose. The decision of the Engineer-in-Charge  
with regard to cause of damage shall be final and binding.

During this period of guarantee the guarantor shall make good all defects to the satisfaction of the  
Engineer-in-Charge at his cost and shall commence the work for such rectification within seven days from the  
date of issue of notice from 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 other applicator or contractorat 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 the defects or commits breach there under then the guarantor will  
indemnify the principal and his successors against all loss, damage cost, expenses or otherwise which may be  
incurred by him by reasons of any default on the part of 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  
and the decision of the Engineer-in-Charge will be final and binding on both the parties.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

An amount equivalent to 2% of relevant item from schedule of quantity will be deducted from Bills as security and the same will be refunded after **FIVE YEARS** from the date of completion of work.

IN WITNESS WHEREOF these presents have been executed by the obligator ----- and by ----- and for and on behalf of the PRESEDENT 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 TO BE EXECUTED BY CONTRACTORS FOR REMOVAL OF DEFECTS AFTER COMPLETION  
IN RESPECT OF PREMIUM ACRYLIC SMOOTH EXTERIOR PAINT WORKS.**

This agreement made this ----- day of ----- -----Two thousand and -----  
between ----- son of ----- of -----  
(hereinafter called the Guarantor of the part) and the PRESIDENT OF INDIA  
(hereinafter called the Government of the other Part)

WHEREAS THIS AGREEMENT is supplementary to the contract (hereinafter called for Contract) dated -----  
----- and made between the GUARANTOR of the one part and the GOVERNMENT of the other part, hereby  
the Contractor interalia, under took that the acrylic painting work done on building will remain non-flaking and  
uniform colouring without patches **shall adhere to all specification that form part of the contract.**

AND WHEREAS THE GUARANTOR agreed to give a guarantee to affect that the said Acrylic painting will  
remain non-flaking and uniform colouring without patches for **SEVEN YEARS** from the date of completion of work.

NOW THE GURANTOR hereby guarantee that Acrylic painting done by him will remain non-flaking and  
uniform colouring without patches and the minimum guarantee period of such painting shall be **SEVEN YEARS** to  
be reckoned form the date of the completion of workthe contract.

Provided that the guarantor will not be responsible for damage caused due to force majeure events like  
earthquake etc. or misuse of buildings or alteration and for such purpose. The decision of the Engineer-in-Charge  
with regard to cause of damage shall be final and binding.

During this period of guarantee the guarantor shall make good all defects to the satisfaction of the  
Engineer-in-Charge at his cost and shall commence the work for such rectification within seven days from the  
date of issue of notice from 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 other applicator or 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 the defects or commits breach there under then the guarantor will  
indemnify the principal and his successors against all loss, damage cost, expenses or otherwise which may be  
incurred by him by reasons of any default on the part of 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  
and the decision of the Engineer-in-Charge will be final and binding on both the parties.

An amount equivalent to 2% of relevant item from schedule of quantity will be deducted from Bills as  
security and the same will be refunded **after 07 (SEVEN) YEARS** from the date of completion of work.

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

IN WITNESS WHEREOF these presents have been executed by the obligator ----- and by -----  
----- and for and on behalf of the PRESEDENT 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

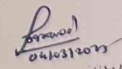
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**PREFERRED MAKE LIST (CIVIL)****Note:**

1. The Contractor shall obtain prior approval from the Engineer-in-charge before placing order for any specific material or engaging any of the specialized agencies. The Contractor shall make a detailed submittal with catalogues and highlighted proposed specifications, as well as full details of the works proposed to be executed by the specialized agency, as specified.
2. Wherever applicable, the Engineer-in-charge may approve any material equivalent to that specified in the tender subject to proof being offered by the Contractor for equivalence to his satisfaction.
3. Unless otherwise specified, the brand / make of the material as specified in the particular specifications and in the list of approved materials attached in the tender, shall only be used in the work.

Sr. No.	Description of items	Approved Makes
1	AAC Blocks	Birla Aerocon, Ultratech, Siporex, Ecolite
2	Acoustic Insulation	U P Twiga, Lloyd Insulation, Saint Gobain, Knauf, Anutone
3	Adhesive For AAC Block	Ultratech, Ardex Ferrous Endura, Sika, Pidilite.
4	Adhesive For Tiles (Is: 15477 : 2004)	Sika, Pidilite, Cico, Fosrock, Homesure
5	Anchor / Ss Stone Cladding Clamps / Dash Fasteners	Hilti, Fischer, Anchor, Cannon. Bosch
6	Aluminum Door / Window Fittings	Classic, Define, Bhoruka, Jyothi, Sigma, Ebco.
7	Aluminium Composite Panel	Aludecor, Eurobond, Alstrong, Alucobond, Alstone
8	Aluminium Extrusion Sections	Jindal, Hindalco, Indal (Use Of Domal/Superior/Heavier Sections Only. Engineer-In-Charge May Relax This Condition As Per Work Requirement).
9	All Types Of Silicone	Dow Corning, Basf, GE, Wacker
10	Anodizing	Lakshmi Anodisers, Aura Architectural Coatings, Alufin, Bhoruka
11	Automatic Sliding Door Operating System	Dorma, Ozone, Cosyst Devices or Equivalent
12	Backer Rod	Supreme Industries, Norton, Bow, Aastha
13	Calcium Silicate Board	Starpan, Hilux, Aerolite, Promat
14	Carpet Tiles & Rolls	Welspun Group, Roya, SMJ, Shaw
15	Calcium Silicate False Ceiling Tiles	Hilux, Aerolite, Diomond, Anutone, Armstrong, Saint Gobain Gyproc, Hunter Douglas
16	Centrifugally Cast (Spun) Iron Pipes And Fittings	Neco, SKF, Kapilansh, Rpmf
17	Cement	ACC, Ultra Tech, J. P. Cement, Vikram, Shree Cement, Birla Shakati, Cement Corporation of India

  
 का. मुख्य अभियंता (सु-1)

18	Cement Primer	Nerolac, Berger, BP White Of Berger, Decoprime Wt Of Asian Paints, White Primer Of Ici Dulux
19	Ceramic Tiles	RAK, Kajaria, H & R Johnson, Somany, Nitco, Orient Bell
20	Concrete Blocks ( Is: 2572 : 2005)	Conwood, Gurjari, Hindustan, Lok Group, Sai Block, Ved Pmc Ltd
21	Composite / Italian Marble	Nitco, Classic Marble, Euro, Asian
22	CPVC Pipes & Fittings	Astral, Birla Hil, Supreme, Finolex, Prince, AKG
23	CP Brass Water Supply Faucets (Fittings) Superior Range	Jaquar, Kohler, Roca, Marc, Grohe
24	CP Brass Water Supply Faucets (Fittings) Normal Range	Hindware, Jaquar, Parryware Prima (ISI Marked), Cera, Ess-Ess, Marc, Kohler, Roca
25	Crystalline Water Proofing Compound (Is : 2645 : 2003)	Fosroc Crystalline, Dr. Fixit Crystalline, Sika Crystalline, Asian Paints Crystalline Quart, BASF, Cico, Ardex Endura
26	D I Pipes & Fittings	Electrosteel, Jindal, Tata Ductura, Sripipes (Lenco)
27	Door Stopper / Indicator Bolt / Push Plate	Dorma, KICH, Hafele, Magnum
28	Epdm Gaskets	Ame Rubber Industries Pvt. Ltd. , Bohra Rubber, Anand Nvh, Roop Polymer, Osaka.
29	Epoxy Flooring	Asian Paints, Fosroc, Bostik, Ardex, Pidilite
30	False Ceilings & Sections	Aerolite, Anutone, Knauf, USG Boral, Hunter Douglas, Saint Gobain, Diamond
31	Fire Retardant Paint	Jotun, Promat, Dulux, Akzonobel, Asian Paints
32	Fire Smoke Seal	Hilti, Promate Fire, Atroflame, Raven
33	Fire Rated Hardware	Dorma, Ingersolrand, Dorset, Backers Fs, Geze, Bhawani Fire .
34	Fire Rated Glass	Saintgobain, Promate Fire, Schott, Pilkinton, Bhawani Fire
35	Flush Door Shutters (Wooden) (Is : 2202 : 1983)	Jain Doors, Kenwood, Anchor, Kutty, Greenply, National, Mayurply, Duroply, Century, Kalpataru (Note: Only Isi Marked Flush Doors Shutters To Be Used)
36	Float Glass Mirror	Modiguard, Saint Gobain, Asahi
37	Float Glass	Saint Gobain, Asahi Glass, Emirates Glass, Guardian Glass, Hng, Pilkinton Glass
38	FRD Frame & Shutters	Kenwood, Anchor, Kutty, Bhawani Fire.
39	Furniture (Readymade)	Godrej, Durian, Nilkamal, Featherlite
40	Fire Rated Hinged Doors (Wooden Composite) Is : 3614 : 2021	Jain Doors, Godrej, Navair, Promat
41	Galvanization	Jenco Group, Sadhana Engineering Corporation Of Steelite Engineering Ltd.

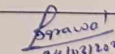
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कार्यपालक अभियंता (यो)  
का. मुख्य अभियंता (मुं-1)

42	G.I.Pipes And Fittings	Sail, Zenith, Tata, Jindal(Hissar), Prakash Surya
43	Glass Mosaic Tiles	Bisazza, Italia, Coral, Mridul, Birla, Jk Cement, Pavitpalladio
44	Glass Processor ( For Safety Glass Etc.)	Saint Gobain, Asahi Glass, Emirates Glass, Guardian Glass (Sunguard), Sejal, Glasstech, Fuso, Fg, Gsc, Nsd, Schott.
45	Glass Door Hardware	Dorma, Kich, HefeLe, Ozone, Geze, Dorset,
46	Glass Fiber Strand	Saint Gobain, Nippon Electric Glass Co. Ltd, Sterlite
47	Grouts	Ardex Endura, Ferrous Crete, Myk Laticrete, Basf, Fosrock, Pidilite, Saint Gobain
48	Gypsum Board / Glass Reinforced Gypsum Tile For False Ceiling	Saint Gobain Gyproc India, Usg Boral Board, Armstoring, Diamond
49	HDPE Pipes	Reliance, Jainpipes, Oriplast, Supreme, Sy-Aron
50	High Density (HDF), Prelaminated Board	Pergo, Greenply, Alstone, Ecoste, Echon
51	Hydraulic Door Closer, Floor Spring	Hardwyn, Dorma, Godrej, Everite, Dorset, Hafele, Hetich, Kich
52	Hydrophobic Coating	Dupont, Dow Corning, Evercrete, Aquamix
53	Hot Press Moulded Thermosetting Glass Fibre Reinforced Polyester Resin (Grp) Sectional (Smc Tank) Water Storage Tanks: Capacity Range:-1000 L To 1200000 L (Is 14399 (Part-1 &Part-2):1996	Sovisy, Sintex, Amitex
54	Intumescent Strips	Promat, Pemko, Intumex, Astroflame
55	Laminates	Formica, Merino, Greenlam, Century, Archid, Kitply, Sunmica, Decolam, Asislam
56	Low Relaxation Prestressing Strands	Tata, Usha Martin, Dp Wires
57	Locks & Latches	Godrej, Dorset, HefeLe, Yale, Link
58	Masking Tape	3M, Sun, Wonder Tape, Roop Polymer
59	Metal False Ceiling	Armstrong, Hunter Douglas, Interarch, Mcra
60	Metallic / Steel Fire Door	Shakti, Promat Navair, Fire, Godrej, Kenwood, Bhavani Fire.
61	Melamine Polish	1. Asian Paints: Melamine Gold 2. Pidilite Industries: Wudfin 3. Dulux; Timbertone
62	HDPE Membrane Water Proofing System For Basement	Basf, Ferrous Crete, Shalimar, Pidilite, Ardex Endura, Myk Arments, Asian Paints
63	Micro Concrete	Asian Paints, Fosroc, Sika
64	NP2 Class, R.C.C. Pipes	Jain Spun Pipe, K. K. Spun Pipe, The Indian Hume Pipe Co. Ltd., Patel Hume Pipes
65	PVC Tanks	Sintex, Plasto, Lotus (Isi Marked)
66	Paver Blocks / Tactile Tile	Vyara, Super, Johnson
67	PVC / WPC Kitchen Cabinets & Cupboards	Rajshree, Alstone, Ecoste

68	Prelaminated Particle Board Exterior Grade	Gvk Novapan, Marino, Kitply, Tesa, Ecoboard, Archid, Century, Greenlam, Action Tesa, Greenlam.
69	Pre Mixed Cement Sand Mortar	Pure, Walplast, Ultratech, Asian Paints, Acc
70	Acrylic Smooth Exterior Paint	1. Apex Suprema Of Asian Paint 2. Weathercoat Glow Of Berger 3. Dulux Professional Weathershield Prima E-900 Of Dulux 4. Excel Super Of Nerolac
71	Premium Acrylic Smooth Exterior Paint	1. Apex Ultima Suprema Of Asian Paint 2. Wc Longlife Flexo Of Berger 3. Dulux Professional Weathershield Prima E-1000 Of Dulux 4. Xi Total Of Nerolac, Weather Coat All Guard Of Berger
72	Acrylic Emulsion Interior Paint	1. Apcolite Suprema Of Asian Paint 2. Bison Emulsion Of Berger 3. Dulux Promise Smart Choice Of Dulux 4. Nerolac Beauty Of Nerolac
73	Premium Acrylic Emulsion Interior Paint	1. Apcolite Suprema Premium Of Asian Paint 2. Rangoli Tot Care Of Berger 3. Dulux Professional Interior A-900 Of Dulux 4. Nerolac Beauty Gold Premium Of Nerolac
74	Epoxy Primer	1. Protectomastic Rpl Of Berger 2. Interseal 670Hs Of Dulux 3. Neromastic 400 Of Nerolac
75	Epoxy Paint	1. Epoxy 2 Pk Finish Of Asian Paint 2. Epilux 155 Enamel Of Berger 3. Interthane 990 Of Dulux 4. Neropoxy 5055 Finish Of Nerolac
76	Aliphatic Pu Paint	1. Bergerthane Pu Finish Of Berger 2. Interthane 990 Of Dulux 3. Nerothane Pu Emamel Of Nerolac
77	Steel Primer Red Oxide Zinc Chromate	1. Truecare High Performance Of Asian Paint 2. Bp Pro- Zinc Yellow Of Berger 3. Dulux Red Oxide Metal Primer Of Dulux 4. Red Oxide Primer Of Nerolac
78	Synthetic Enamel Paint	1. Apcolite Premium Gloss Enamel Of Asian Paint 2. Luxol Hi Gloss Of Berger 3. Dulux Professional Premium Enamel Of Dulux 4. Nerolac Guddy Synthatic Enamel (Nse) Of Nerolac

कार्यपालक अभियंता (यो)  
का. मुख्य अभियंता (मुं-1)

79	Polycarbonate Sheet	Lexan, Mg Polyplast, Ge Silicons, Danapal, Polygal India
80	Ppr Pipes	Sfmc, Prince, Kpt Pipes, Supreme
81	Plasticizer, Admixture, Super Plasticizer, Curing Compounds.	Sika, Fosroc, Basf, Sunanda Chemicals Lts, Rofe / Dr. Fixit (Pidlite Industries), Cico, Ardex Endura (Balendura), Asian Paints
82	PVC Door Frames And Shutters	Rajshri, Plastiwood, Sintex, Accura, Duroplast, Kaka
83	PVC Flooring	LG Hausys, Armstrong, Gerflor, Responsive Industries
84	PVDF Coating	Aura Architectural Coatings, M. J. Coaters Pvt. Ltd., S P Architectural Coatings Pvt Ltd., Ameco
85	Ready Made Gypsum Plaster	Ferrous Crete, Ultratech, Gyproc
86	Ready Mix Concrete	Skyway, A.C.C., Ultra Tech, Lafarge, Rmc Ready Mix, Godrej
87	Reinforcement Steel (Tmt Fe 500D) (Crs Steel)	Sail, Tata Steel, Rinl, Jindal Steel & Power Ltd.(Jsol), Jsw Steel Ltd.
88	Reflective Soft Coated / Low E Glass	Saint Gobain, Asahi Glass, Emirates Glass, Guardian Glass, Glaverbel
89	Rolling Shutters & Grills	Standard, Swastik, Shubdhwar
90	Rock Wool/ Glass Wool	Vetrotex Industries Pvt. Ltd., Up Twiga, Rock Wool India Ltd. Dow Coring, Lloyd Insulation
91	S. F. R. C. Covers	K. K. Spun Pipe, Jain Spun Pipe, S. S. Industries, Pragati
92	Spider Patch Fitting, For Curtain Glazing	Dorma, Hafele, Kich, Ozone, Saint Gobain (Model: Scvax)
93	Structural Steel, Ms Erw Pipes & Tubes (Is: 1239-Part-I-2004, Is: 4923-2017, Is: 1161-2014, Is: 3601-2006, Is: 9295-1983, Is: 3589-2001]	Tata Steel, Sail, Rinl, Jindal, Mpl Steel Pipes,
94	S.S Butt Hinges	Prayag, Ozone, Dorma, Kich, Hafele
95	Stainless Steel Screws	Kundan, Alloy Ltd., Gkw, Nettlefold, Atul Fastener.
96	S.S Bolts, Washers, Nuts	Kundan, Pooja, Atul Hilti
97	S. S. Handles	Dorma, Kich, Hafele, Dorset
98	S.S Friction Hinges	Hetich, Hafele, Ebco, Roto
99	Stainless Steel Pipes For Railing	Made From Salem Steel, Jindal Or Sail Sheet.
100	S S Press Fit Pipes & Fittings	J - Press Or Equivalent
101	Sanitary Wares	Kohler, Roca, Cera, Hindware, Parryware
102	S. S. Sink	Neelkanth, Nirali, Jindal, Futura, Cera, Diamond, Hindware, Joyna
103	SWR Pipes & Fittings	Birla Hil, AKG, Supreme, Astral, Finolex, Prince
104	Thermal Insulation Treatment	Pidilite, Basf, Rock India

  
 04/10/2023  
 कार्यपालक अभियंता (यो)  
 एम. मुख्य अभियंता (मुं-1)

**Schedule Of Quantities (Civil)**

**Name of Work: Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai. (Civil work)**

SLNo	Description	Qty	Unit	Rate	Amount
<b>1</b>	<b>Carriage of Material</b>				
1.1	Excavated Earth by Mechanical transport including loading, unloading and stacking beyond <b>10 km upto 20 km</b>	4800.00	Cum	719.28	3452544
1.1	Excavated Rock by Mechanical transport including loading, unloading and stacking beyond <b>10 km upto 20 km</b>	2040.00	Cum	1139.63	2324845
<b>2</b>	<b>EARTH WORK</b>				
2.1	Earth work in excavation by mechanical means (Hydraulic excavator)/ manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including getting out and disposal of excavated earth lead upto 50 m and for all lift, as directed by Engineer-in-charge.				
2.1.1	All kinds of soil	4800.00	Cum	200.34	961632
2.2	Earth work in excavation by mechanical means (Hydraulic excavator)/ manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including getting out and disposal of excavated earth lead upto 50 m and lift upto 1.5 m, as directed by Engineer-in-charge.				
2.2.1	Ordinary rock	1360.00	Cum	563.09	765802
2.2.2	Hard rock (blasting prohibited)	680.00	Cum	1617.34	1099791
2.3	Excavating trenches of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 m, 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				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	surplus excavated soil as directed, within a lead of 50 m :				
2.3.1	Pipes, cables etc. exceeding 300 mm dia but not exceeding 600 mm.	194.00	Metre	620.49	120375
2.4	Close timbering in trenches including strutting, shoring and packing cavities (wherever required) complete. (Measurements to be taken of the face area timbered).				
2.4.1	Depth exceeding 3 m but not exceeding 4.5 m	1190.00	Sqm	214.05	254720
2.5	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 and for all lif.	1825.00	Cum	221.22	403727
2.6	Extra for every additional lif of 1.5 m or part thereof in excavation / banking excavated or stacked materials.				
2.6.1	All kinds of soil	2925.00	Cum	143.12	418626
2.7	Supplying chemical emulsion in sealed containers including delivery as specified.				
2.7.1	Chlorpyriphos/ Lindane emulsifiable concentrate of 20%	670.00	Litre	264.96	177523
2.8	Diluting and injecting chemical emulsion for POST-CONSTRUCTIONAL anti-termite treatment (excluding the cost of chemical emulsion) :				
2.8.1	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:	130.00	metre	60.33	7843
2.8.1.1	With Chlorpyriphos/Lindane E.C. 20% with 1% concentration				
2.8.2	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:	1170.00	Sqm	349.95	409442
2.8.2.1	With Chlorpyriphos/Lindane E.C. 20% with 1% concentration				
<b>3</b>	<b>CEMENT CONCRETE (CAST IN SITU)</b>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

3.1	Making plinth protection 50 mm 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 75 mm thick bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including necessary excavation, levelling & dressing & finishing the top smooth.	125.00	Sqm	845.72	105715
3.2	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. 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 minimum specified cement content, the contractor shall have discretion to either re-design the mix or bear the cost of extra cement.				
3.2.1	All works upto plinth level :				
3.2.1.1	Concrete of M10 grade with minimum cement content of 220 kg /cum.	190.00	Cum	8957.32	1701891
3.2.2	All works above plinth and upto floor V level				
3.2.2.1	Concrete of M10 grade with minimum cement content of 220 kg /cum.	110.00	Cum	9358.73	1029460
<b>4</b>	<b>REINFORCED CEMENT CONCRETE</b>				
4.1	Centering and shuttering including strutting, propping etc. and removal of form for				
4.1.1	Foundations, footings, bases of columns,	680.00	Sqm	442.61	300975

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	etc. for mass concrete				
4.1.2	Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.	980.00	Sqm	950.91	931892
4.1.3	Lintels, beams, plinth beams, girders, bressumers and cantilevers	6060.00	Sqm	831.16	5036830
4.1.4	Columns, Pillars, Piers, Abutments, Posts and Struts	2100.00	Sqm	1085.00	2278500
4.1.5	Stairs, (excluding landings) except spiral-staircases	180.00	Sqm	863.38	155408
4.1.6	Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick	7420.00	Sqm	1160.73	8612617
4.2	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).				
4.2.1	Suspended floors, roofs, landings, beams and balconies (Plan area to be measured)	5200.00	Sqm	433.75	2255500
4.3	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.				
4.3.1	Thermo-Mechanically Treated bars of grade Fe-550D(CRS) or more.	182000.00	Kg	121.73	22154860
4.4	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.				
4.4.1	Thermo-Mechanically Treated bars of grade Fe-550D (CRS) or more.	387000.00	Kg	121.73	47109510

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

4.5	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.				
4.5.1	All works upto plinth level				
4.5.1.1	Concrete of M35 grade with minimum cement content of 370 kg /cum	1130.00	Cum	11068.62	12507541
4.5.2	All works above plinth level upto floor V level				
4.5.2.1	Concrete of M35 grade with minimum cement content of 370 kg /cum	2031.00	Cum	11470.05	23295672
4.6	Providing and fixing parallel threaded couplers conforming to IS code on "Reinforcement Couplers for Mechanical Splices of Bars for Concrete Reinforcement - Specification", to reinforcement bars including threading, enlargement at connection by forging, protecting the prepared reinforcement bars and related operations as required to complete the works per direction of Engineer- in-Charge.				
4.6.1	Coupler for 16 mm diameter reinforcement bar	4000.00	Each	129.91	519640
4.6.2	Coupler for 20 mm diameter reinforcement bar	5000.00	Each	180.71	903550

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

4.6.3	Coupler for 25 mm diameter reinforcement bar	1000.00	Each	258.41	258410
4.6.4	Coupler for 32 mm diameter reinforcement bar	500.00	Each	359.83	179915
<b>5</b>	<b>MASONRY WORK</b>				
5.1	Providing and laying Autoclaved Aerated concrete (AAC) blocks masonry with 150 mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum conforming to IS:2185 (Part 3) 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).	970.00	Cum	9406.02	9123839
<b>6</b>	<b>CLADDING WORK</b>				
6.1	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 of edges to give high gloss finish etc. complete at all levels.				
6.1.1	Granite stone slab of colour black, Cherry/Ruby red				
6.1.1.1	Area of slab upto 0.50 and above 0.50 sqm	1105.00	Sqm	5797.24	6405950
6.2	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.	960.00	metre	641.71	616042
6.3	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.	58.00	Each	1104.64	64069

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

6.4	Providing and fixing 1st 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.	285.00	Sqm	1431.11	407866
6.5	Designing, 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: (a) Structural analysis & design and preparation of shop drawings for pressure equalisation or rain screen principle as required, proper drainage of water to make it watertight including checking of all the structural and functional design. (b) Providing, fabricating and supplying and fixing panels of aluminium composite panel cladding in pan shape in metallic colour of approved shades made out of 4 mm thick aluminium composite panel material consisting of 3 mm thick FR grade mineral core sandwiched between two Aluminium sheets (each 0.5 mm 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. (c) 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	490.00	Sqm	5660.39	2773591

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	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 approved shop 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.				
6.6	Providing and fixing machine cut, mirror polished , 18mm thick Granite stone work for wall lining including dado, skirting, risers of steps etc., in required design and pattern wherever required, stones of different finished surface texture, on 12 mm (average) thick cement mortar 1:3 (1 cement : 3 coarse sand) including rubbing, curing, polishing etc. all complete as per Architectural drawings, and as directed by the Engineer-in-Charge	85.00	Sqm	4562.25	387791
6.6.1	Granite of any colour and shade				
6.7	Providing and fixing machine cut machine polished Cuddapah stone slab for horizontal shelves, cooking platform, window sills, soap racks etc., fixed with cement mortar 1:3 ( 1 Cement : 3 coarse sand ) including the cost of making necessary grooves in the walls & making good the same after fixing the slabs all				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	complete as directed by the Engineer-in-charge.				
6.7.1	20 to 25 mm thick cuddapah stone	470.00	Sqm	984.77	462842
<b>7</b>	<b>WOOD AND P. V. C. WORK</b>				
7.1	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).				
7.1.1	Second class teak wood	4.00	Cum	161344.47	645378
7.2	Providing and fixing ISI marked flush door shutters conforming to IS : 2202 (Part I) non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters:				
7.2.1	35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws	280.00	Sqm	2700.53	756148
7.2.2	30 mm thick including ISI marked Stainless Steel butt hinges with necessary screws	70.00	Sqm	2451.61	171613
7.3	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).	350.00	metre	521.85	182648
7.4	Extra for cutting rebate in flush door shutters (Total area of the shutter to be measured).	125.00	Sqm	120.43	15054
7.5	Providing and fixing roller blinds( manual operated) manufactured from dust and stain repellent and fire retardant, polyester and PVC blended screens not less than 0.58mm thick, in specified width of approved design and shade of "Vista Levolor" or "Mac" or "Aurolux" make complete with control unit ,idler ,head rail, brackets, opening chain, roller tube and load bar etc. complete as per manufacturer's spercifications.( Payment shall be taken in open position from the top of the head rail to the bottom of the curtain).	350.00	Sqm	1670.81	584784

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

7.6	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.	129.00	Each	1269.60	163778
7.7	Providing and fixing aluminium hanging floor door stopper, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete.				
7.7.1	Twin rubber stopper	129.00	Each	81.66	10534
7.8	Providing & Fixing decorative high pressure laminated sheet of plain / wood grain in gloss / matt/ suede finish with high density protective surface layer and reverse side of adhesive bonding quality conforming to IS : 2046 Type S, including cost of adhesive of approved quality.				
7.8.1	1.0 mm thick	700.00	Sqm	1012.77	708939
7.9	Providing and fixing fire resistant door frame of section 143 x 57 mm having built in rebate made out of 16 SWG G.I. sheet (zinc coating not less than 120 gm/sqm) duly filled with vermiculite based concrete mix, suitable for mounting 60 minutes fire rated door shutters. The frame is fitted with intumescent fire seal strip of size 10x4 mm (minimum) around the frame and fixing with dash fastener of approved size and make, including applying a coat of approved brand fire resistant primer etc. complete as per direction of Engineer-in-charge (Dash fastener to be paid for separately).	112.00	metre	1929.20	216070

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

7.10	Providing and fixing 50 mm thick glazed fire resistant door shutters of 60 minutes fire rating conforming to IS:3614 (Part-II), tested and certified as per laboratory approved by Engineer-in-charge, with suitable mounting on door frame, consisting of vertical styles, lock rail, top rail 100 mm wide, bottom rail 200 mm wide, made out of 16 SWG G.I.sheet (zinc coating not less than 120 gm/sqm) duly filled FR insulation material and fixing with necessary stainless steel ball bearing hinges of approved make, including applying a coat of approved fire resistant primer etc. all complete as per direction of Engineer-in-charge (panneling to be paid for separately).	55.00	Sqm	8502.57	467641
7.11	Providing and fixing glazing in fire resistant door shutters, fixed panels & partitions etc., with G.I. beading made out of 1.6 mm thick G.I. sheet (zinc coating not less than 120 gm/sqm) of size 20 x 33 mm screwed with M4 x 38 mm SS screws at distance 75 mm from the edges and 150 mm c/c , including applying a coat of approved fire resistant primer/powder coating of not less than 30 micron on G.I. beading, & special ceramic tape of 5 x 20 mm size etc complete in all respect as per NBC 2016, IS 16231 (Part 3):2016 and as per direction of Engineer-in-charge with glass of required thickness having 60 minutes of fire resistance both integrity & radiation control (EW60) and minimum 20 minutes of insulation (EI20). The manufacturer have to give test report/certification of fire glass and the glass should have the stamp showing the value of E, EW & EI. The glass shall be tested in approved NABL accredited lab or by any other accreditation body which operates in accordance with ISO/IEC 17011 and accredits labs as per ISO/IEC 17025 for testing and calibration scopes shall be eligible. The maximum glazing size shall not be more than 1100x2200 mm (w x h) or 2.42 sqm.	6.00	sqm	45604.94	273630

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

7.12	Providing and fixing panic bar / latch (Double point) fitted with a single body, Trim Latch & Lock on back side of the Panic Latch of reputed brand and manufacture to be approved by the Engineer- in- charge, all complete.	28.00	Each	9442.70	264396
7.12.1	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 of 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:-				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	Structural design proof checked from a Government Engineering Institute, to be provided by the manufacturer for (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				
7.13.1	Three track three panels sliding door with Aluminium channel for roller track, wool pile, zinc alloy (zamak) powder coated handle on two panels along with multi-point locking system, adjustable nylon rollers with SS 304 body.				
7.13.1.1	Using R3 series with frame (98mm & above) x (40mm & above) & sash (30mm & above) x (74mm & above). (Height upto 2.5 metre).	345.00	Sqm	9353.43	3226933
7.14	Providing and fixing stainless steel Grade SS-304 sliding door bolts ALD-SS-100 of Shalimar brand or equivalent with nuts, bolts and screws etc. complete				
7.14.1	250x16 mm	129.00	Each	939.62	121211
7.15	Providing and fixing stainless steel Grade SS-304 tower bolts TB-SS-100 of Shalimar brand or equivalent with necessary screws etc. complete :				
7.15.1	250 x 10 mm	38.00	Each	439.42	16698
7.16	Providing and fixing Mortice Handle Set consist of SS 304 Grade Mortice Handle holo section 19mm dia alongwith 9" Lock Body + 70mm Pin cylinder Key & knob. Brand : KICH PR or equivalent with necessary screws etc. complete as per direction of Engineer-in-charge.	77.00	Each	2629.10	202441
7.17	Providing and fixing bright /matt finished Stainless Steel handles of approved quality & make with necessary screws etc all complete.				
7.17.1	125 mm	56.00	Each	134.54	7534
7.18	Providing and fixing stainless steel fancy handle of approved make fixed with SS screws etc. complete as per direction of Engineer-in-charge.				
7.18.1	200 mm	54.00	Each	210.66	11376
<b>8</b>	<b>STEEL WORK</b>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

8.1	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.				
8.1.1	80x1.20 mm M.S. laths with 1.20 mm thick top cover	36.00	Sqm	3732.60	134374
8.2	Providing and fixing ball bearing for rolling shutters.	4.00	Each	555.71	2223
8.3	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.				
8.3.1	Hot finished welded type tubes	2750.00	Kg	219.41	603378
8.4	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.				
8.4.1	In stringers, treads, landings etc. of stair cases, including use of chequered plate wherever required, all complete	420.00	Kg	139.51	58594
8.4.2	In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works	200.00	Kg	194.81	38962

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

8.5	Providing and fixing stainless steel ( Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, bufing, 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-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.).	4020.00	Kg	871.79	3504596
<b>9</b>	<b>FLOORING</b>				
9.1	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).				
9.1.1	Light shade pigment using white cement.	60.00	Sqm	1582.41	94945
9.2	Extra for pre finished nosing in treads of steps of Granite stone/ sand stone slab/granite	852.00	Metre	216.03	184058
9.2.1	Extra for granite stone/ sand stone in treads of steps and risers using single length above normal size up to 2.00 metre.	120.00	Metre	49.83	5980
9.3	25 mm wooden planking, tongued and grooved in flooring, including fixing with iron screws complete with :				
9.3.1	Second class teak wood	280.00	sqm	5089.16	1424965
9.4	Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved make, in all colours and shades, laid on 20mm 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., complete.				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

9.4.1	Glazed Vitrified tiles Matt/Antiskid finish of size				
9.4.1.1	Size of Tile 600 x 600 mm	215.00	Sqm	1653.35	355470
9.4.1.2	Size of Tile 800x800 mm	4500.00	Sqm	1946.29	8758305
9.5	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 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3 kg/ sqm including grouting the joint with white cement & matching pigments etc. complete.				
9.5.1	Size of Tile 800x800 mm	230.00	Sqm	2199.17	505809
9.6	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 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3kg/sqm including grouting the joint with white cement & matching pigments etc. complete.				
9.6.1	Double charged vitrified tiles polished finish				
9.6.1.1	Size of Tile- 600 x 1200 mm	880.00	Sqm	1670.27	1469838
9.7	Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge.				
9.7.1	Size of Tile 800x800 mm	4500.00	Sqm	276.24	1243080
9.8	Deduct for not grouting the joints with white cement and matching pigment in the items of fixing of vitrified tiles.	4500.00	Sqm	-15.01	-67545

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

9.9	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.				
9.9.1	Polished Granite stone slab of colour Black, Cherry/Ruby Red or equivalent	1300.00	Sqm	5057.96	6575348
<b>10</b>	<b>ROOFING</b>				
10.1	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 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm 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, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 20 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				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	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 :				
10.1.1	12.5 mm thick tapered edge Glass Reinforced Gypsum (GRG) board conforming to IS: 2095- (Part 3):1996 (Boards with BIS certification marks)	2300.00	Sqm	1715.71	3946133

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

10.2	<p>Providing and fixing tiled false ceiling of specified materials of size 595x595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanized steel sections ( galvanized @ 120 grams/ sqm, both side inclusive) consisting of main "T" runner with suitably spaced joints to get required length and of size 24x38 mm made from 0.30 mm thick (minimum) sheet, spaced at 1200 mm center to center and cross "T" of size 24x25 mm made of 0.30 mm thick (minimum) sheet, 1200 mm long spaced between main "T" at 600 mm center to center to form a grid of 1200x600 mm and secondary cross "T" of length 600 mm and size 24x25 mm made of 0.30 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grids of 600x600 mm and wall angle of size 24x24x0.3 mm and laying false ceiling tiles of approved texture in the grid including, required cutting/making, opening for services like difusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats of size 27 x 37 x 25 x1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm GI adjustable rods with galvanised butterfly level clips of size 85 x 30 x 0.8 mm spaced at 1200 mm center to center along main T, bottom exposed width of 24 mm of all T-sections shall be pre-painted with polyester paint, all complete for all heights as per specifications, drawings and as directed by Engineer-in-charge.</p>				
10.2.1	<p>GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm thick with 8 mm drop; made of GI sheet having galvanizing of 100 grns/sqrm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC (Noise Reduction Coeficient ) of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation and backed with a black Glass fiber acoustical</p>	200.00	Sqm	2334.96	466991

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	fleece.				
10.3	<p>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 70 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 UL-94HB/94V-0 category as per IS14434:2023 or category V0 &amp; HB as per ASTM D635-18 or BS1D0 classification as per EN13501 for fire safety. The yellowness index tested as per ASTM E313 (D1925) or ASTM E313 (O1925) 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 polycarbonate sheet shall be held position by using stainless steel (SS304 grade) trapezoidal cleat of 1 mm thick having minimum bottom width 35 mm and top width 50 mm 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.</p>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	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. Note : The fixing arrangement using cleat shall be designed separately for coastal areas for cyclonic wind speed. Shop drawing shall be submitted for approval and proof checked from IIT or any recognized government institute.				
10.3.1	16 mm thick, 1000 ( $\pm 10\%$ ) wide panet with U value not more than 2.10 W/m <sup>2</sup> K and weight not less than 2.75 kg/sqm	175.00	Sqm	4152.01	726602
<b>11</b>	<b>FINISHING</b>				
11.1	Extra for plastering exterior walls of height more than 10 m from ground level for every additional height of 3 m or part thereof.	5910.00	Sqm	98.31	581012
11.2	Finishing walls with Premium Acrylic Smooth exterior paint with Silicone additives of required shade:				
11.2.1	New work (Two or more coats applied @ 1.43 ltr/10 sqm over and including priming coat of exterior primer applied @ 0.90 litre/10 sqm) (Minimum Dry Film Thickness (DFT)- Total 85 microns( 20 microns for primer and 65 microns for exterior paint.) The painting work shall carry a warranty of 7 (Seven) years by the paint manufacture whose paint is used for the work. The painting work shall be done by the approved applicator of the manufacture from whom the contractor decides to purchase the material.	4700.00	Sqm	193.12	907664
11.3	Painting with Aliphatic polyurethane coating paint on steel work of approved brand and manufacture to give an even shade :				
11.3.1	New work (Two or more coats polyurethane paint coating having minimum Dry Film Thickness (DFT)- 50 microns and including priming coat of epoxy primer having minimum Dry Film Thickness (DFT)- 100 microns). Total thickness shall be 150 microns (minimum).	5000.00	Sqm	306.50	1532500

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

11.4	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.	21750.00	Sqm	176.13	3830828
11.5	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, to achieve even shade and colour (Minimum Dry Film Thickness (DFT)- 30 microns. The painting work shall carry a warranty of 5 (Five) years by the paint manufacture. Whose paint is used for the work. The painting work shall be done by the approved applicator of the manufacture from whom the contractor decides to purchase the material.				
11.5.1	Two coats	21750.00	Sqm	161.18	3505665
11.6	Applying priming coats with primer of approved brand and manufacture, having low VOC (Volatile Organic Compound ) content.				
11.6.1	With ready mixed pink or grey primer on wood work (hard and soft wood) having VOC content less than 50 grams/ litre	500.00	Sqm	79.41	39705
11.6.2	With water thinnable cement primer on wall surface having VOC content less than 50 grams/litre	21750.00	Sqm	83.46	1815255
11.7	Melamine polishing on wood work (one or more coat).	100.00	Sqm	1345.73	134573
11.8	Providing and applying 18 mm thick (average) premixed formulated Two coat readymade plaster such as "READYPLAST" readymix plaster of wall plast products Ultratech or quivalent having additives and aggregates produced at automated dry mixed plant mixed with cement,sand and polymers in ratio 1:4 (1 cement:4 sand and polymers in appropriate ratio) in two layers under layer 12mm thick and 6mm thick applied on hacked/uneven background such as bare brick/CC and Block/RCC work on walls and	4400.00	Sqm	691.86	3044184

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	ceiling as per manufacturers specification finished in smooth line and level etc. complete:				
11.9	Providing and applying 12mm thick (average) premixed formulated one coat readymade plaster such as "READYPLAST" ready mix plaster of make as per preferred make list or equivalent having additives and aggregates produced at automated dry mixed plant mixed with cement, sand and polymers in ratio 1:4 (1 cement : 4 sand and polymers in appropriate ratio) applied on hacked/uneven background such as bare brick/CC and Block/RCC work on walls and ceiling at all floors and locations as per manufacturers specification finished in smooth line and level etc complete.	15150.00	Sqm	455.20	6896280
11.10	Providing and applying 6mm thick (average) premixed formulated one coat readymade plaster such as "READYPLAST" ready mix plaster of make as per preferred make list or equivalent having additives and aggregates produced at automated dry mixed plant mixed with cement, sand and polymers in ratio 1:4 (1 cement : 4 sand and polymers in appropriate ratio) applied on hacked/uneven background such as bare brick/CC and Block/RCC work on walls and ceiling at all floors and locations as per manufacturers specification finished in smooth line and level etc complete.	11800.00	Sqm	347.91	4105338
<b>12</b>	<b>ROAD WORK</b>				
12.1	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-rolling the sub grade and disposal of surplus earthwith lead upto 50 metres.	720.00	Sqm	247.06	177883

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

12.2	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 5 mm), including making drainage opening wherever required complete etc. as per direction of Engineer- in-charge (length of finished kerb edging shall be measured to calculate volume for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-charge).	8.00	Cum	11419.54	91356
12.3	Providing and laying C.C. pavement of mix M-25 with ready mixed concrete from batching plant. The ready mixed concrete shall be laid and finished with screed board vibrator , vacuum dewatering process and finally finished by floating, brooming with wire brush etc. complete as per specifications and directions of Engineer-in-charge. (The panel shuttering work shall be paid for separately). (Note:- Cement content considered in this item is @ 330 kg/cum. Excess/ less cement used as per design mix is payable/ recoverable separately).	225.00	Cum	11087.93	2494784
12.4	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.				
12.4.1	With material conforming to Grade-II (size range 53 mm to 0.075 mm ) having CBR Value-25	144.00	Cum	3301.22	475376

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

12..5	Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x9.8mm 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.	155.00	Sqm	2277.23	352971
<b>13</b>	<b>SANITARY INSTALLATIONS</b>				
13.1	Providing and fixing concealed stop cock with wall flange, Model No. CQT-23069K of Jaquar Clarion series including Model No. ALD-069 concealed body or Model No. C-332A of ESS ESS Cromia series including Model No. B2CC101 concealed body or Model No. F570007 of HindwareAspiro series including required concealed body as per manufacturer or equivalent with all necessary fittings etc., complete as per direction of Engineer-in-charge.	83.00	Each	1027.55	85287
	15 mm nominal bore				
13.2	Providing and fixing CP Bottle Trap 32 mm Size with required Long Wall Connection Pipes & Wall Flange, Model No. ALD-769L300x190 of Jaquar or Model No. C-231 of ESS ESS or Model No. F850004 of Hindware or equivalent make with all necessary fittings etc., complete as per direction of Engineer-in-charge.	50.00	Each	1674.15	83708
13.3	Providing and fixing Pillar cock, Model No. CQT-23011 of Jaquar Clarion series or Model No. C-201 of ESS ESS Cromia series or Model No. F570001 of HindwareAspiro series or equivalent with all necessary fittings etc., complete as per direction of Engineer-in-charge.				
13.3.1	15 mm Nominal Bore	28.00	Each	1102.10	30859

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

13.4	Providing and fixing Two way Bib cock with wall flange, Model No. CQT-23041 of Jaquar Clarion series or Model No. C-203G of ESS ESS Cromia series or Model No. F570005 of HindwareAspiro series or equivalent with all necessary fittings etc., complete as per direction of Engineer-in-charge.				
	15 mm nominal bore	33.00	Each	1171.25	38651
13.5	Providing and fixing CP Health faucet (Hand shower) with 8 mm dia and minimum 1.00 meter longflexible tube with wall hook, Model no. ALD-573 of Jaquar or Model No. C-232N of ESS ESS Cromia series or Model No. F160195 of Hindware or equivalent and as per direction of Engineer In charge.	33.00	Each	1359.05	44849
13.6	Providing and fixing white vitreous china wall mounted type water closet (European type W.C. pan) Code No. 30438IN-0 of KOHLER or equivalent with soft close slim seat cover, hinges & Accessories set complete including all fittings like CI Chair brackets, GI rag bolts, inlet & outlet gaskets with Single piece Slim Concealed Cistern Body With Installation kit & "P type" Drain Pipe Connection Set for Wall Hung WC JCS-26351IN-P-NA with Flush Control Plate 28476-IN-MCP of KOHLER or equivalent t etc. all complete including cutting and making good the walls and floors wherever required as per manufacturer's specifications and direction of the Engineer-in-Charge. (For the purpose of payment, only the number of water closets provided and fixed in position shall be enumerated). · Wall hung with solid plastic seat and soft close cover of KOHLER or equivalent of matching colour and shade	23.00	Each	16558.37	380843
13.7	Providing and fixing Table Top Basin 581 mm x 402 mm in white colour of kohler make (K-2215IN-2-0) or equivalent as per Achitectoral drg. & as directed by the Engineer in charge.	28.00	Each	7843.35	219614

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

13.8	Providing and fixing Curved shaped urinal partition with frosted glass 8 mm Chrome finish size 900 X 450 of Jaquar (Model No-JSE-CHR-810UC450X) or equivalent with all fixing arrangements all complete as per architectural drawing and the direction of Engineer in Charge.	12.00	Each	4531.60	54379
13.9	Providing and fixing Urinal with rear spud in white 0.5L 381mm x 330mm x 550mm K-26474IN-ER-0 with Urinal sensor in polished chrome K-24199IN-C01-CP of KOHLER series or equivalent as per Achitectural drg. & as directed by the Engineer in charge.	17.00	Each	34079.60	579353
13.10	Supplying and installation of concealed Metropole Flush valve (Model No.FLV-CHR-1095NSQ ) of jaguar or equivalent Regular 32mm size (concealed body) with exposed shut off provision and 100 mm square plate with all accessories to complete the item including cutting, fixing , removing existing sensor system and finishing with matching the shade etc complete as per direction of Engineer-in-charge.	17.00	Each	4266.50	72531.00
13.11	Providing and fixing disabled friendly Grab Bar 692 mm Long, White of Jaquar (WAC-WHT-BR0600N) or equivalent with all necessary fixing arrangements all complete as per the architectural drawing or the direction of Engineer in Charge.	20.00	Each	1287.95	25759
13.12	Providing and fixing Grab Bar Vertical Swing of Jaquar (WAC-WHT-BG0800N) or equivalent, with all necessary fixing arrangements all complete as per the architectural drawing or the direction of Engineer in Charge.	10.00	Each	3628.35	36284
13.13	Providing and fixing disabled friendly of kohler series (K-30520IN-0) Wall Hung Basin with Wall mount half pedestal basin with single faucet hole in white fixing arrangements all complete as per the architectural drawing or the direction of Engineer in Charge.	5.00	Each	7569.35	37847

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

13.14	Providing and fixing white vitreous WC Rimless Bowl With Cistern For Coupled of kohler or equivalent REACH™ K-3983IN-S-0 Onepiece toilet with QuietClose™ seat cover in white (724mm x 361mm x722mm of model no 3983IN-S-0P Trap- 180 mm all complete including cutting and making good the walls and floors wherever required as per manufacturer's specifications and direction of the Engineer-in. Charge.	5.00	Each	22418.40	112092
13.15	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:				
13.15.1	White Vitreous china Orissa pattern W.C. pan of size 580x440 mm with integral type foot rests	10.00	Each	7638.23	76382
13.16	Providing and fixing white vitreous china laboratory sink including making all connections excluding cost of fittings :				
13.16.1	Size 600x450x200 mm	15.00	Each	4602.36	69035
13.17	Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete.	28.00	Each	1814.86	50816
13.18	Providing and fixing soil, waste and vent pipes				
13.18.1	100 mm dia				
13.18.1.1	Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside IS:15905	259.00	metre	1319.77	341820
13.18.2	75 mm diameter :				
13.18.2.1	Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside IS:15905	182.00	metre	1088.33	198076

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

13.19	Providing and fixing M.S. holder-bat clamps of approved design to Sand Cast iron/cast iron (spun) pipe embedded in and including cement concrete blocks 10x10x10 cm of 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), including cost of cutting holes and making good the walls etc. :				
13.19.1	For 100 mm dia pipe	26.00	Each	409.55	10648
13.19.2	For 75 mm dia pipe	19.00	Each	406.32	7720
13.20	Providing and fixing bend of required degree with access door, insertion rubber washer 3 mm thick, bolts and nuts complete.				
13.20.1	100 mm dia				
13.20.1.1	Hubless centrifugally cast (spun) iron epoxy coated inside & outside as per IS:15905	15.00	Each	640.19	9603
13.21	Providing and fixing plain bend of required degree.				
13.21.1	Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside IS:15905	25.00	Each	415.35	10384
13.21.1.1	75 mm dia				
13.21.2	Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside IS:15905	25.00	Each	284.99	7125
13.21.2.1	100 mm dia				
13.22	Providing and fixing double equal plain junction of required degree.				
13.22.1	100x100x100x100 mm				
13.22.1.1	Sand cast iron S&S as per IS - 3989	10.00	Each	1213.39	12134
13.23	Providing and fixing single equal plain invert branch of required degree :				
13.23.1	100x100x100 mm				
13.23.1.1	Hubless centrifugally cast (spun) iron epoxy coated inside & outside as per IS:15905	15.00	Each	728.50	10928
13.24	Providing and fixing shielded coupling for Hubless centrifugally cast iron pipe				
13.24.1	100 mm dia				
13.24.1.1	SS 304 grade coupling with EPDM rubber gasket	72.00	Each	487.65	35111
13.24.2	75 mm dia				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

13.24.2.1	SS 304 grade coupling with EPDM rubber gasket	111.00	Each	439.11	48741
13.25	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 :				
13.25.1	100 mm inlet and 75 mm outlet				
13.25.1.1	Hubless centrifugally cast (spun) iron epoxy coated inside & outside as per IS:15905	43.00	Each	667.50	28703
<b>14</b>	<b>WATER SUPPLY</b>				
14.1	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply and all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall				
14.1.1	40 mm nominal dia Pipes	77.00	metre	793.40	61092
14.1.2	50 mm nominal dia Pipes	225.00	metre	1054.35	237229
14.2	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.				
14.2.1	Concealed work, including cutting chases and making good the walls etc.				
14.2.1.1	20 mm nominal dia Pipes	300.00	metre	606.78	182034
14.2.1.2	32 mm nominal dia Pipes	275.00	metre	834.44	229471
14.3	Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc. External work				
14.3.1	50 mm dia nominal bore	57.00	metre	860.22	49033
14.3.2	80 mm dia nominal bore	25.00	metre	1175.74	29394

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

14.4	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 :				
14.4.1	50 to 80 mm nominal bore	1.00	Each	2015.09	2015
14.5	Providing and fixing gun metal gate valve with C.I. wheel of approved quality (screwed end) :				
14.5.1	50 mm nominal bore	3.00	Each	1158.76	3476
14.5.2	80 mm nominal bore	5.00	Each	2939.71	14699
14.6	Providing and fixing brass ferrule with C.I. mouth cover including boring and tapping the main :				
14.6.1	25 mm nominal bore	4.00	Each	549.44	2198
14.7	Constructing masonry Chamber 30x30x50 cm inside, in brick work in cement mortar 1:4 (1 cement :4 coarse sand) for stop cock, with C. I. surface box 100x100 x75 mm (inside) with hinged cover fixed in reinforced cement concrete slab 1:1.5:3 mix (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size), including 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 :				
14.7.1	With common burnt clay F.P.S.(non modular) bricks of class designation 7.5	5.00	Each	2249.01	11245
14.8	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 100 mm 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 20 mm nominal size), including 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				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	mm thick, finished with a floating coat of neat cement complete as per standard design :				
14.8.1	With common burnt clay F.P.S.(non modular) bricks of class designation 7.5	4.00	Each	21328.33	85313
14.9	Painting G.I. pipes and fittings with two coats of anti-corrosive bitumastic paint of approved quality :				
14.9.1	80 mm diameter pipe	25.00	metre	49.66	1242
14.10	Providing and filling sand of grading zone V or coarser grade, allround the G.I. pipes in external work :				
14.10.1	80 mm diameter pipe	25.00	metre	318.06	7952
14.11	Providing and fixing G.I. Union in G.I. pipe including cutting and threading the pipe and making long screws etc. complete (New work) :				
14.11.1	50 mm nominal bore	5.00	Each	929.81	4649
14.11.2	80 mm nominal bore	3.00	Each	1363.39	4090
14.12	Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms.				
14.12.1	15 mm nominal bore	15.00	Each	901.76	13526

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

14.13	<p>Providing and fixing ISI marked Hot Press Moulded Panels using Sheet Moulding Compound (SMC) for assembly of sectional water tanks of required size at site. The sectional water tanks comprising of such SMC panels shall be used for storing potable water under pressure not exceeding the static head of 3 m. and at temperatures not exceeding 50 °C. The flanges of the panels shall be perpendicular to the main surface (or double flange as per para 6.1 of the IS 14399 Part 1), should be free from irregularities and not less than 45 mm wide with holes to accommodate fasteners. The nominal external size of the panels shall be 1m x 1m, or 1m x 0.5m or 0.5m x 0.5m or as agreed by the Engineer-in-Charge. The tolerance in external size shall be <math>\pm 0.2</math> percent and the tolerance on the angles shall be <math>\pm 0.3^\circ</math>. The Panel shall be Type A (unless otherwise specified as Type B or Type C, for which cost adjustment shall be made) of minimum thickness 3 mm. The mechanical and physical properties, acceptance criteria and test methods shall be in accordance with Table 1 of IS 14399 Part 1. The Assembly, Installation and Testing shall be as per IS 14399 Part 2. The cost of all accessories as mentioned in IS 14399 Part 2 para 4 like sealants, Bolts and Nuts, Support System inlet-outlet, overflow, drain, airvent designed and constructed to prevent entry of insects and foreign material, external and internal ladders (GRP or Aluminium alloy ladder of required size and strength), GRP manhole with cover (minimum size 600 mm with stainless steel hinges) and locking arrangements, all complete as per directions of Engineer-in-charge. The rates are inclusive of all material including accessories, labour and tools &amp; plants and nothing extra shall be paid nor anything deducted</p>				
14.13.1	SMC Panels of Type A (3 mm minimum thickness)	45.00	sqm	6217.65	279794

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

14.13.2	SMC Panels of Type B (4 mm minimum thickness)	45.00	sqm	8143.10	366440
<b>15</b>	<b>DRAINAGE</b>				
15.1	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 :				
15.1.1	100 mm diameter	128.00	metre	572.30	73254
15.1.2	150 mm diameter	15.00	metre	628.05	9421
15.2	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 x 300 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:				
15.2.1	100x100 mm size P type				
15.2.1.1	With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	18.00	Each	3056.07	55009
15.3	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 :				
15.3.1	Inside size 120x90 cm and 90 cm deep including C.I. cover with frame (heavy duty) 560 mm internal diameter, total weight of cover and frame to be not less than 208 kg (weight of cover 108 kg and weight of frame 100 kg) :				
15.3.1.1	With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	4.00	Each	37086.00	148344

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

15.4	Providing and laying Non Pressure NP-3 class (Medium duty) R.C.C. pipes including collars/ spigot jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete				
15.4.1	450 mm dia RCC pipes.	190.00	Metre	3020.97	573984
<b>16</b>	<b>ALUMINIUM WORK</b>				
16.1	Providing and fixing glazing in 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 . (Cost of aluminium snap beading shall be paid in basic item):				
16.1.1	With float glass panes of 5 mm thickness (weight not less than 12.50 kg/sqm)	280.00	Sqm	1698.95	475706
16.2	Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors, including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer-in-charge.				
16.2.1	With stainless steel cover plate minimum 1.25 mm thickness	4.00	Each	3187.23	12749
16.3	Filling the gap in between aluminium frame & adjacent RCC/ Brick/ Stone work by providing weather silicon sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-charge complete.				
16.3.1	Upto 5 mm depth and 5 mm width	820.00	metre	109.20	89544
16.4	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	20.00	Sqm	6011.23	120225

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	complete as per direction of Engineer-in-charge (Door handle, lock and stopper etc.to be paid separately).				
16.5	Providing and fixing 12 mm thickness toughned glass in aluminium door, window, ventilator shutters and partitions etc. with patch fitting. complete as per the architectural drawings and the directions of Engineer-in-charge . (Cost of aluminium shall be paid seperately):	70.00	Sqm	3481.94	243736
16.6	Providing & fixing 30-35 micron (minimum) thick 3M or equivalent make non reflective, matt, frosted / horizontal strip, scratch resistant, high performance resin coated polyster film on the glass surfaces of partitions, door shutters etc. complete as per direction of Engineer-in-charge. (Payment shall be made for the finished area of the film actually provided. No deduction shall be made for openings up to 0.10 sqm area each and nothing shall be paid extra for making such openings)	90.00	Sqm	1213.97	109257
<b>17</b>	<b>WATER PROOFING</b>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

17.1	<p>Providing and laying water proofing coating on the sunken portion of the WCs, bathroom, etc. by applying single component liquid polyurethane elastomeric compound with minimum elongation 400% (ASTM D 412) having tensile strength minimum 2 MPa (ASTM D 412) and minimum solid content 80% (ASTM C 1250) as below mentioned process :</p> <p>i) Preparation of base concrete surface and crack treatment, creating smooth corners by making of fillet at the corners of size 50mm x 50mm with epoxy mortar, ii) Applying of epoxy based primer of approved brand applied on the prepared concrete surface having moisture content less than 5% iii) Applying single component liquid polyurethane (PU) elastomeric compound to achieve Dry Film Thickness (DFT) of 1.5 mm in two or three coats iv) Providing and laying of Non woven Polyester / Polypropylene needle punched thermally bonded Geotextile of 150 GSM on the completed and cured surface, (over the horizontal, vertical surfaces and over the gola), the geotextile should stick to the PU membrane without any gaps and may be held in place with adhesive if required. v) 50mm thick protection screed concrete over horizontal surface to the required slope is to be provided with gola (fillet) at edges of size 50x50mm which shall be paid separately in CC 1:2:4 (1 Cement : 2 M-sand : 4 Coarse aggregate), vi) Premix plaster of 18mm thickness over vertical surfaces and terminated over the screed concrete shall be paid separately. The rate shall include all material, labour &amp; machinery and nothing extra shall be payable, unless otherwise mentioned above. The work shall be carried out as per PU manufacturer and directions of Engineer in charge.</p>	215.00	Sqm	1075.10	231147
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CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

17.2	<p>Providing and spray applying two component hybrid polyurea polyurethane waterproofing system at horizontal and vertical surface of terrace and similar areas waterproofing by the manufacturer or his approved applicator, consisting of the following operations: a) Grinding the surface to remove clinged App layer and, dirt, dust, grease etc. and treating the surface as recommended by manufacturer and thereafter treated cracks, hold etc surface polymer modified cement mortar or is ponded with water for 24 hours for testing of leakage or seepage . b) Providing and applying by spray or brush, two component solvent free resin / epoxy primer mixed in proportion by volume / weight as recommended by manufacturer over cement concrete surface after 14 days, having consumption from 0.20 to 0.40 kg/sqm depending on the porosity and undulations of the surface. c) Providing and sprinkling sand, as recommended by manufacturer, over freshly laid primed tacky surface @ 0.25 to 0.40 kg/sqm as decided by the Engineer-in-Charge. d) Over sandy surface, providing and spray applying two component hybrid polyurea polyurethane coating system, solvent free, mixed in proportion by volume i by weight as recommended by the manufacturer having elongation &gt;400%, Shore A Hardness &gt; 75 ( after 28 days), tensile strength of minimum of 10 Mpa as per DIN iASTM and Tear strength of minimum 30 N/mm as per DIN 53515 or minimum 45 N/mm as per ASTM D624 and having dry film thickness of two coats shall be minimum 1.5 mm and 20 second maximum gel time / reaction time. e) A layer of non-woven polypropylene geotextile of minimum mass / unit area of 120 gsm with an overlap of 50 mm shall be laid over the polyurea/polyurethane coating surface, having minimum tensile strength 2.40 KN/m as per ASTM.</p>				
17.2.1	New Work on Horizontal Surfaces	1550.00	Sqm	2455.78	3806459

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

17.3	Grading roof for water proofing treatment with				
17.3.1	Cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size)	130.00	Cum	9077.19	1180035
17.4	Supplying and laying 1.5 mm thick pre-applied fully bonded, HDPE membrane for Type A (barrier protection) as per IS 16471 :2017, for external waterproofing system below horizontal RCC raft/slab, with thermo-fused laps, of approved make having tensile strength of > 25 MPa as per ASTM D 412, elongation of > 500 % as per ASTM D 412, puncture resistance of > 1000 N as per ASTM E 154, hydrostatic head resistance > 60 m as per ASTM D 5385, lap peel adhesion of > 450 N/m at 22 °C as per ASTM D1876. Methodology for laying of membrane shall be conforming to IS 16471:2017 and requirements of underground waterproofing structures, as per manufacturer's recommendation. The HDPE shall be laid over plain cement concrete (PCC) slab after proper surface preparation. The membrane should be minimum 1.2 m or maximum available width to reduce the number of joints, with min. 75 mm factory made selvedges which comprises of a pressure sensitive adhesive layer over the HDPE material, which is covered by a weather proof protective and trafficable granular layer to protect self-adhesive polymer layer. The membrane overlaps should be thermo-fused by hot air welding with double seam welding machine to ensure seamless joints. The membrane shall be terminated 50 mm below RCC raft thickness, as per manufacturer's specifications, for proper seaming with the vertical external waterproofing system. The system includes PCC base preparation by cleaning, brushing and removal of flaky materials, oil & grease, grouting the porous area with cementitious grout, all as per manufacturer's specifications. The rates for the waterproofing system are inclusive of all labor, material and tools and plants. The waterproofing system should be applied	1170.00	Sqm	762.05	891599

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	directly by the manufacturer or by authorized applicator of the company with 10 years of system guarantee against leakage (Guarantee bond format provided elsewhere in the tender document).				
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CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

17.5	<p>Supplying and laying 1.5 mm thick SBS modified self adhesive waterproofing membrane topped with HDPE valeron film of Type A (barrier protection) as per IS 16471 :2017, for external waterproofing system along the vertical surfaces of RCC walls of approved make having tensile strength of 4 MPa and with minimum transverse elongation &gt; 200% (as per ASTM D 5147 / D412) and minimum longitudinal elongation &gt; 200% (as per ASTM D 5147 / D412) and puncture resistance of &gt;200 N (as per ASTM E154). Methodology for laying of membrane shall be conforming to IS 16471:2017 and requirements of underground waterproofing structures, as per manufacturer's recommendation. The SBS membrane should be sealed properly at joints &amp; maintaining 75 mm overlap between the membrane selvedge &amp; 100 mm overlap on the end joints of the membrane over the surface etc. The system includes PCC base preparation by cleaning, brushing and removal of flaky materials, oil &amp; grease, grouting the porous area with cementitious grout and priming the surface with cold applied bituminous primer @ 5 sqm per litre, of approved make, followed by installation of waterproofing membrane. Apply aluminium Strip (patti) of 4 mm thick &amp; 20 mm wide, screwed with stainless shot-screw at a distance of 400 mm C/C at the top edge along the periphery. The rates for the waterproofing system are inclusive of all labor, material and tools and plants. The waterproofing system should be applied directly by the manufacturer or by authorized applicator of the company with 10 years of system guarantee against leakage (Guarantee bond format provided elsewhere in the tender document). (Aluminium strip shall be paid separately irrelevantitem.)</p>	120.00	Sqm	1149.20	137904
18	<b>Sub-Head : Rain Water Harvesting and Tube Well</b>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

18.1	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, beyond 90 metre & upto 150 metre depth below ground level.				
18.1.1	All types of soil				
18.1.1.1	400 mm dia	5.00	Metre	1397.87	6989
18.1.2	Rocky strata including Boulders				
18.1.2.1	400 mm dia	80.00	Metre	2405.72	192458
18.2	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.				
18.2.1	200 mm nominal size dia	28.00	Metre	1256.62	35185
18.3	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.				
18.3.1	200 mm nominal size dia	94.00	Metre	1417.28	133224
18.4	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.	20.00	Cum	1704.08	34082
18.5	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.	42.00	Cum	1736.19	72920

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

18.6	Gravel packing in tubewell construction in accordance with IS: 4097, including providing gravel fine/ medium/ coarse, in required grading & sizes as per actual requirement, all complete as per direction of Engineer- in-charge.	20.00	Cum	2285.01	45700
18.7	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.	4.00	Each	1580.09	6320
18.8	Development of tube well in accordance with IS : 2800 (part I) and IS:11189, to establish maximum rate of usable water yield without sand content (beyond permissible limit), with required capacity air compressor, running the compressor for required time till well is fully developed, measuring yield of well by "V" notch method or any other approved method, measuring static level & draw down etc. by step draw down method, collecting water samples & getting tested in approved laboratory, i/c disinfection of tubewell, all complete, including hire & labour charges of air compressor, tools & accessories etc., all as per requirement and direction of Engineer-in-charge.	25.00	hour	1224.68	30617
18.9	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:				
18.9.1	200 mm dia	3.00	Each	362.47	1087
18.10	Providing and fixing M.S. clamp of required dia to the top of casing/ housing pipe of tubewell as per IS: 2800 (part I), including necessary bolts & nuts of required size complete.				
18.10.1	200 mm clamp	3.00	Each	2588.79	7766

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

18.11	Providing and fixing Bail plug/ Bottom plug of required dia to the bottom of pipe assembly of tubewell as per IS:2800 (part I).				
18.11.1	200 mm dia	3.00	Each	403.62	1211
<b>19</b>	<b>STRUCTURAL GLAZING ALUMINIUM COMPOSITE PANEL</b>				
19.1	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.	4600.00	Kg	467.61	2151006
19.2	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 pass the proof test at 1.5 times design wind pressure without any failure), including functional design of the aluminium 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:				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	<p>(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 seperator to prevent bimetallic contacts with nuts and washers etc. of stainless steel grade 316, of the required capacity and in required numbers.</p>				
	<p>(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.</p>				
	<p>(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.</p>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	<p>(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&amp;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, duly 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. 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.</p>				
	<p>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.</p>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

	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 NABL 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.				
	6. Onsite Test for Water Leakage for a pressure range 50 kpa to 240 kpa (35psi) upto 2000 ml	710.00	Sqm	3962.23	2813183

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

19.3	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.	510.00	Sqm	4197.22	2140582

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

19.4	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.	40.00	Sqm	4143.95	165758
19.5	Providing, fabricating and supplying shadow box of required size and shape, for fixing in the spandrel portion of the structural glazing, in linear as well as curvilinear portions of the building by providing semi -rigid, inorganic, non-combustible fibre glass wool insulation 50 mm thick, conforming to IS: 8183 and BS: 3958 Part 5. The insulation layer shall have facing (factory bonded on surface # 1 of the fibre glass insulation layer), of black non-woven fibre glass tissue of nominal thickness 0.5 mm and nominal mass not less than 60 gm /sqm, made of randomly oriented glass fibres distributed in a binder by a wet-lay process including fixing 1.5 mm thick solid aluminum sheet backing using, 6 mm thick cement board including SS rivets, nuts, bolts, washers etc complete.	200.00	Sqm	2437.55	487510

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

19.6	<p>Providing and supplying Spandrel Glass Panels comprising of 6 mm thick heat strengthened monolithic float glass of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade so as to match the colour and shade of the IGUs in the vision panels etc. ,all complete for the required performances as specified, as per the Architectural drawings, as per the approved shop drawings, as specified, and as directed by the Engineer- in- Charge. For payment, only the actual area of glass on face # 1 of the glass panels (but excluding the area of grooves and weather silicone sealant) provided and fixed in position, shall be measured in sqm. (Payment for fixing of Spandrel Glass Panels in the curtain glazing is included in cost of relevent Item*)."(i) Coloured tinted float glass 6 mm thick substrate with reflective soft coating on face # 2, 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 K etc. . The properties of performance glass shall be decided by technical sanctioning authority as per the site requirement.</p>	200.00	Sqm	2765.43	553086
<b>20</b>	<b>NEW TECHNOLOGIES AND MATERIALS</b>				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

20.1	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 0.33 mm thick (galvanized @ 120 gram 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 600 mm 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.				
20.1.1	With fully perforated 12 mm thick micro tegular edged or 10 mm thick square edged GRG false ceiling tiles.	3220.00	Sqm	2152.79	6931984
21	DEMOLISHING				

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

21.1	Demolishing existing building including disposal of unseceable materials and crediting of distressed/dilapidated survey report 1 no buildings of aadminstative block and training centre with 1 UG water tank at indian institute of packaging andheri(east) muumbai 400093				
		1.00	per job	-558626	-558626
	<b>GRAND TOTAL =</b>				<b>255755621</b>

**Executive Engineer-I,  
CPWD, Mumbai-20.**

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

# PART -C

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**PROFORMA OF SCHEDULES: A TO F**  
**(Minor component :- Electrical Work)**

**SCHEDULE 'A':**

Schedule of quantity for quoting rates:

As per **Page 277 to 356 (For Electrical Work)**

**SCHEDULE 'D'**

Extra schedule for specific requirements /document for the work, if any.

NIL

**SCHEDULE 'E'**

Reference to General Conditions of contract:

General Conditions of Contract 2023  
for Construction as amended /  
modified up to the last date of  
submission of Bid.

Name of work: Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.

Estimated cost of work: **As per Part "A"**

Earnest money: **As per Part "A"**

Performance Guarantee: **As per Part "A"**.

Security Deposit: **As per Part "A"**

**SCHEDULE 'F':** (General Rules & Directions)

Officer inviting tender : Executive Engineer, Mumbai-I, CPWD

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 (C). See below

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**Definitions:**

2(v) Engineer-in-charge (Electrical work) :Executive Engineer (E), Mumbai-I, CPWD, Mumbai

2(viii) Accepting Authority : Chief Engineer, Mumbai-I, CPWD,

2(x)Percentage on cost of materials and labour to cover all overheads and profits : 15%

2(xi) Standard Schedule of Rates :(For Electrical Work) CPWD, DSR 2022 with amendments up to the date of submission of bids.

2(xii) Department : Central Public Works Department

9(ii) Standard CPWD contract Form GCC-2020 for construction, CPWD Form-7 modified &corrected up to last date of submission of bids **:General Conditions of Contract for Contruction Works 2023**

**Clause 1**

i) Time allowed for submission of performance Guarantee, program chart, (Time and Progress) and applicable labour licenses, registration with GST, EPFO, ESIC and BOCW Welfare Board or proof of applying thereof from the date of issue of letter of acceptance, in days: 07 (Seven) days

ii) Maximum allowable extension with late fee @ 0.1% (Non-refundable) per day of performance Guarantee amount beyond the period provided in i) above in days. 3 days with late fee @ 0.1% per day

**Clause 2**

Authority for fixing Compensation under Clause 2: **As per Part "A"**

**Clause 5**

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

Number of days from the date of issue of letter of acceptance for reckoning date of start: 05 (Five) days

Milestones as per table given **As per Part "A"**

**Time allowed for execution of work:** **As per Part "A"**

i) Authority to convey the decision of shifting of milestone and extension of time, if any : **As per Part "A"**

ii) Authority to decide rescheduling of milestones and Extension of time, if any : **As per Part "A"**

iii) Authority to decide Shifting of date of start in case of delay in handing over of site : **As per Part "A"**

**Clause 6/6A** : Computerised MB  
(Clause 6A is applicable)

**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:

62.56 Lakh (for electrical)

**Clause 7A**

Whether Clause 7A shall be applicable **Yes, No Running Account Bill shall be paid for the work till the applicable labour licenses, registration with GST, EPFO, ESIC and BOCW Welfare Board, whatever applicable as submitted by the Bidder to the Engineer-in-Charge.**

**Clause 8**

Competent Authorities to inspect and issue part / final completion certificate **:As per Part "A"**

**Clause 8A**

Authority to decide compensation on account if contractor fails to submit completion plans for Internal and External Civil, Electrical and Mechanical Services within 30 days

**:As per Part "A"**

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**Clause 10A**

Testing equipment to be provided  
by the contractor at Field testing laboratory : List attached as Appendix II

**Clause 10B (ii)**

Whether Clause 10B (ii) shall be applicable : Not Applicable

**Clause 10C**

Component of labour expressed as  
percent of value of work : 25%

**Clause 10CC:** Applicable

**Clause 11**

Specifications to be followed for  
execution of work:

- Electrical Work
  1. CPWD General Specifications for Electrical Works Part-I Internal -2023
  2. CPWD General Specifications for Electrical Works Part II External - 2023
  3. CPWD General Specifications for Electrical Works Part VII (D.G. Sets) - 2013
  4. General Specifications for Electrical Works Part III (Lifts & Escalators) - 2003
  5. Specifications for Heating, Ventilation & Air Conditioning (HVAC) -2024
  6. General Specifications Electrical Works Part IV (Substation) - 2013
  7. General Specifications Electrical Works Part V (Wet Riser & Sprinkler systems) – 2020
  8. General Specifications Electrical Works Part VI (Fire Detection and alarm System) – 2018
  9. General Specifications Electrical Works Part VIII (Gas Based Fire Extinguishing System) – 2013

**Note :- All above specifications shall be applicable with correction slips up to last date of submission / uploading of bid.**

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**Clause 12.2 (C)** **100%**

**Clause 16**

Competent Authority for deciding reduced rate.

**As per Part “A”**

**Clause 18**

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

Description of Machinery	Quantity
As per Appendix –II	

**Clause 19 (C)**

Authority to decide penalty for each default:

Engineer-in-charge

**Clause 19 (D)**

Authority to decide penalty for each default:

Engineer-in-charge

**Clause 19 (G)**

Authority to decide penalty for each default:

Engineer-in-charge

**Clause 19 (K)**

Authority to decide penalty for each default:

Engineer-in-charge

**Clause 25**

Conciliator	Special Director General (Mumbai) or his successor(s)
Arbitrator Appointing Authority	Chief Engineer, Mumbai-I, CPWD, Mumbai or his successor(s)
Seat and Place of Arbitration	Mumbai

**Clause 32**

The Requirement of Technical

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

Representative(s) and Recovery Rates applicable as below :- **As per Part "A"**

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**Appendix-II****Equipments for Testing of Materials at site laboratory**

Equipments for conducting necessary tests (as per CPWD Specifications 2019) shall be provided and installed at site in the well-furnished site laboratory by the agency at his own cost. The following laboratory equipment should be in general or as and when required be set up at site laboratory: -

**B)Electrical: -**

1. Megger(0-1000v)
2. TongueTester
3. AluminiumLadder-Suitableforinternal&externalelectricalwork.
4. TachoMeter
5. HydroMeter
6. Crimplingtoolforall sizes.
7. Wheeladderforstreetlightrepairing
8. Ammeter
9. Voltmeter0–500volts
10. Chainwrench2”,4”,6”
11. Pipewrenchupto4“
12. Spannerskit
13. Insulationtester
14. Earthresistancetester
15. LuxMeter(Digital)
16. Vernier;Screwgauge(Digital)

**Note:**

1. **The above list is only indicative and not exhaustive. The Bidder may be required to deploy more equipment as per requirement of work.**

2. **All the above plants & machinery are to be deployed as and when required or directed by Engineer-in-Charge.**

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**ADDITIONAL CONDITIONS OF CONTRACT AND SPECIFICATIONS FOR E & M WORKS**

**1. GENERAL AND COMMERCIAL CONDITIONS :**

- 1.1. This section covers the various commercial conditions applicable and to be read in connection with the conditions of contract of the standard form (CPWD-7 / 8) of the department (CPWD) forming part of the tender papers. In the event of any discrepancy between these two, the requirements of the former will be followed.
- 1.2. These additional conditions and additional specifications are applicable to all E&M works in general. For specific tender some of the E&M services may not be a part of the particular tender. In such cases the conditions and specifications which are not related to the works or components thereof mentioned in the schedule of work shall not apply for that particular tender.
- 1.3. All the E & M works shall be carried out as per direction and to the entire satisfaction of the Engineer-in-charge.
- 1.4. The contractor has to be submitted all the drawings to the Engineer – in – charge of the works for approval from the competent authority i.e. HT panel, MV panel, AMF panel, Pole & Pole Bracket for Street light, all other panels & Layout drawing of all works before execution or procurement of materials.

Unless otherwise specified in the following conditions, the work shall, in general, be carried out as per following specifications:

- (a) CPWD General Specifications for Electrical Works – Part-I (Internal), 2023 amended up to date.
- (b) CPWD General Specifications for Electrical Works – Part-II (External), 2023 amended up to date.
- (c) CPWD General Specifications for Electrical Works – Part III (LIFT & ESCALATOR) 2003 amended up to date.
- (d) CPWD General Specifications for Electrical Works – Part IV (Substations) 2013 amended up to date.
- (e) CPWD General Specifications for Electrical Works – Part V (Wet Riser & Sprinkler Systems) 2020 amended up to date
- (f) CPWD General Specifications for Electrical Works – Part-VI (Fire Alarm System), 2018 amended up to date.
- (g) CPWD General Specifications for Electrical Works – Part VII (D. G. Sets) 2023 amended up to date.
- (h) CPWD General Specifications for Electrical Works – Part VIII (GAS BASED FIRE EXTENGUSHER SYSTEM) 2018 amended up to date.
- (i) CPWD General Specifications for Electrical Works of HVAC-2024
- (j) CPWD Code of practice for Fire Alarm System, 2018 & NBC-2016 amended up to date.
- (k) Relevant BIS specifications amended up to date.

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

- (l) Indian Electricity Act 2003 and Indian Electricity Rules 2005 amended up to date.
  - (m) Local Fire Regulations applicable at the place of installation.
  - (n) Relevant and applicable foreign standards and specifications amended up to date.
  - (o) Any other relevant act or rules and local byelaws.
  - (p) Commercial and additional conditions and specifications for E & M work for this tender.
  - (q)
- 1.5. If the specifications for any item or its component are not available in the CPWD specifications cited above, relevant BIS specification as amended up to date shall be followed, whether or not the specific reference of a particular BIS specification has been made in this specification / tender document.
  - 1.6. Wherever any reference to any Indian Standard specification occurs in the document relating to this contract the same shall be inclusive of all amendments issued thereto or revisions thereof, if any, up to the date of opening of tender.
  - 1.7. All materials should conform to relevant BIS specifications wherever the same exists in absence of stipulation in this tender document.
  - 1.8. Where manufacturers furnish specific instructions / recommendations relating to the materials used in this job and/or their installation, covering points not specifically mentioned in these documents, these instructions shall be followed in all cases and shall be deemed to be included in the schedule of work whether they have been specifically mentioned or not.
  - 1.9. Manufacturer's catalogue /literature on installation, testing, maintenance and troubleshooting of major equipment shall be submitted to the department while handing over the installation.
  - 1.10. MATERIALS TO BE USED IN THE WORK :
    - 1.10.1. All materials used in the work shall be new and of good quality, conforming to the relevant specifications as per good Engineering practice.
    - 1.10.2. All the materials proposed to be used in the work should be got approved from Engineer in Charge before use in work.
    - 1.10.3. The materials to be supplied / provided by the contractor in execution of the work should be ISI marked, wherever applicable and of make as specified in the agreement. Where the make of any particular material is not specified in the contract document, the material shall be supplied as per makes desired by the Engineer-in-charge.
    - 1.10.4. It will be the responsibility of the contractor / bidder to ensure use of genuine materials in the work. The department reserves the right to get (any / all materials / components) inspected by the manufacturer or their authorized representatives at any stage of the execution of work. If any of the materials, equipments supplied and used in work is found spurious at any stage, then the department reserves the right to ask

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

the contractor to replace it by genuine one and make suitable recovery and / or withheld suitable amount till it is done, even if any payment against that material is already made.

- 1.10.5. The department may ask for any valid document like manufacturer's test certificate, document for purchase of the material, document for import / shipment of imported materials etc. as deemed fit by the engineer-in-charge to ascertain genuinity of material supplied by / used in the work by the contractor. The contractor shall remain bound to submit all such documents to the department failing which payment may not be made or if already paid may be recovered / withheld from subsequent running account payment.
- 1.10.6. Copies of all purchase documents for all equipments, accessories, fittings, fixtures etc. which carry guarantee / warrantee shall be handed over to the department in suitable form so that proper guarantee of materials are available to the department.
- 1.10.7. All the equipments and their components and all the materials to be used in the work shall be suitable for the environmental conditions at the location of the work.
- 1.10.8. The materials to be supplied in this work shall be scheduled in such a way that miles stones are achieved and no shortfall is there. At the same time materials should be brought at sight in phases in such a manner so that they are not brought much in advance at site and dumped in work site for long period before installation and guarantee / warrantee of the materials are available for full period i.e. from the date of beneficial use of the material / equipment as per tender conditions. If the materials / equipments are supplied at site much before actual use in work, the department shall not remain bound to accept and make payment for such items of work involving the said materials / equipments. The decision of the engineer in charge will be final and binding on all.
- 1.10.9. Dismantle materials, if any, should be returned to the department unless otherwise anything in contrary has been specifically stated in the tender document / BOQ.
- 1.11. RATES :
- 1.11.1. Unless otherwise provided in the schedule of quantities of the work the rates 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.
- 1.11.2. The rates for all items of work shall, unless clearly specified otherwise, include cost of all labours, materials and other inputs involved in the execution of the item irrespective of whether they have been specifically mentioned in the tender document or not.
- 1.11.3. This being an indivisible works contract, GST, Excise Duty etc. are not payable separately. The rates tendered shall be firm and inclusive of all taxes, duties, cess and levies as applicable, and all charges for packing, forwarding, insurance, freight and delivery, installation, testing and commissioning at site, watch and ward etc. including temporary constructional storage, risks, over head charges, general

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

liabilities / obligations and clearance from local bodies and State Fire Services, as applicable. Nothing extra shall be paid. However, fees payable to the local bodies / authorities for such clearance etc. shall be borne by the department.

- 1.11.4. Octroi exemption certificate may be issued by the department if required by the contractor. However, the department is not liable to reimburse the octroi duty in case exemption certificates are not honoured by the concerned authorities.
- 1.11.5. The rates quoted by the tenderer, shall be firm and inclusive of all taxes (including works contract tax but excluding service tax), octroi, duties and levies and all charges for packing forwarding, insurance, freight and delivery, installation, testing, commissioning etc. at site i/c temporary constructional storage, risks, overhead charges, general liabilities/obligations and clearance from local authorities. The fee for the inspection of installation by government authorities shall be reimbursed by the department on production of receipts. The contractor has to, however, initially make the payment. Likewise, service tax applicable shall be initially paid by the contractor and shall be reimbursed to him by the department after verification of payment receipts etc.
- 1.12. COMPLETENESS OF TENDER :
- 1.12.1. 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.
- 1.13. STORAGE AND CUSTODY OF MATERIALS:
- 1.13.1. The agency has to make his own arrangement for watch and ward of the stores. Their safe custody shall be the responsibility of the contractor till the final taking over of the installation by the department.
- 1.14. ACCIDENT: The department (CPWD) shall not have any responsibility or liability in case of any accident injury to the personnel to the contractor at work site or to the general public at the work site due to mishandling of equipments by the personnel of the contractor or any other similar reason. The responsibilities and liabilities for such accidents and incidents shall be borne in full by the contractor.
- 1.15. AFTER SALES SERVICE : The contractor shall ensure adequate and prompt after sales service in the form of maintenance personnel and spares as and when required with a view to minimize the break down period. Particular attention shall be given to ensure that all spares are easily available during the normal life of the installation.
- 1.16. All the equipments except LED fittings shall be guaranteed for a period of 12 months from the date of taking over the installation by the department or date of completion of agreement which is later against unsatisfactory performance and / or break down 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

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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.

In order to keep balance default liability period of one year from the date of completion of work or date of taking over of installation by the Engineer – in – Charge, which is later, the contractor may have to purchase additional warranty with the same terms and conditions as the original warranty from the OEM or his authorised service partner. Nothing extra shall be payable on this account. LED fittings shall be guaranteed for at least 5 years, any defective materials and equipments shall be replaced free for cost at the direction for the engineer-in-charge. The decision of the Engineer-in-Charge in this regard shall be final.

- 1.17. Before completion of defect liability period of one years, the main contractor has to Submit security deposit (in addition to 2.5%) of 5% of 80% of the price of LED fittings (based on invoices) for the remaining 4 years warranty period for LED fittings in acceptable form i.e., FDR/Bank guarantee, to concerned Executive Engineer & Senior Manager (E). The security Deposit deducted from the bills of contractor shall be Refunded to the main contractor only after submission of above security deposit for LED fittings by main contractor, failing which this LED security deposit shall be deducted for total work and balance amount only will be refunded after completion of defect liability period. The LED security deposit will be released after completion of warranty period 5 years to the main contractor.

**Note : 5% of total quantity of LED fittings of each model (i.e., not less than 1 No) extra shall be supplied at free of cost at site within the quoted rates without claiming any extra cost (the quoted amount shall include the total quantity and 5% of extra quantity of LED fittings extra mentioned.**

- 1.18. REMOVAL OF SURPLUS MATERIALS AND TOOLS: After completion of work the agency shall remove his men, materials and debris etc. from site.
- 1.19. QUALITY OF WORK AND WORKMANSHIP :
- 1.19.1. The contractor shall be entirely responsible and answerable for all the works done by him regarding quality, adherence to the laid down specifications, terms and conditions, warranty/guarantee etc. and he shall be liable to bear any compensation that may be levied by the department under any of the clauses of the agreement.
- 1.19.2. Clause 1.15 of CPWD General Specifications for Electrical Works, Part – IV, Substation 2013 and clause 1.13 of CPWD General Specifications for Electrical Works, Part – VII (DG Sets), 2013 shall be applicable.
- 1.19.3. The materials having ISI mark shall have precedence over the one conforming to IS Specifications.
- 1.19.4. The contractor is advised to visit the site before quoting for his tender to apprise himself about the site environments and other conditions. Drawings and inventories can be seen in the office of the Engineer – in – charge.

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- 1.20. SITE ORDER BOOK: The contractor or his authorized representative shall sign the site order book and comply with the remarks entered them in by the representative of the department.
- 1.21. WATCH AND WARD :
- 1.21.1. The contractor will make his own storage of his own materials. The watch and ward of the materials and of the installations would be responsibility of contractor till the work is completed / handed over to the department. Nothing extra shall be paid to the contractor on this account.
- 1.21.2. Making payment to the contractor in any form against supply of materials / equipments / components or execution thereof shall not absolve the contractor of his responsibility of watch and ward of the equipments / materials etc. and their satisfactory functioning until the same is taken over by the department after successful installation, testing, commissioning and running in period.
- 1.21.3. No separate storage space will be provided to the contractor for storage of his materials and equipments to be brought at site and used in execution. The available open site space may however be used by the contractor for storage purposes in which case he may build up temporary store at available site space at his own cost.
- 1.22. VARIATION IN QUANTITY :
- 1.22.1. Quantities shown against each item of work or supply are tentative which may vary on either side (plus or minus). This variation shall, in general, be governed by clause no. 13 of the clauses of contract of CPWD form 7 / 8. The contractor should ensure from the Engineer-in-charge and from the site condition the actual quantity required / to be used / to be supplied before bringing the materials at site. In case the actual quantity of material required at the site is less than the stipulated quantity, the contractor cannot claim to supply entire quantity stipulated in the schedule of quantities of work (Schedule – A) as well as cannot demand for payment thereof. The contractor shall therefore, be very careful about the quantity of materials to be supplied / brought at site. The decision of the Engineer-in-charge in this regard shall be final and binding on the part of the contractor. Even if initial payment for supply of materials is made in any form for bringing material at site and if it is found at later stage that the actual requirement is less as per site requirement or as per decision of the Engineer-in-charge, the contractor shall have to take back the additional quantity brought / supplied at site and necessary adjustment shall be made from his next bill on this account. No claim in this regard shall be entertained.
- 1.23. NATURAL CALAMITY : No payment will be made to the contractor for any damage caused by rain, snow fall, floods, dampness, fire, sun or any other natural cause whatsoever during the execution of work. The damage to the work due to above reason, if any, shall have to be made good by the contractor at his own cost and no claim on this account shall be entertained.
- 1.24. INSPECTION AND TESTING :
- Materials and equipments to be used in the work shall be inspected by the departmental officers. Such inspection will be of following categories:

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- 1.24.1. Inspection of materials / equipments to be witnessed at the Manufacturer's premises in accordance with relevant BIS / Agreement Inspection Procedure.
- 1.24.2. To receive materials at site with Manufacturer's Test Certificate(s)
- 1.24.3. To inspect materials at the authorized dealer's Godown to ensure delivery of genuine materials at site.
- 1.24.4. To receive materials after physical inspection at site.
- 1.25. Adequate care to ensure that only tested and genuine materials of proper quality are used in work shall be ensured by firm. The firm shall ensure that:
  - 1.25.1. Material will be ordered & delivered at site only with the prior approval of the department to ensure timely delivery.
  - 1.25.2. As and when the order is placed for the fittings / fixtures, cables, switchgears, poles, rising main, other main items etc, its copy shall be endorsed to the CPWD Engineer-in-charge.
  - 1.25.3. The firm will be required to procure material like exhaust fans, MCB's & DB's, switches & sockets, wires & cables, conduits and switchgears etc directly from the manufacturer/ authorized dealers to ensure genuineness & quality and as per the approved makes only. Proof in this regard shall be submitted by the contractor if required by the department.
  - 1.25.4. Inspection at factory or at Godown of the manufacturer, as required, shall be arranged by the firm for a mutually agreed date. Certificate for genuineness of the fittings shall have to be provided duly signed by the manufacturer's officer not below the rank of Regional Manager.
  - 1.25.5. Delivery of material shall be taken up only with the consent of department, after clearance of the material.
  - 1.25.6. Department shall reserve the right to waive inspection in lieu of suitable test certificate, at its discretion.
  - 1.25.7. 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.
  - 1.25.8. The contractor shall give a trial run of the equipments and machinery for establishing its capability to achieve the specifications within laid down tolerances to the satisfaction of the Engineer-in-charge before commencement of work.
  - 1.25.9. Final Inspection and testing
    - 1. Final Inspection and testing will be done by the Engineer-in-Charge or his representative as per details indicated in relevant section of Technical Specifications.
    - 2. The installation will be offered for inspection by local bodies, if required. The contractor or his representative shall attend such inspection of the Local Fire authority, Local Body etc, if any and extend all test facilities as are considered

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necessary, rectify and comply with all observations of the Local Fire authority, Local Body etc, if any, which are part of the agreement and arrange for obtaining necessary clearance certificate in favor of department. In case contractor fails to attend the inspection and make desired facilities available during inspection, the department reserves the right to provide the same at the risk and cost of the contractor and impose penalty for the same. The installation will be accepted by the department only after receiving clearance from Local Fire authority, Local Body etc, for the work executed by the contractor under the agreement.

- 2.1. COMPLETION DRAWING AND MANUAL :In addition to the mode and form of submission of completion drawings and manuals as stipulated in the relevant CPWD Specifications for various sub-heads of E&M works, the contractor shall also submit soft copy of the completion drawings in CD / DVD.
- 2.2. POWER SUPPLY AND WATER SUPPLY: No Power & Water Supply shall be provided by the department for the purpose of execution of the E&M work, except for testing and commissioning of installations. The contractor shall make his own arrangement in this regard. The power supply for testing and commissioning will be given at one point inside the premises and the contractor shall have to make arrangement for required cabling work and switch gears for extension of the power to the required location for testing. This will be applicable to all sub-heads of E&M works.
- 2.3. WORKS TO BE DONE BY THE CONTRACTOR :
  - 2.3.1. Unless 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 – whether specifically indicated in the schedule of quantity / work or not:
  - 2.3.2. Preparation of all layout, working drawings for execution of the work (E&M) components and submission to the Engineer-in-charge for approval within 15 days from the scheduled date of commencement of the work.
  - 2.3.3. Foundations for equipments / structures / fuel tank / pumps including vibration isolation spring / pads.
  - 2.3.4. All minor building works necessary for installation of equipments such as making of openings in walls / floors, either of RCC or brick masonry, foundation trench for fuel line and cable, making of opening in walls or in floors and restoring them to their original condition / finish and necessary grouting etc. as required.
  - 2.3.5. Dismantling of brick wall, if any, for inserting / positioning / placement of equipments, Control panel / Diesel Tanks or for taking ducting / cable tray / pipes and rebuilding / making good the same to its original position / finish for the same nothing extra shall be paid by the department.
  - 2.3.6. Making good all damages caused to the structure during installation and restoring the same to their original finish.

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- 2.3.7. Supply and installation of all necessary angle / channel / flat iron supports and brackets etc. for installation of the substation equipments, D.G. Sets / Diesel Tanks / Exhaust Piping / Water and fuel piping / Cabling / electric Panels / bus-trunking / pumps / accessories on floor / wall / Shaft / terrace and at other places, as may be necessary including their installations in position.
- 2.3.8. Responsibility to ensure safety of all materials against pilferage and damage till the installation is handed over to the department.
- 2.3.9. All scaffolding as may be necessary for installation of Exhaust piping / Cabling / Electric Panels / exhaust pipe / wet riser and sprinkler pipes / ducts and all other equipments and their sub assemblies / accessories on floor / wall / Shaft / terrace and at other places during erection work and subsequent removal.
- 2.3.10. Painting of all exposed metal surfaces of equipments and components with appropriate / approved colour as required and as desired by the Engineer – in - charge.
- 2.3.11. All electrical works including cables / wires, earthing etc as specified in Schedule of work.
- 2.3.12. Small wiring, inter-connection etc. inclusive of all materials and accessories necessary to comply with the regulations as well as proper and trouble-free operation of the equipment.
- 2.3.13. Closing of the cable entry points in sub-station against seepage of water rodents etc.
- 2.3.14. Battery and battery charging system for the DG Sets.
- 2.3.15. Supply of POL i.e. HSD oil and lubricating oil and coolant for diesel engine for testing & commissioning including load testing at manufacturers works as well as works site for testing & commissioning etc as required.
- 2.3.16. All control cables of required core and size from HT panel to Transformer, DG Set to the Control / Manual panel etc. as required.
- 2.3.17. Approval / clearance of the complete installation shall be obtained by the contractor from CPCB / State Pollution Control Board / Local Bodies / Central Electricity Authority (CEA) / other licensing authorities wherever required. However, application shall be made by the Department and any statutory fee, as applicable, shall be paid by the department directly to the government authorities concerned.
- 2.3.18. Onsite training of the staff / departmental official (two persons) to be engaged in the operation of the DG Sets and maintenance of the substation equipments and air-conditioning equipments for at least 15 days.
- 2.4. WORKS TO BE ARRANGED BY THE DEPARTMENT : The works mentioned in clause 1.6 of CPWD General Specifications for Electrical Works Part IV (Substations) 2013 and clause 1.4 of the CPWD General Specifications for Electrical Works Part – VII (DG Sets) 2013 shall be applicable except that power supply and water supply shall not be made available by the department for erection purpose but for testing purpose. The contractor has to make his own arrangement for the same.

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2.5. DATE OF TAKING OVER OF THE INSTALLATION AND DATE OF ACCEPTANCE:

2.5.1. The date of taking over of the installations under any sub-head of E&M works shall be the date of taking over the complete building (s) after due completion of the entire composite work and after complete test and trial run of all the major equipments under all sub-heads of E&M works to the entire satisfaction of the engineer-in-charge.

2.5.2. Subject to the guarantee clause, date of taking over the installation after stipulated period of trouble-free operation of all the E&M works shall be the date of acceptance.

2.6. The appointment of Arbitrator shall be governed by the relevant clause of CPWD General Condition of Contract. The condition of contracts shall be governed by GCC, CPWD.

1.31 Payment terms for E&M packages: The following percentage of contract rates shall be payable against the stages of work shown herein:

Stage	Items	On initial inspection of materials and delivery at site in good condition on pro-rata basis	On completion of pro-rata installation	On completion of testing and commissioning	Obtain NOC from fire authority and handing over
Sl. No.	Percentage of Rate on pro rate basis				
1	Internal EI, Fans, fitting & UPS system	As per work progress			
2	HVAC Chiller	70	10	10	10
3	Fire Fighting & fire alarm	70	10	10	10
4	CCTV, LAN, EPBAX	70	10	10	10
5	Substation & DG set	70	10	10	10
6	Electric Cable	70	10	10	10

3. **ADDITIONAL CONDITIONS AND SPECIFICATION FOR INTERNAL EI, FAN AND FITTING ELECTRICAL WORKS :**

3.1. The Department shall not issue any T & P and nothing extra shall be paid on account of this.

3.2. The main contractor should possess valid electrical contractor license. In case the main contractor does not have the electrical license to operate in the concerned location/jurisdiction, he shall associate an electrical contractor who has the license to operate in the said relevant jurisdiction. The main contractor shall however continue

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to be responsible in all respects for the work done by his associate and also for the necessary statutory compliances. Such associate contractor shall be eligible in terms of the criteria given below himself meets the above criteria, he shall be allowed to execute this sub-head of work after due verification by the Engineer-in-Charge of Electrical Works.

- i. Three similar works each of value not less than 40% of Estimated Cost of the corresponding Item  
Or
- ii. Two similar works each of value not less than 60% of Estimated Cost of the corresponding Item  
Or
- iii. One similar works each of value not less than 80% of Estimated Cost of the corresponding Item

Note:-The value of executed similar 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 the last day of the month previous to the one in which the tenders are invited.

- 2.3 The firm shall be issued tender on production of valid electrical license from competent authority in the name of the contractor. However, the contractors shall be allowed to participate in tender with an undertaking that they will either obtain valid electrical license at the time of execution of electrical work or associate contractors having valid electrical license of eligible class. In case of association of electrical contractor, the main contractor has to enter in agreement with the contractor associated and copy of such agreement shall be submitted to Executive Engineer in charge of E&M component. In case the main contractor intends to change the associated contractor during operation of the contract, he shall obtain prior approval of respective Engineer in charge. The new agency shall have to satisfy the laid down eligibility criteria. In case Engineer in charge of respective discipline is not satisfied with the performance of the agency, he can direct the main contractor to change the agency associated for execution of minor component and this shall be binding on the main contractor.
- 2.4 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 work.
- 2.5 The tenderer shall guarantee among other things, the following vis-à-vis specifications.
- (a) Quality, strength and performance of the materials used.
  - (b) Satisfactory operation during the maintenance period.
- 2.6 DEFECT LIABILITY PERIOD :
- 2.6.1 All the 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 break

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down 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 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.

2.7 EXTENT OF WORK:

2.7.1 The work shall comprise of entire labour including supervision and all materials necessary to make a complete installation and such tests and adjustments and commissioning as may be required by the department.

2.7.2 Minor building works necessary like making of opening in walls or in floors and restoring to their original condition, finish and necessary grouting etc as required to be undertaken.

2.7.3 Maintenance (Routine & preventive) for one year from date of completion and handing over.

2.8 Co-operation with other agencies: The successful tender shall co-ordinate with other contractors and agencies engaged in the construction of the building 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 existing portion of the building 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. Water proofing of pits shall not be damaged under any circumstances.

2.9 Verification of correctness of material at Destination: 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. The contractor shall have to produce all the relevant records to certify that the genuine material from the manufacturers has been supplied and erected.

2.9.1 Materials and equipments to be used in the work shall be inspected by the Departmental officers. Such inspection will be of following categories:

- (a) 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.

2.9.2 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.

2.10 INTERPRETING SPECIFICATIONS / Order of Preference: Should there be any difference or discrepancy between the description of items as given in the Schedule of Quantities,

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technical specifications for individual items of work (including additional and commercial conditions) and IS Codes etc., the following order of preference shall be followed:

- (a) Schedule of quantities.
  - (b) Commercial and Additional conditions, technical specifications for this work.
  - (c) General Conditions of Contract for CPWD Works.
  - (d) Drawings (if any approved by the Engineer-in-charge)
  - (e) CPWD General Specifications for electrical works
  - (f) Relevant IS or any other International code in case IS code is not available.
- 2.11 Executive Engineer (Elect.) shall be the Engineer-in-Charge as far as electrical works are concerned. Separate tender form for electrical component is appended with his tender. It will be obligatory on part of the main contractor to sign the tender documents for all the component.
  - 2.12 The main agency shall be responsible for all acts of commissions and non-commissions of the electrical contractor or sub-contractor engaged by him, even with approval of department.
  - 2.13 Approval of the Engineer-in-charge shall be taken well in advance for all the materials to be used in the work by the contractor.
  - 2.14 Running payment for Electrical/Mechanical components shall be made by the EE (E) directly to the main Contractor. The main contractor shall make the payment to associated Contractor within 15 days of receipt of each running account payment.
  - 2.15 Payments terms: -On account payments for part work (after stipulated and statutory deductions) as assessed by the Engineer – in-charge for the applicable items in the Contract shall be payable at part rates. The part rates will be decided by the Engineer-In-Charge of the work and shall be binding on the contractor.
  - 2.16 The main contractor shall be responsible for coordinating the activities of all works and will ensure progress of works as per laid down programme.
  - 2.17 The Associated electrical Contractor or his representative is bound to sign the site order book as and when required by the Engineer-in-charge and will comply with the remarks therein.
  - 2.18 The contractor shall make his own arrangement at his own cost for electrical / General Tools and plants required for the work.
  - 2.19 The connections, inter-connections, earthing and inter-earthing shall be done by the contractor wherever required to be done for energisation of the installation and nothing extra shall be paid on this account.
  - 2.20 The contractor must be able to work on concrete slabs / walls as and when required and in complete co-ordination with the civil works. Cutting of chases in the plastered wall shall in no case be allowed. The contractor shall fix conduits and boxes in the walls soon after the

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brick work is completed and finish the chase to rough surface with proper cement sand mixture. Only in exceptional cases e.g. where cutting of plaster

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2.22 ed surface cannot be avoided it will be contractor's responsibility to ensure that plastering is done to match the original finish at no extra cost.

2.23 The contractor shall remove all the debris due to the electrical works from the site as soon as the work is completed.

2.24 The rupturing capacity of the MCB's shall be 10 KA. The MCB's shall have ISI marked.

2.25 All the MCCBs shall be rated for  $I_{cs}=I_{cu}$ .

2.26 The copper wire to be used on this work shall be FRLS type.

2.27 Make of MCB/MCCB shall be the same as the make of MCB DB.

2.28 The Electrical works shall be carried out by the contractor, side by side with the progress of the civil works.

2.29 The Contractor shall on demand by the Engineer-in-charge, furnish the proof to the satisfaction of Engineer-in-charge regarding purchase of Wires, MCBs, MCBDB, Fittings, accessories and other items, from the manufacturers authorized outlets.

2.30 Cutting of brick walls shall be with chase cutting machine only. All repairs and patch works shall be neatly carried out to match the original finish and to the entire satisfaction of the Engineer in Charge.

2.31 All the sub main and circuit wiring includes loose wire for connections inside switch boxes and MCB DB s. No payment for these loose wires shall be made. However, wires within the cubicle panel will be measured and paid under relevant item of work.

2.32 The connection between incoming switch / isolator and bus bar shall be made with suitable size of thimble and cable at no extra cost.

2.33 Copper conductor of insulated cables of size 1.5 Sq.mm and above shall be stranded and terminals shall be provided with crimped lugs.

2.34 All MS pulling box cover should be of phenolic laminated sheet of thickness not less than 3mm and for which nothing extra shall be paid on the account.

2.35 All sub-main shall be terminated in the main board with suitable copper lugs and thimbles for which nothing extra will be paid on this account.

2.36 All hardware items such as screws, thimbles, GI wire etc. which are essentially required for completing an item as per specifications will be deemed to be included in the item even when the same have not been specifically mentioned.

2.37 All hardware items such as nuts/ bolts/ screws/ washers etc. to be used in work shall be zinc/ cadmium plated iron.

2.38 Any conduit which is not be wired by the contractor shall be provided with GI fish wire for wiring by some other agency subsequently. Nothing extra shall be paid for the same.

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- 2.39 While laying conduit, suitable size junction boxes shall be provided for pulling the wire as per the decision of the E-in-C.
- 2.40 Materials to be used in work are to be ISI marked wherever applicable. The make of the materials have been indicated in the list of acceptable makes. No other makes will be acceptable. For items for which acceptable makes are not mentioned in the tender document, Engineer-In-Charge shall decide the make before bringing the material to the site by the contractor. The materials to be used in the work shall be got approved by the Engineer in Charge / his representative before its use at site. The E-in-C shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not acceptable.
- 2.41 Quantity of various items as specified in tender document may changes during construction stage as per site condition / client's requirement, the successful bidder is advised to verify the actual requirement of items including fittings, fixtures before bringing the material to the site.
- 2.42 In case the same item(s) appear more than once in the schedule of work / BOQ under the same sub head or among the different subhead of works, the lowest rate quoted for that item (s) shall be considered for the particular item(s) wherever appeared in any part of BOQ/ Schedule of works for the purpose of tender evaluation although web generated e-price bid may incorporate different quoted rate for same item(s) as per the quoting pattern of the tenderer. The tendered amount thus worked out shall be final & shall be binding on the contractor.
- 2.43 All statutory deductions like WCT, Labour welfare cess etc. shall be made from the bills.
- 2.44 Testing: All testes 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.
- 2.45 Commissioning on Completion: After Completion of the work, it shall be ensured that the installation is tested and commissioned.
- 2.46 COMPLETION PLAN AND COMPLETION CERTIFICATE :
- 2.46.1 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.
- 2.46.2 (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, T5, LED based, 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.

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- 2.46.3. The contractor shall submit the completion plan separately in triplicate on blue print with one set on tracing "Cloth" as per the contract within 30 days of the completion of work. In case, the contractor fails to submit the plan, he shall be liable to pay a sum equivalent to 3.5% of the value of the work subject to a ceiling of ₹35,000.00.

### **3 ADDITIONAL CONDITIONS AND SPECIFICATION FOR EARTHING SYSTEM :**

- 3.1 This section covers the general requirements of the earthing system for Sub-station installation & Protection of building against lightning.
- 3.2 SYSTEMS :
- 3.2.1 Earthing system shall comprise earth electrodes in accordance with clause 8.2.1 of General specifications for Elect. Works (part I Internal) 2023. For every additional transformer 2 more separate and distinct earth electrodes shall be provided for neutral earthing. The body earthing for transformers, HV & MV panels shall be done to a common earth bus connected to two separate and distinct earth electrodes. For a one transformer sub- station total number of earth electrodes shall be 4 (2 for neutral earthing and 2 for connection to a common earth bus for body earthing)
- 3.3 ELECTRODES :
- 3.3.1 The earth electrodes shall be as per CPWD General Specifications for Electrical Works (Part I Internal ) 2023.
- 3.4 LOCATION OF EARTH ELECTRODES :
- 3.4.1 Normally an earth electrode shall not be situated less than 1.5m from any building. Care shall be taken that the excavation of earth electrode may not affect the column footings or foundation of the building. In such cases electrodes may be farther away from the building. The location of the electrode earth will be a place where the soil has reasonable chance of remaining moist. As far as possible, entrances, pavements and road ways, are to be definitely avoided for locating the earth electrode.
- 3.5 WATERING ARRANGEMENT : Method of watering arrangement shall comply with CPWD general specifications.
- 3.6 SIZE OF EARHT LEAD :
- 3.6.1 The recommended sizes of copper earth bus lead in case of sub-stations shall be accordance with clause 8.2.2 of general specifications for electrical works (Part –I Internal) 2023 amended upto date. The minimum size of earth lead shall be 25 mm x 5 mm copper of equivalent GI strip.
- 3.7 INSTALLATION :
- 3.7.1 All joints shall be riveted and sweated. Joints in the earth bar shall be bolted and the joints faces tinned. Where the diameter of the bolt for connecting earth bar to apparatus exceeds one quarter of the width of the earth bar, the connection to the bolt shall be made with a wider piece of flange of copper jointed to earth bar. These shall be tinned at the point of connection to equipment and special care taken to ensure a permanent low resistance

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contact to iron or steel. All steel bolts, nuts, washers etc. shall be cadmium plated, main earth bars shall be spaced sufficiently on the surface to which they are fixed such as walls or the side trenches to allow for ease of connections. Copper earthing shall not be fixed by ferrous fittings. The earthing shall suitably be protected from mechanical injury by galvanized pipe wherever it passes through wall and floor. The portion within ground shall be buried at least 60 cm deep. The earthing lead shall be securely bolted and soldered to plate or pipe as the case may be. In the case of plate earthing the lead shall be connected by means of a cable socket with two bolts and nuts. All washers shall be of the same materials as the plate or pipe. All iron bolts nuts and washers shall be galvanized.

3.7.2 Earthing system shall comprise earth electrodes in accordance with clause 8.2. of General Specifications for electrical works (Part I internal) 2023. Normally an earth electrode shall not be situated less than 1.5 m from any building. GI Pipe electrode shall be used for earthing of internal electrical installations like DB, Meter Board, Feeder Pillars & Poles etc. GI plate electrode shall be used for firefighting pumps, water supply pumps, lightning conductors. Separate earth electrodes shall be provided for lightning arrestor / lightning conductors.

3.8 TESTING :

3.8.1 After installation, the tests as specified in CPWD General Specifications for Electrical work (Part I Internal) 2023 shall be carried out and results recorded

3.9 Selection of Type of Electrodes :

3.9.1 Following are general guidelines for the selection of the type of electrodes.

Number of Earth Electrodes.

(a) In all cases, relevant provisions of Rules 33, 61 and 67 of the Indian Electricity Rules, 2005 as amended, shall be complied with.

(b) Non-current carrying metal parts of all apparatus utilizing power supply at voltage exceeding 250 volts shall be earthed by two separate and distinct connections to the earth bus, or to two separate and distinct earthing sets.

#### **4 ADDITIONAL CONDITIONS AND SPECIFICATIONS CHILLER**

4.1.1 The work shall be carried out in accordance with the General specification for Electrical works of CPWD amended up to date, relevant I.E rules & as per directions of Engineer-in-Charge.

4.1.2 The contractor will carry out preventive maintenance/ Checks and operating as per CPWD Specification/ respective standard trade practice and as per details attached in Annexure – 1.

4.1.3 The contractor shall arrange to render efficient service as outlined above. However, in case he fails to maintain the service to the satisfaction of the Engineer-in-charge and the department has made any expenditure to maintain the installation by alternate

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arrangement, the expenditure thus incurred will be recovered from the contractor, for which decision of Engineer-in-charge shall be final.

- 4.1.4 The A.M.C. shall be taken only for Equipment working in all respects. Before entering in to AMC, representative of the firm shall visit the site and ascertain the proper functioning of Equipment and its sub – assemblies.
- 4.1.5 Only bonafide contractor's persons shall be allowed in the premises for carrying out the maintenance work.
- 4.1.6 The contractor shall responsible for any accident occurring during the period of the maintenance or any other work is being attended by the contractor.
- 4.1.7 The contractor shall responsible for any damage caused to the equipment/ building during the execution of the maintenance work.
- 4.1.8 During the period of AMC firm shall provide the following services. Preventive Maintenance Calls: Once in a week i/c inspection safety equipment, cleaning of panels, adjusting sensitive parts and safety parts. Break Down Calls : As required or requisitioned from time to time. Reach Time: Every effort shall be made to attend to any complaint within 4 hours. Major Breakdown Repairs : May take up to 24 hours from the date & time of complaint. With consultation of Engineer – in – charge.
- 4.1.9 In case any major defects founds in the system during checking it should be informed to the Engineer-in-charge and defects should be rectified immediately.
- 4.1.10 Any abnormality in electrical installation or major fault should be brought into the notice of Engineer-in-charge.
- 4.1.11 The tendered rates should be inclusive of all types of taxes, Octorio, levies, works contract taxes, Service taxes, packing, transportation, handling, duties etc. i.e. the rates quoted by the contractor shall be firm & final. Nothing extra will be paid on this account.
- 4.1.12 No advance payment will be made to the contractor. Quarterly running payment shall be made on the basis of services rendered by the contractor as per the terms and conditions of contract.
- 4.1.13 A suitable record for the works done will have to be maintained by the contractor in consultation with the Junior Engineer / Assistant Engineer of the site.
- 4.1.14 No T & P will be issued to the contractor by the department.
- 4.1.15 Contractor is liable to provide all necessary electrical precautionary measure to his staff and all the local safety & security regulations shall be observed strictly.
- 4.1.16 The department reserves the right to terminate this contract without giving any prier notice, at any time if the performance of the contractor is found unsatisfactory.
- 4.1.17 The monthly report detailing the nature of the service carried out, the defect observed to be supplied to the Engineer-in-charge.
- 4.1.18 In case of any accident during the Operation/Maintenance of the equipment leading to injuries/damages to human being equipment & or loss of life, the contractor shall be fully responsible for settling all claims & indemnify the department against any Claims arising out

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of such accidents, consequential damages to other systems will however be not recoverable from contractor.

- 4.1.19 Any break-down call or complaint reported to the contractor verbally or in writing shall be attended promptly. In case any break-down or complaint attend more than 24 hours, a proportionate double recovery will be made from contractor bill.

4.4 ADDITIONAL CONDITIONS AND SPECIFICATIONS FOR CABLE AND CALBE LAYING WORK :

- 4.4.1 The work shall in general be carried out as per CPWD General Specifications for Electrical Works, Part – II, 1994 amended up to date.

- 4.4.2 When more than one cable is laid in the same trench, the smallest size of the cable shall be considered as main cable and the higher size cables shall be considered as additional cable laying in the same trench. Measurement of cable laying work shall be taken accordingly.

- 4.4.3 The make of UG cable supplied shall be one from the preferred makes of materials. The MV cables shall have ISI certification mark having valid ISI certification license.

- 4.4.4 A certified copy of the valid BIS license for all sizes and type of UG Cables covered in this work shall be furnished before offering of inspection of cable. All the UG cables used in this work shall of any one makes from the list of preferred makes of materials. Cables of different makes, though from list of preferred makes of materials, shall not be used.

- 4.4.5 Inspection & Testing – Contractor must intimate to the Engineer-in-Charge at least 14 days in advance, about the probable dates when the entire lot of UG Cables of all sizes to be used in this work shall be ready at the manufacturer's premises. Engineer-in-charge or his authorized representative shall inspect the UG Cables at the manufacturer's premises and carry out the Acceptance and Routine tests on the ISI marked cables of sizes, (separate for each size) as prescribed in IS-7098 (Part-I) – 1988 as amended up to date and in accordance with the sampling plan prescribed therein.

- 4.4.6 In addition to above, contractor shall arrange to furnish certified copies of all the Type Test Certificates, as prescribed in the relevant IS-7098 (Part-I)-1988 to the Engineer-in-charge, along with the call of Inspection of the UG Cables. The Engineer-in-Charge or his authorized representative shall be given access to the original Type Test for verification in respect of each size of the Cables, under inspection, by the manufacturers.

- 4.4.7 Inspection of the items of supply shall be done by the Inspecting officer, before they are dispatched to place of delivery. On completion of inspection, dispatch instructions accompanied with copies of inspection report shall be issued by the Inspecting Officer / Engineer-In-Charge. Only those materials as passed in inspection by the Inspecting Officer

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shall be dispatched. Copy of inspection certificate as issued by Inspecting Officer shall be dispatched to site of work.

- 4.4.8 Place of Inspection / Testing: Contractor should state the place / factory where the equipment will be put up for inspection. They should also clearly indicate the facilities available for different tests.
- 4.4.9 Inspecting Officer: The inspecting officer will be the Engineer-in-charge or any officer authorized by the Engineer-in-charge for the purpose of inspection/test.
- 4.4.10 Arrangement for Inspection / Testing: All arrangements required for inspection of materials and testing at factory are to be made by the supplier and nothing extra shall be paid for the same.
- 4.4.11 Marking of Inspected Materials: The inspecting officer will get the stickers {marked "INSPECTED"} pasted on all items inspected and an additional sticker marked "TESTED" only on the items tested.
- 4.4.12 Inspection schedule: The inspection call should be sent by Fax / Telegram after award of work as per Table of Mile Stone. Inspection call shall be given at least 14days prior to date of inspection proposed.
- 4.4.13 Packing: Strictly in accordance with the provisions as per clause 18.1, 18.2 and 18.2.1 in IS-7098 (Part-I) – 1988 as amended up to date.
- 4.4.14 Delivery Period: Shortest possible time schedule in delivery is required to be framed / observed, but not later than the specified. The date of actual receipt of materials at site will be considered as the relevant date for this purpose. The delivery schedule shall be as per Table of Mile Stone.
- Payment Terms: The percentage of contract rates for the various items included in this sub-head of work shall be payable as per mention General and commercial condition head.
- 4.4.15 Placing Order on UG Cables: Before placing orders on the manufacturer for supply of the cables, the contractor is required to carefully get assessed the exact requirement of each size of the cable at the site of work and get the same approved from the Engineer-in-charge. Department shall Not Take Back any spare quantity of cable whether in pieces or in sealed drums if procured more than that actually required at site / approved by the Engineer-in-charge. Even if advance payment is made for the cable and after erection surplus cables are found, the payment towards surplus cables made if any, shall be adjusted from the next on account bill of the contractor.
- 4.4.16 However, it may be noted that the contractor shall have to arrange extra quantity of the cable, over and above that assessed by the contractor, before start of the work and approved by the Engineer-in-charge, if such additional quantity of the cable is required at site, in order to make the installation as covered in the Reach and Scope of this work, in

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order to make the installation operational. Such extra quantity shall be paid as per terms of the Agreement.

- 4.4.17 Inspection & Testing – All the cable used at work should be tested before measurement of cables at work site as well as before use at work. The manufacturer test certificate should be produced at site at the time of delivery of cables at work site.

## **5 ADDITIONAL CONDITION AND SPECIFICATIONS FOR ELECTRICAL WORK ASSOCIATED WITH FIRE FIGHTING INSTALLATION**

- 5.4 SCOPE : This chapter covers the requirements for the electrical works associated with fire fighting installations, namely, motors, switch boards, power cabling, control wiring, earthing and remote control-cum-indicating panels.

### **5.5 GENERAL**

- 5.5.1 Unless otherwise specified in the tender specifications, all equipments and materials for electrical works shall be suitable for operations on 415 V / 240 V + 10%(3 phase/single phase), 50 Hz. AC system.

- 5.5.2 All electrical works shall be carried out complying with the Indian Electricity Rules, 1956 as amended to date.

- 5.5.3 All parts of electrical works shall be carried out as per appropriate CPWD General Specifications for Electrical works, namely, Part I (Internal) 2013, Part II (External) 1994 work, and Part IV (Sub-station), 2013 all as amended to date.

- 5.5.4 All materials and components used shall conform to the relevant IS specifications amended to date.

- 5.6 POWER SUPPLY : Following 3 phases, 415 Volts, 50 Hz., supplies shall be made available for fire fighting installations directly from sub-station.

- 5.6.1 Normal supply for fire pumps near underground tank.

- 5.6.2 In buildings where power failures are likely to be for long duration, in order to facilitate operation of Jockey Pump and maintain pressure in the system, essential supply for Jockey Pump and control for diesel engine shall be made available in the pump house.

- 5.6.3 Power cable of adequate size shall be laid from the sub-station directly to the switch board of above pumps. Independent supply shall be provided for water supply pumps if installed in the same pump house. The power supply for fire fighting is not to be used for any other purpose.

- 5.6.4 If the fire pump house, is away from the sub-station building, the route of the cable shall not pass under the building or permanent structure. Cable shall be laid along the route which is safe from fire.

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## 5.7 MOTORS :

5.7.1 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 class 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.

## 5.8 MOTOR STARTER :

5.8.1 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, + 10%, 50 Hz., 3 phase AC supply and shall be integrated in the panel.

5.8.2 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.

5.8.3 Each starter shall be provided with the following protections :

- (a) Thermal overload on all the three phases with adjustable settings,
- (b) Independent single-phase preventer. (current sensing type)

5.8.4 Adequate number of extra NO/ NC contacts for interlocks, indicating lamps, remote operation etc. shall be provided on the starter/ contactor.

5.8.5 Under voltage/No volt trip shall not be provided.

## 5.9 SWITCH BOARDS :

5.9.1 The main switch board shall be floor mounted, free standing or wall mounted cubical type and shall be factory built fabricated by one of the approved switch board manufacturers. 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. It shall be suitable for termination of the incoming cable(s) from bottom.

5.9.2 The capacity of switch gear shall be suitable for the requirements of motor fed/controlled. Starting currents shall be duly considered.

5.9.3 Switch fuse units shall be used upto and including 32 A and SDFU shall be used for 63 A and above. ACB shall be used for 630 A and above ratings. Alternatively, MCCBs of appropriate fault level may be provided.

5.9.4 All switch fuses/SDFU shall be of AC 23 duty as per IS: 4064-1978 as amended upto date. They shall be complete with suitable HRC cartridge type fuses.

- 5.9.5 Switch boards shall house starters for motors with independent current sensing type single phase preventor for each starter.
- 5.9.6 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.
- 5.9.7 The fabrication of switchboard shall be taken up only after the drawings for the fabrication of the same are approved by the Engineer-in-charge.
- 5.9.8 Switchboards shall be fabricated as per specifications indicated in sub-para above.
- 5.9.9 The layout shall be designed for convenient connections and inter-connections with the various switch gear. Connections from individual compartments to cable alleys shall be such as not to shut down healthy circuits in the event of maintenance work becoming necessary on a defective circuit.
- 5.9.10 Care shall be taken to provide adequate clearances between phase bus bars as well as between phase bus bars, neutral and earth.
- 5.9.11 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.
- 5.9.12 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 tiers shall be duly clamped within the switchboard.
- 5.9.13 Identification labels shall be provided against each switchgear and starter compartment, using plastic/aluminium engraved labels.
- 5.9.14 Metallic danger board conforming to relevant IS shall be fixed on each electrical switchboard.
- 5.10 POWER CABLING :
- 5.10.1 Unless otherwise specified, the power cables shall be XLPE insulated, PVC outer sheathed aluminium conductor, armoured cables 1100 V grade. The power cables shall be of 2 core for single phase, 4 core for sizes upto and including 25 sq.mm, 3-1/2 core for sizes higher than 25 sq.mm for 3 phase.
- 5.10.2 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.
- 5.10.3 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

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sheet with adequate structural strength and rigidity. Necessary supports and suspenders for cable trays shall be provided by the contractor as required.

#### 5.11 CONTROL WIRING :

- 5.11.1 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.
- 5.11.2 The number and size of the control cables shall be such as to suit the control system design adopted by the contractor.
- 5.11.3 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.
- 5.11.4 Control wiring shall correspond to the circuitry/sequence of operations and interlocks approved by Engineer-in-Charge.

#### 5.12 EARTHING :

- 5.12.1 Provision of earth electrodes and the type of earthing shall be as specified in the tender specifications.
- 5.12.2 The earth work shall be carried out in conformity with CPWD Specifications for Electrical works (Part-I), Internal 2013.
- 5.12.3 Metallic body of all motors, medium voltage equipments and switch boards shall be connected by two separate and distinct earth conductors to the earth stations of the installations; looping of such body earth conductors is acceptable from one equipment, or switch board to another.
- 5.12.4 The size of earth conductors for body earthing of equipments shall be 2 Nos. 6mm dia copper wire/2 Nos. 25 x 3 mm G.I. strip
- 5.12.5 Armouring of cables shall be connected to the body of the equipments/switch board at both the ends. Compression type glands shall be used for all such terminations in the case of PVC cables.

#### 5.13 PAINTING :

- 5.13.1 All panels shall be supplied with the manufacturer's standard finish painting or as indicated in the Schedule of Work.

#### 5.14 INSTALLATION, TESTING AND COMMISSIONING :

- 5.14.1 SCOPE : This chapter covers the requirement of Installation, testing and commissioning of fire fighting system.
- 5.14.2 PREPARATION AND APPROVAL OF DRAWING : On 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. The stage of approval of drawings is therefore very important. All drawings should be carefully and critically examined before

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approval. The requirement of various components of fire fighting system has been described in previous chapters dealing with the components. However generally following points are to be taken care while examining and approving the drawings.

- 5.14.3 Site survey should be carried out in detail.
- 5.14.4 In addition to building plans, layout plan along with landscape plan/horticulture plan and other services plans should be consulted while deciding route of underground pipes around the building.
- 5.14.5 As far as possible, underground pipe are not to be laid under road, pavement, building and long open spaces. The locations along road, foot path in earth be preferred.
- 5.14.6 The location of fire service inlet and fire service connection are to be decided as per norms. However necessary adjustments are to be made so that these components do not become hindrance in vehicular movement and entrance to the building. Requirement of other building services are also to be given due consideration. Symmetry should be maintained for aesthetic considerations.
- 5.14.7 Pipe sizes are to be decided in accordance with provision mentioned in the relevant para of the specification.
- 5.14.8 Pump Layout : The dimensioned foundation drawing of pumps should be available for marking in the pump room layout. The layout is to be prepared in such as a way that it should be possible to maintain any equipment without disturbing the adjoining equipment. Electrical panel are to be installed at a location which is easily accessible near the entrance to the pump house and there should be no possibility of water dripping over or near the electrical panel.
- 5.14.9 Electrical Panel : Complete wiring drawing, layout etc. are to be examined to ensure that provisions of agreement are incorporated in the drawing. Sizes of various panel, mounting arrangement be decided keeping in view ease of operation and aesthetic consideration as wall.
- 5.14.10 INSTALLATION : Following precautions are to be taken during execution of the work.
  - (a) The pump and motor are to be perfectly aligned on the base plate so that there is no vibration during operation. All nuts, bolts, washers shall be of adequate size and galvanized.
  - (b) The pipe supports should be decided in a way that the weight of pipes and valves is not transferred to the pumps and supports do not cause hindrance in movement inside the pump house. As for as possible floor supports be provided in pump house.
  - (c) All valves shall be installed at a height and in a position that their operation by right hand is conveniently possible.
  - (d) All pressure gauges should be installed so that the dial is vertical and is visible while entering the pump house.

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- (e) Electrical panels should not be installed at floor level. The panels shall be sufficiently raised above ground level. If panels are to be mounted on wall, an angle iron frame shall be provided so that atleast 75 mm spaces are left behind the panels. The panels shall be easily approachable.
- (f) Cable tray layout should give neat appearance. All cable tray shall be adequately supported from the ceiling /floor.
- (g) In no case any structural member i.e. RCC wall, column, beam, floor area to be damaged during installation, Mechanical fasteners are to be used for grouting support. U.G. tank wall is not to be used for any support. No pipe/cable is to cross the pump house below ground level. Opening above ground level are only to be used for this purpose.
- (h) While excavating for laying of external pipes, suitable sign board/ barricading shall be provided to ensure that no person falls in the trench.
- (i) The width and depth of trench shall be adequate for laying the pipe 1m below ground level.
- (j) No earth or any other matter is to be allowed to enter the pipes. The ends shall be kept closed always.
- (k) The anticorrosive treatment is to be applied on the entire length laid underground. The treatment is not to be damaged.
- (l) Pressure testing is to be carried out in sections before filling the earth back in the trench.
- (m) The earth filling is to be done in layers of 20 cm each and properly rammed so as to avoid possibility of settlement. Surplus earth/ malba shall be removed from the site by the contractor.
- (n) Where Pipes are crossing road likely to have heavy traffic, additional protection over pipe shall be provided to ensure that pipe is not damaged.
- (o) External hydrants and fire service connection/ inlet shall be located parallel to the nearby road/ foot path so as to give proper appearance. Foundation shall be raised from below ground level and shall be properly plastered in plumb. The hydrants shall be facing the road/ approach. There shall be no obstruction in approaching the hydrants for operation.
- (p) 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.
- (q) Internal hydrant shall be provided in the centre and facing outside 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.
- (r) 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.

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## 5.14.11 TESTING :

- (i) Initial Testing :
  - i. 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.
  - ii. 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.
- (ii) Final Testing : 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.
- (iii) 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 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.
- (iv) The contractor shall arrange for all the materials and labour required in connection with inspection of equipment or for any testing to be carried out at his works / manufacturers' works or at site of installation. Notice of such inspection / presence for testing shall be given by the contractor to the Engineer-in-charge at least fifteen days in advance.
- (v) Notwithstanding approval for such tests / inspection of equipments / components by the Engineer-in-charge or his authorised representative, the contractor shall be required to perform site tests as desired by the Engineer-in-charge and prove the correctness of ratings and performance of equipments / components and materials supplied and / or installed by him as per contract specifications and conditions at his own cost.
- (vi) The Engineer-in-charge reserves the right to reject any equipment / machinery / material should it, on tests after installation, be found not to comply with contract specifications or its performance is not satisfactory.
- (vii) Final inspection and testing will be done by the Engineer-in-charge or his representative as per details to be indicated by the Engineer-in-charge.

5.14.12 INSPECTION BY LOCAL FIRE OFFICER : After completion of the work and testing to the entire satisfactory of Engineer-in Charge, the installation shall be offered for inspection by Chief Fire Officer or his representative. Testing as desired by the Fire Officer shall be carried out. The contractor will extend all help including man power during testing. The observation of Chief Fire Officer which are a part of agreement shall be attended by the contractor. Nothing extra is to be paid for testing as above.

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- (a) It shall be the responsibility of the contractor to get the installation inspected and passed by the local authorities concerned, as may be required by the local bye laws. The contractor will extend all help including test facilities to the representatives of the local bodies. In case the contractor fails to make desired facilities available during inspection, the department reserves the right to provide the same at the risk and cost of the contractor. The observation of the local authorities will be promptly attended by the contractor. The installation will be accepted by the department only after receiving clearance from the local bodies / fire authorities. The inspection charges leviable by the local / statutory authorities for the inspection shall however, be borne by the department.

#### 5.14.13 COMMISSIONING :

- (a) Flushing the System : Before commissioning, the entire system shall be flushed to ensure that any earth/ foreign matter which might have entered during installation is taken out. For this, pump be operated and valves opened at different locations.
- (b) 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 be commissioned by isolating the system of under construction portion of the building. The fire fighting system shall be maintained from the very first day of its commissioning.
- (c) 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.

#### 5.15 ADDITIONAL CONDITION AND SPECIFICATIONS FOR PIPE WORK

5.16 This chapter covers the requirements of pipe work in fire fighting installations.

#### 5.17 PLUMBING DESIGN :

5.17.1 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/slucice valves shall be provided at suction and delivery sides of pumps. (If positive suction is not provided valve at suction is not to be provided).
- (b) External hydrant
- (c) Fire service connection/inlet.
- (d) Test valve.
- (e) Drain connections.

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- i. For testing the system healthiness and automatic operation on daily basis, one test pipe with butterfly/slucice 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 upto 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.

5.18 PIPE MATERIALS : Pipes shall be of the following materials :

5.18.1 Mild steel heavy class (C-class) conforming to IS:1239 for sizes up to 150 mm.

5.18.2 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 up to 350mm dia and from minimum 7mm thick M.S. sheet for pipes of 400mm dia and above.

5.18.3 Cast iron double flanged class-'A' conforming to IS-1536 or IS-1537(To be provided only in underground application).

5.18.4 GI Pipe medium class (B-class) conforming to IS:1239 (For Drain)

5.18.5 Cadmium plated steel nuts/bolts/washers shall be used.

5.19 PIPE JOINTS :

5.19.1 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.

5.19.2 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 unavoidable and to connect underground 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.

5.19.3 Mild steel flanges shall be in accordance with Table - 17 of IS 6392 i.e. "Plate Flanges for Welding" (Appendix D) and flange thickness shall be as under. Gasket thickness shall not be less than 3 mm.

Pipe dia	Flange Thickness
200 mm.	24 mm.

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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EE/ AE (P)

<b>Pipe dia</b>	<b>Flange Thickness</b>
150 mm and 125 mm.	22 mm.
100 mm and 80 mm.	20 mm.
65 mm.	18 mm.
40 mm and below.	16 mm.

5.20 All hardware items such as Nuts, Bolts, Washers shall be of appropriate size. Washers shall be used on both sides of the bolt.

5.21 VALVES : Sluice valve conforming to IS:14846 or butter fly 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/shunt indicator fitted.

5.21.1 The material of valves shall be as under :

- (a) Body - Cast iron Gasket -Neoprene gaskets or equivalent.
- (b) Non return valves shall be swing check type in horizontal run and lift check type in vertical run of pipes.
- (c) Air release valves shall be of gunmetal body.

5.21.2 STRAINERS: Stainless steel strainers shall have minimum 1mm thick screen with 3 mm perforations. Strainers shall be provided with flanges.

5.21.3 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 burrs and diameter not less than one-half of the internal diameter of the pipe to which it is fitted.

5.22 INSTRUMENTS :

5.22.1 Pressure gauge of appropriate range and 150 mm. dial size shall be provided.

5.22.2 The pressure gauge shall be duly calibrated before installation and shall be complete with shut off valve.

5.23 AIR VESSEL: - Air vessel shall be provided on top of each riser and shall be fabricated of 8 mm. thick M.S. Sheet. The ends shall be dished. This shall be 250 mm. dia and 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 kg/cm<sup>2</sup> pressure before installation.

5.24 INSTALLATION :

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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EE/ AE (P)

- 5.24.1 The installation work shall be carried out in accordance with the detailed drawings prepared by the contractor and approved by the Engineer-in-charge.
- 5.24.2 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.
- 5.24.3 Tee-off connections shall be through equal or reducing tees, otherwise ferrules welded to the main pipe shall be used. Drilling and tapping of the walls of the main pipe shall not be resorted to.
- 5.24.4 Open ends of piping shall be blocked as soon as the pipe is installed to avoid entrance of foreign matter.
- 5.24.5 Piping installation shall be supported on or suspended from structure adequately. The contractor shall provide, clamps, hangers etc. Proper lines and levels shall be maintained while installing exposed pipes.
- 5.24.6 Pipe supports in pump house shall be floor mounted and of mild steel/G.I.
- 5.24.7 Spacing of pipe supports shall not be more than that specified below:

<b>Nominal Pipe Size (mm)</b>	<b>Spacing (m.)</b>
20 and 25	2.00
32 to 125	2.50
150 and above	3.00

- 5.24.8 Extra supports shall be provided at the bends and at heavy fittings like valves to avoid undue stress on the pipes.
- 5.24.9 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.
- 5.24.10 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.
- 5.24.11 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.
- 5.24.12 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.
- 5.24.13 Riser shall have suitable supports at the lowest point.
- 5.24.14 Where mild steel pipes are to be buried under ground the same shall be treated before laying. The top of the pipes shall be not less than 100 cms. below the ground level. Where

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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this is not practicable, permission of the Engineer-in-charge shall be obtained for burying the pipes at lesser depth. Masonry or C.C. blocks shall be provided for supporting the pipes at intervals. 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.

- 5.24.15 Underground pipe shall be laid at least 2 m. away from the face of the building preferably along the roads, foot paths. As far as possible laying of pipes under road, pavement, large open spaces shall be avoided. Pipes shall not to laid under building and where unavoidable these shall be laid in masonry trenches with removable covers.
- 5.24.16 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.
- 5.24.17 Pipe over ground shall be painted in red colour. Suitable identification shall be provided to indicate the run of underground pipe wherever the route of underground pipe cannot be ascertained from the location of yard hydrant/isolating valves.
- 5.24.18 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.

## 5.25 PRESSURE TESTING

- 5.25.1 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.
- 5.25.2 Piping repaired subsequent to the above pressure test shall be re-tested in the same manner.
- 5.25.3 System may be tested in sections and such sections shall be securely capped.
- 5.25.4 Pressure gauges may be capped off during pressure testing of the installation.

## 5.26 ANTI-CORROSIVE PROTECTION ON UNDER GROUND PIPE :

- 5.26.1 Corrosion protection tape shall be wrapped on M.S. Pipes to be buried in ground. This corrosion protection tape shall comprise of coal tar/asphalt component supported on fabric of organic or inorganic fibre and minimum 4mm. thick and conform to requirement of IS

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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10221-Code of practice for coating and wrapping of underground mild steel pipe line. Before application of corrosion protection tape all foreign matter on pipe shall be removed with the help of wire brush and suitable primer shall be applied over the pipe thereafter. The primer shall be allowed to dry until the solvent evaporates and the surface becomes tacky. Both primer and tape shall be furnished by the same manufacturer. Corrosion protection tape shall than be wound around the pipe in spiral fashion and bounded completely to the pipe. There shall be no air pocket or bubble beneath the tape. The overlaps shall be 15 mm. and 250 mm. shall be left uncoated on either end of pipe to permit installation and welding. This area shall be coated in situ after the pipe line is installed. The tapes shall be wrapped in accordance with the manufacturer's recommendations. If application is done in cold weather, the surface of the pipe shall be pre- heated until it is warm to touch and traces of moisture are removed and then primer shall be applied and allowed to dry.

- 5.27 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.
- 5.27.1 Split pipe support clamps with rubber lining for vertical, horizontal and roof hanging.
- 5.27.2 Clevis Hangers for horizontal supports to adjust varying heights.
- 5.27.3 Sprinkler Hangers for horizontal supports for pipes from 15 mm. dia to 150 mm dia.
- 5.27.4 Fasteners and fully threaded rods shall be used for installing the pipe supports. The sizes of pipe support and installation shall be in accordance with manufacturer's recommendations. Some of the typical supports are shown in the Figure – 9.
- 5.27.5 For pipes of size 100mm.and above, with the prior approval of Engineer-in-Charge 'U' clamp with dash fastener may be used for supporting horizontal pipe from ceiling.
- 5.28 MEASUREMENT: Measurements of plumbing work shall be on following basis
- 5.28.1 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.
- 5.28.2 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.
- 5.29 ADDITIONAL CONDITION AND SPECIFICATIONS FOR FIRE FIGHTING ACCESSORIES
- 5.30 SCOPE : This chapter covers landing valves, first aid hose reels, hose pipes, branch pipes etc. which are vital tools for fire fighting.
- 5.31 LANDING VALVE : Landing valves are provided in the system for connection of hose pipes for discharging water for fighting fire by fire brigade or trained personal.
- 5.31.1 The landing Valves shall be as per I.S.: 5290.

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NIL

OMISSIONS - NIL

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- 5.31.2 The landing valves are of single out let type and double head out let type.
- 5.31.3 Material of construction.
- (a) Body, out let and cap etc. : Bronze or Aluminium alloy or stain Less steel.
- (b) Spindle : Brass for Bronze body, stain less Steel for Aluminium alloy and stain Less steel body.
- (c) Hand wheel : Mild steel or cast iron.
- 5.31.4 The water discharge shall be not less than 900 LPM for single head and 1800 LPM for double head valves at 7 kg/cm<sup>2</sup> pressure.
- 5.31.5 Installation : 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 a height of 1 m. from floor level.
- 5.31.6 The valve base shall be vertical and the valve facing out-side. There should be no hindrance in operation of the handle.
- 5.32 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 provide 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, 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 mean of 37 mm socket and valve. The hose tube can be pulled out easily for the purpose of discharge of water on fire.
- 5.32.1 First aid hose reel shall be as per IS- 884. The coupling, branch pipe and nozzle shall be as per IS: 8090.
- 5.32.2 Material of Construction :
- (a) Hub and sides :Aluminum Alloy / Mild steel / Aluminum sheets.
- (b) Wall Bracket : Cast iron / Mild steel.
- (c) Hose tube (20 mm) :Thermoplastic (Textile Reinforced) Type-2 (Nominal internal dia) as per IS-12585.
- (d) Nozzle with branch Pipe :Brass.
- (e) Stop Valve (Ball Valve) :Gun metal.
- 5.32.3 Normally M S construction is used. Other material may be used in areas having corrosive atmosphere.
- 5.32.4 The water flow rate shall be not less than 24 lpm and the range of jet shall be not less than 6 m.
- 5.32.5 Installation :

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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- (a) First aid hose reel are installed with internal hydrant space for which is provided. 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.
- (b) 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.
- (c) There shall be no obstruction in swinging the hose reel and should be installed above landing valve where provided.
- (d) The inlet valve shall be at 900 mm above floor level.
- (e) Hose reel bracket should be firmly grouted on the wall with the help of rawl bolts.

#### 5.33 FIRE HOSE DELIVERY COUPLING, BRANCH PIPE AND NOZZLES :

5.33.1 These are important accessories used for fire fighting operations.

5.33.2 Materiel of Construction.

5.33.3 Copper Alloy.

5.33.4 Aluminium alloy.

5.33.5 Stain less Steel.

#### 5.34 DELIVERY HOSE COUPLING'S :

5.34.1 The delivery hose coupling consist of male half coupling and female half coupling. Groves 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.

5.34.2 Sizes : These are available in two size i.e. 63 mm and 70 mm. Normally size 63 mm is used.

5.34.3 Branch Pipe and Nozzle : Branch Pipe 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.

5.34.4 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)

- 5.35 FIRE SERVICE INLET AND FIRE SERVICE CONNECTION : These are provided for connection of fire service hose pipes for either directly pressurising the system with their pumps or filling water in the tank from a distance. In the first case non return valve with butter fly valve shall be provided for holding water pressure. Fire service inlet shall be provided with each wet riser/down comer and the ring main. These are fixed to 150 mm dia pipe and located in MS Box made of 2 mm thick mild steel sheet with open able glass cover.
- 5.35.1 These shall be as per IS: 904.
- 5.35.2 Material of Construction :
- (a) Copper Alloy.
- (b) Aluminium Alloy.
- 5.36 HOSE PIPES : Hose pipes shall be rubber lined woven jacketed and 63 mm in dia meter. 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.
- 5.36.1 The hose pipe shall be complete with male and female coupling at the ends.
- 5.37** Besides keeping hose pipe with internal hydrant and yard hydrant, spare hose pipes along with branch pipes shall be kept in fire control room/pump room.
- 5.38 DOWN COMER / WET RISER SYSTEM
- 5.38.1 Erection Tools: No tools and tackles either for unloading or for shifting the equipment for erection purposes would be made available by the department. The successful tenderer shall make his own arrangement for all these facilities.
- 5.38.2 Acceptable makes of Various Equipments: The Acceptable makes of various equipments/ components/accessories have been indicated in the annexure of “ List of Acceptable Makes” .The tenderer shall work out the cost of the offer on this basis. Alternate makes are not acceptable
- 5.38.3 MATERIAL APPROVAL The material brought at site shall be approved by the Engineer-in-Charge before use in the work. In case during execution any material being used in the work is found not asper agreementspecifications, Engineer-in-Charge may issue instruction to the contractor to remove the material from site and the contractor will be bound to do so.
- 5.38.4 QUALITY OF MATERIALS AND WORKMESHIP :
- (a) The components of installation shall be of such design so as to satisfactorily function under all conditions of operation

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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- (b) The entire work of manufacture/ fabrication, assembly and installation shall conform to sound engineering practice.
- (c) All equipments and materials to be used in work shall be manufactured in factories of good repute having excellent track record of equality, manufacturing, performance and proper after sales service.
- (d) Satisfactory operation during the maintenance period.

#### 5.39 SAFETY CODES AND LABOUR REGULATIONS :

5.39.1 In respect of all labour employed directly or indirectly on the work for the performance of this package, the contractor at his own expense will arrange for the safety provisions as per the statutory provisions, B.I.S. recommendations, factory act, workmen's compensation act, CPWD Code and instructions issued from time to time. Failure to provide such safety requirements would make the tenderer liable for penalty for ` 200.00 for each violation. In addition, the Engineer in Charge shall be at liberty to make arrangement and provides facilities as aforesaid and recover the cost incurred therein from the contractor.

5.39.2 The contractor shall provide necessary barrier, warning signals and other safety measures while laying pipelines, cables etc. or wherever necessary so as to avoid accident. He shall also indemnify CPWD against claims for compensation arising out of negligence in this respect. Contractor shall be liable, in accordance with the indirect law and regulations for any accident occurring due to any cause. The department shall not be responsible for any accident occurred or damage incurred or claims arising there from during the execution of work. The contractor shall also provide all insurance including third party insurance as may be necessary to cover the risks. No extra payment would be made to the contractor due to above provisions thereof.

5.40 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 :

5.40.1 Factories Act.

5.40.2 Indian Electricity Rules.

5.40.3 B.I.S. & other standards as applicable.

5.40.4 Workmen's compensation Act.

5.40.5 Statutory norms prescribed by local bodies like CEA, Power Supply Co., etc.

5.41 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

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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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.

- 5.42 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.
- 5.43 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 requirement would make the tender liable for penalty 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.
- 5.44 INTRODUCTION & SCHEME :
- 5.44.1 Scheme must be followed as per provision laid in NBC - 2017 (Part IV) & CPWD General Specifications for Electrical Works Part V (Wet Riser & Sprinkler system) : 2020.
- 5.44.2 Wet Riser System : The operating pressure of individual hydrant shall be 3.5 Kg / sq.cm. At terrace level hydrant, minimum 3.5 Kg / sq.cm shall be maintained. The pipe line shall be such that it should be possible to get discharge at any location. The maximum flow velocity shall be 2.5 MPS & maximum friction shall be 5 mtr per 100 mtr. run. Location of the Wet Riser shall be so decided that no corner of the building is farther than 30 mtr from nearest down comer and the horizontal distance between the two wet riser are not more than 50 mtr. wherever feasible.
- 5.44.3 Pressure at hydraulically remote hydrant and at the highest hydrant shall not less than 3.5 kgf/cm<sup>2</sup>. The pressure at the hydrants shall however not exceed 7 kgf/cm<sup>2</sup>.
- 5.45 The terrace pump shall be selected such that discharge against Head is as mentioned in Schedule of Work.
- 5.46 Internal Hydrant :
- 5.47 Every riser will be provided with the following at every floor including terrace and basement over and above sprinkler system.

(i)	Single headed out let	-	2 Nos.
(ii)	First Aid Hose Reel [Length of pipe shall be such that nozzle of the Hose can be taken into every room and within 6 Mts. of any part of the rooms keeping in view Layout and obstruction.]	-	1 No.
(iii)	Hose pipe 63 mm. dia 15 m. long with male and female coupling at both ends Branch pipe 63 mm. dia with 20 mm. (Nominal internal diameter)	-	2 Nos.
(iv)	Nozzle and suitable for instantaneous Connection.	-	1 No.

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

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- 5.47.1 Fire Service inlet : In order to facilitate feeding of water in the system by fire service, a 3 way CI body with 3 No. Gun Metal male instantaneous inlet couplings complete with cap and chain shall be provided and connected with each riser/down comer with non return valve and butter fly/slucice valve. This should be located at a place where fire brigade tender can reach.
- 5.47.2 Air Vessel : To counteract the water hammer effect, air vessels shall be provided one at top of each riser
- 5.47.3 Orifice Plate : To reduce pressure on individual hydrant to operating pressure of 3.5kg/cm<sup>2</sup>, orifice plate shall be provided before connection of hydrant
- 5.47.4 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 internal hydrant The control panel for terrace pumps shall be provided near the pumps in a suitable enclosure to avoid unauthorized operation. 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 for facilitating pumping of water from fire service tender.
- 5.47.5 Facility shall also be provided for manual operation. A selector switch for auto/manual selection shall be provided in each pump.
- 5.48 DESIGNING :
- 5.48.1 The pipe line will be designed in such a way that it should be possible to get discharge at any location. Design parameters shall be as under:
- (i) Maximum flow velocity : 2.5 mps
- (ii) Maximum Friction : 5 m per 100 m run.
- 5.48.2 Suction and delivery pipes of pumps shall be not less than following.
- | No. | ump Discharge | suction dia (mm) | ivery dia (mm) |
|-----|---------------|------------------|----------------|
| a)  | 450 LPM       | 50               | 50             |
| c)  | 900 LPM       | 75               | 50             |
- 5.48.3 Fire service inlet and fire service connection shall be with pipe size not less than 150 mm.
- 5.49 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.

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

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- 5.50 Selection of Material : Components like landing valve, hose coupling branch pipes etc are available in three material i.e. Aluminium Alloy, Gun metal and Stain less steel, Aluminum Alloy is prone to wear and tear and weather conditions faster than other two materials. However, being cheaper, Aluminium Alloy be used in location where chances of pilferage are more. Stainless steel be considered at location not very safe from theft. Gun metal be used in installations which are well protected.
- 5.51 Hose Pipes/ Branch pipes : A minimum of two number of 63 mm dia 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.
- 5.52 Orifice Plate: The pressure in a fire fighting 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 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.
- 5.53 Payments:-
- 5.53.1 The percentage of contract rates for the various items included in this sub-head of work shall be payable as per mention General and commercial condition head.
- 5.54 For other items, the part rates will be decided by the Engineer- In-Charge of the work and shall be binding on the Contractor
- 5.55 The Sub-Standard work if any, shall not be accepted & measured unless approved by the competent authority.
- 5.56 The rates of any Extra/Substituted/Deviated Items of work shall be derived by the Department as per the provisions in the agreement or as decided by the Engineer-in-Charge, and the same shall be binding & acceptable to the contractor.
- 5.57 The Engineer-in-Charge reserves the right to recover any part/item not executed, due to site requirements etc. The rates of such items shall be derived by the Department as per the provisions in the agreement or decided by the Engineer-in-Charge, and shall be binding & acceptable to the contractor.
- 5.58 Completion & Guarantee :
- 5.58.1 The completion of the work shall be certified by the competent authority of the department, the defects if any shall have to be rectified to the entire satisfaction of the competent authority.
- 5.58.2 The contractor shall stand guarantee / warranty for a period of at least 12 months from the date of completion of work or after taking over the installations by the department whichever is later, against any manufacturing defect in material, unsatisfactory performance / working of system/ installation and / or breakdown due to defective design, workmanship. The equipments or components, or any part thereof, so found defective during guarantee period

CORRECTIONS - NIL  
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OMISSIONS - NIL

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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 the Engineer-in-charge in this regard shall be final & binding on the contractor.

- 5.58.3 The tender shall guarantee among other things, the following :
- (a) Quality, strength and performance of the materials used as per manufacturers standards.
  - (b) Safe mechanical and electrical stress on all parts under all specified conditions of operation.
  - (c) Satisfactory operation during the maintenance period.
- 5.58.4 The contractor must carry out routine inspection/ testing as per the manufacturer's recommendation or as per decision of the Engineer-in-Charge during the guarantee period and attend to the defects taking place during this period.
- 5.58.5 Sufficient number of trained and experienced staff shall be made available to meet any exigency/ emergency at site of work during the guarantee period.
- 5.59 The contractor shall provide the following drawings for approval of Engineer-in-Charge before commencement of supply/ fabrication.
- 5.59.1 Schematic Diagram of complete Wet Riser / Down Comer System
  - 5.59.2 General layout-Plans of Pumps & other equipments to be installed.
  - 5.59.3 Layout plans of internal / external Hydrants
  - 5.59.4 Layout plans of Manual Fire Alarm System
  - 5.59.5 Plumbing Drawings showing the layout of entire piping, dia. & length, valves & accessories, plumbing connections etc.
  - 5.59.6 Any other drawing the Engineer-in-Charge may deem fit.
- 5.60 The contractor shall have to submit completion plans in triplicate within 30 days of the completion of work failing which a sum equal to 2.5% of the value of work done subject to the ceiling of ₹ 1,00,000.00 (Rupees One Lakh Only) shall be recovered from the contractor.
- 5.61 WORKS TO BE DONE BY THE CONTRACTOR :
- 5.61.1 Unless otherwise mention in the tender document, the following works shall be done by the contractor and therefore their cost shall be deemed to be included in their tendered cost, whether specifically indicated in the schedule of work or not.
- (i) Foundation for equipments including foundation bolts and vibration isolation spring and pads.
  - (ii) Suspenders, brackets and floor / wall supports for suspending / supporting pipes / cable trays.

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

- (iii) Excavation and refilling of trenches in soil wherever the pipes are to be laid directly in ground, including a base treatment and supports.
- (iv) Sealing of all floors / slabs / wall opening provided by the department or made by the contractor for pipes and cables from fire safety point of view, after laying of the same.
- (v) Painting of all exposed metal surfaces of equipments and components with appropriate colour.
- (vi) Making openings in the walls / floors / slabs or modifications in the existing openings wherever provided for carrying pipeline, cables etc.
- (vii) All electrical works including cables / wires, earthing etc. beyond power supply made available by the department.
- (viii) Making good all damages caused to the structure during installation and restoring the same to their original finish.

**5.62** Approval from local bodies / fire authorities as may be required as per local by-laws. (The contractor's responsibility shall be limited to the work executed by him). The inspection fee of local bodies / fire authorities shall be borne by the department.

**5.63 List of specialized items E & M**

1. Lifts
2. D.G. Sets
3. Fire fighting & Fire alarm system
4. HVAC system
5. UPS system
6. LAN/EPABX/CCTV/Access control system
7. Solar PV system

**6.0** "Not withstanding anything contained elsewhere, in case of any conflicting provisions / specifications / conditions in this documents, the more stringent provisions / specifications / conditions shall be applicable.

**ANNEXURE – ‘A’**  
**QUALITY ASSURANCE, QUALITY AUDIT AND INSPECTION**

1. Sole responsibility for Quality of work rests with the contractor through routine inspection and testing by the technical staff employed by the contractor. The quality of the work shall be assured through routine and random testing of materials and items of work in the field laboratory and outside laboratory.
2. **QUALITY AUDIT AND INSPECTION** : The Engineer-in-charge and / or his representative including the Third Party Inspecting Agency (TPIA) duly deputed by the Government may also assure proper quality being achieved by the.
3. **OUTSIDE LABORATORY** : The tests required to be conducted in outside laboratory shall be conducted in the laboratory as may be approved by the Engineer-in charge such as National Test House, Regional Research Laboratory, Regional Engineering College, Laboratory of other Engineering Colleges or any other laboratory.
4. **Non-association during Sampling and / or Testing**: In case the contractor or his authorized representative is not present or does not associate himself in collection of test samples, the test results / reports such tests and consequences thereon shall be binding on the contractor.
5. **Costs**:
  - a. Samples of materials / items of work required for testing in field or outside laboratory shall be provided free of cost by the contractor. The contractor shall also assist inspection and collection of samples for testing by Engineer-in-Charge or his authorized representative.
  - b. **Sampling**: All costs incurred in collection of samples, packing & transportation to the approved outside lab / field laboratory shall be borne by the contractor.
  - c. **Testing** : The cost of tests conducted in outside approved laboratory, shall be borne by the contractor.
6. **Contractor to facilitate all necessary help at no extra cost for carrying out**:
  - a. Inspection of works.
  - b. Inspection at factories and collection of test samples there from.
  - c. Collection of samples of all materials brought at site.
  - d. Testing of all materials at field laboratory / outside laboratory approved by Engineer-in-Charge.
7. The contractor shall submit fortnightly work program to the Engineer-in-Charge in order to enable him / TPIA to supervise inspection of work and testing of materials.

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**ANNEXURE - 'B'****SCHEDULE OF DEPARTURE FROM TENDER SPECIFICATION**

<b>Section / No.</b>	<b>Ref. to Clause of the specifications</b>	<b>Description of departure</b>	<b>Reasons for departure</b>	<b>Remarks</b>
(1)				
(2)				
(3)				
(4)				

Certified that except for the departures mentioned above, the tender is in accordance with specification for Electrical Works Part-I (Internal)-2023, Part-II(External)-2023, Part-III-Lift & Escalators - 2003 Part-V (Wet Riser and Sprinkler System for Fire Fighting Installations)- 2020, Part VII D.G. Sets -2013 General Specifications for Heating, Ventilation & Air-Conditioning (HVAC)- 2024, IE Rules, Indian Standards **amended up to date** and as per direction of Engineer-in-Charge amended up to date and in accordance with the detailed requirements specified in the tender specifications.

**(SIGNATURE OF THE TENDERER)**

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**ELIGIBILITY CRITERIA FOR MAIN AGENCY WITH RESPECT TO ASSOCIATED ELECTRICAL AGENCY TO BE ENGAGED BY MAIN CONTRACTOR FOR EXECUTING THE ELECTRICAL SUB-HEADS**

1. After award of work and before the first milestone, the main contractor will have to submit Name (s) of the proposed associate contractor (for each of the E&M works), who fulfill set eligibility criteria for the relevant sub-head ending last day of previous month of submission or date of 1<sup>st</sup> mile stone. The documents will have to be submitted in detail as required, which will be checked as per NIT for approval of the associate contractors. It will be essential that proposed electrical associate agency qualify the eligibility criteria for sub-head given in NIT.
2. The department reserves the right to allow the main firm to submit additional Documents additional names of the associates in case of the deficiencies in documents or in case of no associate getting qualified in respect of certain subheads. The same will have to be complied with the main contractor within the time allowed. The decision of the department shall be firm & binding on the intending bidders.
3. The main firm should submit the willingness from eligible electrical contractors to get associated with them for execution of the electrical component of works in wholesome manner and as per the conditions set out in the MOU to be entered into, between the one who is awarded the work and the associated eligible electrical contractor.
4. In support of the eligibility conditions of the proposed associated electrical contractor, copy of their registration documents, Electrical Contractor's License, GST documents, eligibility documents by competent authority shall have to be submitted. Such associate electrical contractor will certify that they are not debarred as on the day of application for sale of tender.
5. In event of the concerned E&M agency not performing satisfactorily or failure of associate/sub-contractor to complete the E&M work, the main contractor on the written direction of the department, shall remove the Associate/sub-contractor deployed on the work and shall submit name of new associate who fulfills the conditions mentioned in NIT to execute the leftover work without any loss of time or variation in cost to the department in this regard. Such associates shall also enter into Agreement with the main tenderer and shall meet the entire guarantee for the equipments already supplied for which payment has been released by the department in part. If any equipment supplied for the work, during the currency of the earlier Associate/sub-contractor and paid partly by the department, becomes redundant /not in a position to be installed and commissioned and put to beneficial use due to change in agency for execution of E&M work, the main contractor

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

shall be liable for replacement of the equipment(S) at no cost to Department, No change of Electrical Contractor will be allowed without prior approval of the EE (E), Mumbai-I,CPWD, Mumbai-20

6. EE (E), Mumbai-I,CPWD, Mumbai-20 shall be the Engineer-in-charge as far as electrical works are concerned.
7. The main contractor shall be responsible and liable for proper and complete execution of the Electrical work and ensure coordination and completion of both civil and electrical work.
8. The main contractor has to enter into agreement with contractor(s) associated by him for execution of E&M subheads. Copy of such agreement shall be submitted to EE(E) in charge of work. In case of change of associate contractor, the main contractor has to enter into agreement with the new contractor associated by him.
9. The associate or sub-contractor shall attend the inspection of the work by the Engineer-in-charge of E&M works as and when required. The agencies executing the electrical work should have valid license for LT/HT as applicable and as described in eligibility criteria.
10. Verifiable completion certificates of the work eligibility documents as the case may be, duly attested by the applicant shall be submitted. Valid Electrical Contractor' license, as the case may be, duly countersigned by the applicant as well as signed by the associate contractors shall also be submitted. Self attested GST documents in respect of the associated agencies as well as signed by associate firms shall be submitted by contractor within 15 days of award of work.
11. For components of E&M works, the eligibility criteria for specialized agencies to be associated by the main contractor after award of work will be as detailed below:

For the different E&M subheads, the main contractor will have to engage the associate electrical contractor/specialized agency in the field after award of work as per following: -

- (a) The main firm should either himself meet the eligibility conditions for the respective E&M Packages or otherwise he will have to associate an agency meeting the eligibility requirements given below. They will have to submit willingness certificate for each of the component of the Electrical work for Associate agencies by clearly indicating the applicable component of the work.
- (b) The firm should have successfully completed similar works during the last 7 years ending up to previous day of last date of submission of tender for each sub heads:

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

- (c) 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 the last date of submission of bid.

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**ANNEXURE – ‘C’**

**WILLINGNESS CERTIFICATE FROM CONCERNED COMPETENT ELECTRICAL CONTRACTOR (Separate for each sub head of E&M work)**

Name of Work: Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri ( E), Mumbai. related remaining works

I hereby give my willingness to work as electrical 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.

Dated:

Signature of Main Contractor

Signature of Associate Electrical Contractor

Address:

Registration detail Address:

Telephone:

Telephone:

FAX:

FAX:

e-mail:

e-mail:

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**MEMORANDUM OF UNDERSTANDING (M.O.U)**  
**(Separate for each sub head of E&M work)**

1] M/S [Name of the firm with full address]

(Henceforth called the main contractor)

And

2] M/S[Name of the firm with full address]

(Henceforth called Associated Electrical Contractor or Electrical Contractor)

For the execution of Electrical Work: Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.

Name of sub-work: .....

1. 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 this MOU allows. In case of any dispute, either of us will go for mediation/arbitration by the EE (E), Mumbai-I,CPWD, Mumbai-20. Any of us may appeal against the edition/arbitration to the EE (E), Mumbai-I,CPWD, Mumbai-20. His decision shall be final and binding on both of us.

We have agreed as under:

- 1. The electrical contractor will execute all electrical works in the wholesome manner as per terms and conditions of the agreement. The electrical contractor shall be paid as per standard procedure followed by the department and the agreement between parties. Any type of internal transaction between the electrical contractor and the main contractor shall be as per their convenience and mutual understanding without involving the department.
- 2. The electrical contractor shall be liable for disciplinary action if he failed to discharge

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

theaction[s] and other legal action as per agreement.

3. All the machinery and equipments, tools and tackles required for execution of the electrical works, as per agreement, shall be the responsibility of the electrical contractor.

4. The site staff required for the electrical work shall be arranged by the electrical contractor as per terms and conditions of the agreement.

i) Site order book maintained for the said work shall be signed by the main contractor as well as by the Engineer of the Associated Contractor and by AssociatedContractor himself.

ii) All the correspondence regarding execution of the electrical work shall be done by the Department with the Associated Contractor with a copy to the main contractor. In case of non-compliance of the provisions of agreement, the main contractor, as well as theassociatedcontractor shall be responsible.The action under clauses 2 and 3 shall be initiated and taken against the main contractor.

5. Name of the Sub Head to be indicated :

Signature of main contractorSignature of associated electrical contractor

Name :	Name :
Address :	Address :
Date:	Date:
Place:	Place:

COUNTERSIGNED

EXECUTIVE ENGINEER (E)

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

**PREFERRED MAKE LIST (E&M Services)**

Note:

1. The Contractor shall obtain prior approval from the Engineer-in-charge before placing order for any specific material or engaging any of the specialized agencies. The Contractor shall make a detailed submittal with catalogues and highlighted proposed specifications, as well as full details of the works proposed to be executed by the specialized agency, as specified.
2. Wherever applicable, the Engineer-in-charge may approve any material equivalent to that specified in the tender subject to proof being offered by the Contractor for equivalence to his satisfaction.
3. Unless otherwise specified, the brand / make of the material as specified in the particular specifications and in the list of approved materials attached in the tender, shall only be used in the work.

Sr. No.	Description of items/equipments	Approved Makes
1	Air Circuit Breaker (ACB)	L&T U Power / Legrand Dmx3/ Schneider/ Master Pack Nw/ Siemens 3 W1 / ABB
2	Access Control Biometric Cum Access Reader	Bosch/Honeywell/HID/ Morpho
3	Access Controller	Bosch/Honeywell/HID / Lenel/ Software House / Johnson Control
4	Access Control Software / Video Interface Software	As Per The Access Controller OEM
5	Acoustic Enclosure For Dg Set	OEM / OEA Of DG Set
6	Actuator For Fire Damper	Siemens/ Honeywell /Belimo /Johnson
7	Addressable Fire Detectors, Optical Cum Thermal Detectors, Smoke Detectors, Thermal Detectors	Notifier / Bosch /Johnson Control / Siemens
8	Addressable Manual Call Points, Monitor Module, Control Module, Fault Isolator, Low Intensity Hooters	Notifier / Bosch /Johnson Control / Siemens/Edwards
9	Air Filters	Thermodyne/Purolator/Anfilco/Camfil/ Pyramid/Dyson / Coway
10	Air Flow Switch	Omicron/Kele/Greystone
11	Air Handling Unit, Fan Coil Unit	Systemair/Edgetech/ Carrier VTS /Trane/Blue Star/Voltas /Wave /Zeco
12	Air Vessel	Getech / Newage / Padmini
13	Air Washer, Air Curtain, Dryscrubber	Systemair/Zecoaircon/Edgetech/ VTS TF Air Systems / Wave/ Trion/ Espair/Russel/RO OTS Air/Brightflow/ Humidin
14	Alternator	Stamford/ Leroy Somer / Crompton Greaves / Kirloskar / ABB / Siemens
15	Automatic Mains Faileur (Amf) Panel	OEM / OEA Of DG Set
16	Analog Phone	Alcatel/ Avaya/ Panasonic/Beetel/Sony
17	Anchor Fastener	Fisher / Hilti /Anchor / Trixel / Bosch

CORRECTIONS - NIL  
NIL

OMISSIONS - NIL

INSERTIONS -

EE/ AE (P)

		As Per Manufacturer Standard Specification
18	Anti Vibrations Mountings For D.G Set	Dunlop/ Emerald/ Easy Flex/ Resistoflex
19	Anti Vibration Mounting (Except D.G. Set)	L&T/Enercon/ABB/ Siemens/ Schneider
20	Apfc Relay/Reactor /Thyristor Module	Electric/ Neptune(Ducati)
21	Ats	L&T/Siemens/Schneider/ABB
22	Auto Air Vent With Stop Valve	Rapid Cool / Anergy/ Honeywell /Johnson Control
23	Aviation Light	Bajaj/ Insta Power/Spectrum/Crompton
24	Balancing Valve	Audco/Advance/ Danfoss/ Hammer / Oventrop
25	Batteries (Lead Acid / Maintenance Free)	Exide / Amar Raja / Okaya / Luminous
26	Bldc Ceiling Fan	Atomberg- Gorrila/Havells/ Crompton
27	Branch Pipe	Padmini / New Age / Omex / Minimax / Superex
28	Cables (Audio, Video, Hdmi, Vga, Speaker, Microphone And Other), Connectors	Belden / Kramer / Extron / Kenter
29	Cable Gland /Cable Lugs/ Thimble	Comet / Jainsons / Braco/Dowells
30	Cable Tray -Perforated Hot Dipped Gi	OBO/ Mk/Erico/Bravo/Steelways/Slotco/ Pilco
31	Cable Tray - Steel Wiremesh Ss304	OBO / Legrand / MK
32	Capacitor	Schneider / Siemens / L & T / Legrand
33	Car Parking (Double Stack)	Klaus/ RR Parkon/Wohr
34	Card Reader	Honeywell / HID / Bosch
35	Cast Iron Stand Post	New Janta Metal Works /New Age / Aaag / Padmini
36	Cat 6 Patch Cord, Cat 6 Lan Cable, Fibreoptic Cable, Fibre Patch Cord	Legrand/Amp/Dlink/Molex/ Cisco/ Schneider / Kenter
37	Cctv Camera, Digital Video Storage, Recorders & Management Software	Bosch/Honeywell/Sony/ HikviSIon
38	Centrifugal/Axial/Vane Axial/ In-Linefansandtheirfan Motors	Kruger/Greenheck / Nicotra / Wolter / Ostbergwith Motor From Their Approved OEM / System Air / Carrier
39	Chilled Water Machines	Carrier/ York/ Trane/Daikin
40	Ci - Sluice Valve/ Butterfly Valve / Non Return Valve	Kirloskar /Advance/Audco/ Zoloto/ Hammer
41	Contactors & Relays	L&T / Siemens / Telemecanique/ ABB
42	Control Panel (Car Parking)	As Per OEM
43	Control Valve (Installation/ Isolation And Any Other)	HD / Spray Safe /Tyco / Grinnell / Padmini / Newage
44	Coolingtower	Paharpur/ Advance/Bell
45	Co2 Sensor	Honeywell/Siemens/Johnsoncontrol/ Danfoss/Dwyer/Indfos/ Omicron
46	Coupling	Lovejoy/Dunlop
47	Current Transformer / Potential Transformer	AE / Kappa / L&T / Neptune
48	D.C. Cable	Duly ISI Marked: Finolex/Polycab/Havells/KEI/ Lapp Kabel / RR Kabel

*Dr. Anand*  
कार्यपालक अभियंता (यो)  
का. मुख्य अभियंता (मु-1)

49	Ddc (Digital Direct Control)	Honeywell (Trend)/ Siemens/ Johnson Control
50	Diesel Engine	Cummins / Koel/Volvo Penta/Caterpillar
51	Differential Pressure Switches	Honeywell / Siemens/Johnson Control
52	Digital Signal Processor	Extron / Bimap / QSC
53	Dwc Pipe/Hdpe Pipe	Rex/ Natni /Polymer/Gemini/ Duraline/ Trupti / Sy-Aron
54	Electro Magnetic Lock	Trimec / Securitron / Lockwood
55	Electronic Timer	L&T / Minilec/Schneider/Siemens/ Legrand
56	Electric Motors For Pumps	Siemens / Kirloskar /Crompton /ABB/ Bharat Bijlee
57	Energy Meter	Havells/L &T /Siemens/ HPL/AE / ABB
58	Epbax Ip Based Server With Licenses	Avaya / Alcatel / Unify / NEC / Panasonic / Siemens
59	Exhaust Fan/ Fresh Air Fan / Wall Fan	Usha/Havells/Crompton
60	Exit Switch/ Egress Switch	Securitron / Lockwood / Tesa
61	Fire Hose Pipe, Hose Coupling, Hose Reel Drum, First-Aid Rubber Reel, First Aid Hose Reel	Padmini / New Age / Omex / Jayshree / Superex / Lifegaurd / Getech / Jyoti / Dunlop / Aaag, Essel
62	Fire Survival Armored Cable	Draka/Ranorlappkable/Beldon/Tyco
63	Fire Extinguisher (Portable)	Cease Fire/ Minimax/ Firequip/Safe Guard/Safex /Lifeguard / Omex/ Vintex
64	Fire Landing Valve	Padmini / New Age / Omex / Jayshree / Superex / Lifegaurd / Getech / Jyoti / Dunlop / Aaag, Essel
65	Flexible Connection Pipe (For Sprinklers)	HD / Newage /Flexguard
66	Flexible Grooved Fittings/ Couplings	Victaulic/Tyco/Grinnel/Viking
67	Flow Switch	HD/Honeywell/Siemens/System Sensor/ Johnson Control
68	Frls Copper Wire	Duly ISI Marked: Finolex / Havells/ Kenter / RR Kabel / KEI / Polycab / Kenter, Kolors
69	Frls Armoured Cable (Power, Control)	Duly ISI Marked : Finolex / Havells / Kenter / RR Kabel / Polycab/ KEI / Vishal / Kenter, Akg, Ganak Cables
70	Pvc Conduit And Accessories	Duly ISI Marked: PrecISIon/ Finolex/Pressfit/ Polycab/ AKG
71	Gi Duct -Factoryfabricated	Zeco/Rollastar/Ductofab/Voltas/ Wave/ Edgetech/ Ecoduct
72	Gi/ Ms Pipe	Duly ISI Marked: Tata / Sail / Jindal (Hissar)
73	Gi Sheet For Car Parking	Duly ISI Marked: Tata / Sail / Jsw, Uttam Galva /Essar
74	G. M. Hydrant Valve	Padmini/ New Age / Omex / Minimax / Superex
75	Grille/ Diffuser / Jet Nozzle	System Air/Caryaire/ Airflow/ Conaire/ Mapro/ Dynacraft/Cosmos/Pineair
76	Gunmetal Valves - Gate Valve/ Nrv/ Ball Valves/ Check Valves	Leader / Zoloto/ Kirloskar / Advance/Audco

77	Hdmi Transmitter/Receiver/Convertors	Lightware / Amx / Extron
78	Heat Recovery Wheel	Dri / Green Heck / Zeco / Flaktwoods / Ostberg / Bry Air
79	Ht Vcb Panel	ABB/Siemens/Schneider Electric/L&T/ Kirloskar/ Crompton
80	Humidistat, Airstat	Honeywell/ Johnson / Siemens / Danfoss
81	Hydraulic Cylinder	Hytech / Island/As Per OEM
82	Hydraulic RISing Bollard	BGI/ Atg Access/ Gunnebo / Delta Scientific
83	Hydropneumatic Pump	Texmo / Siemens / Mather & Platt (Wilo)/ Grundfos/ ABB
84	Indicating Lamp (Led Type) /Push Button	L&T / Raas Control / Schneider Electric / Vaishno / BCH / Siemens
85	Intelligent Addressable Main Fire Alarm Control Panel With Battery Backup/ Repeater Panel/Mimic Panel	Notifier/ Bosch /Johnson Control/ Siemens
86	Insulation - Expanded Polystyrene	Beardsell / Up-Twiga / Styrene Packaging/ PR Packaging
87	Insulation I/C Puf, Fibreglass, Rockwool, Phenolic Foam, Pir	Up-Twiga/Lloyd Insulation/Supreme Industries/ Owens Corning/Armaflex /Vidoflex
88	Insulation -Nitrile Rubber	Armaflex /Vidoflex/ Eurobatex / Therma Flex / A- Flex / K-Flex
89	Ip Phone	Avaya/Alcatel/ Unify/ Nec/ Panasonic
90	Ip Camera	Bosch/ Axis/ Pelco / Sony
91	Junction Box For Solar Pv	Hensel / Adarsha / Automotous / Novus Green / As Per OEM Of Spv
92	Lan Network Switch / Core Switch / Distribution Edge	Cisco/ Dlink / Legrand /Impulse / Juniper / Extreme
93	Lift	Mitsubishi / Otis / Schindler / Kone / Johnson
94	Led Display Monitor	Samsung/Sony/LG/Panasonic
95	Led Light Fitting, Led Tube, Led Downlighter, Led Dimmable Track Light, Track Light , Track, Led Street Light Fitting, Led Post Top Lantern Fitting	Phillips /Wipro /Trilux / Lighting Technology / Regent / Crompton / Focus Lighting & Fixtures Ltd. / Kolors
96	Led Wall Mounted Decorative Luminaire	Luker/ Phillips/Wipro/ Trilux / Lighting Technology
97	Level Switches, Level Transmitters	Danfoss/Dwyer/Indfos/Sontay/Potter/ Omicron/Filpro
98	Licensed Bms Software	Honeywell (Trend)/ Siemens (Desigo)/Johnson Control
99	Lighting Arrester / Surge/ Flash Counter	Indelec/ ABB Furse/ Purcel/ Tercel
100	Light Interface Unit (Liu)	Amp/Dlink/Cisco/Legrand

*Shrawan*  
04/03/2023

व.र.प.अ.क. अभियंता (या)  
का. मुख्य अभियंता (मु-1)

101	Lt Panel /Mv Panel / Apfc Panel And Other Electrical & Fire Panels (Cpri Approved)	ABB / Schneider/Siemens/Legrand/L&T [Note : (1) The Contractor May Also Procure From Licensed Partner Of Above OEMs. The Licensed Partner Shall Use OEM Design Only For Which, He Will Procure A Certificate From The OEM Mentioning The Agreement No. On OEM Letter Head. (2) Amongst Licensed Partners The Following Are Specifically Approved : (1) Pristine Power System
102	Matrix Switcher/ Switcher	Amx / Extron / Bosch / Phillips/ Bose / Honeywell
103	Mcb Db'S/Mcb/Rcbo/ Rccb/ Mpcb /Isolator	Legrand /Hager/Siemens / ABB / Schneider
104	Metal Box/Surface Box [Is 14772 : 2020]	Legrand / Havels / Anchor
105	Mccb	Schneider Compact Nsx/Legrand Dpx3/ Siemens 3 VL/L & T Dsine/ ABB
106	Mdf Box	ADC / GE / Malson
107	Meters - Digital Ammeter / Digital Volt Meter / Digital Multifunction Meter	AE/Schneider(Conzerve)/Neptune/L&T/ABB /Secure
108	Microphone( Chairman, Gooseneck, Lapel, Handheld)	Beyerdynamics / Sennheiser/ Shure / JBL / Bosch/ Bose / Phillips / Honeywell
109	Modular Switches/ Sockets /Modular Plate With Base Frame/Gi Switch Box	Legrand -Arteor / Mk Element/Schneider-Zencelo / Kolors- Krest / ABB Tivisha, Artino/Panasonic/Schneider
110	Modulatingmotor	Danfoss/Honeywell/Johnsonscontrol/ Belimo
111	Motorized Fire Damper	System Air/Caryaire/Greenheck/ Ruskin/ Kruger/Belimo/Dynacraft
112	Motorized Valves (Butterfly, Modulating And Balancing Etc)	Johnson Control / Honeywell /Siemens / Danfoss
113	Non-Percolating Flexible Fire Fighting Delivery Hose [ Is : 636 :2018]	Essel /New Age / Dunlop / Fire Chief/ Monsher
114	Pa System (Speakers, Amplifier, Controller)	Bosch /Honeywell/ Bose / Johnson Control/ Notifier / Siemens
115	Pc Based Operator Console	Avaya, Alcatel, Unify, Nec, Panasonic.
116	Pid Control Valve With Actuator, Motor & Thermostat	Danfoss / Siemens / Oventrop / Honeywell / Flowcon / Belimo / Johnson Control
117	Pipe Coating Material (Pipe Protection)	Pypkote / Coalteck
118	Pipe Hanger	Camry / Chilly /Gmgr
119	Ph Sensor	Omicron/Kele/Sontay
120	Pole Octagonal/ Steel	Bajaj / Volmount / Phillips / BPP/ Aster
121	Power Amplifier For Audio Video Package	Bose / Extron / QSC / Creston / JBL
122	Transformer Ou & Dry Type	Crompton/ABB/Voltamp/Siemens/Bhel/ Schneider/Kirloskar/ Power Star
123	Pre-Filter	Anfilco /Thermodyne /Purolator/Spectrum

124	Pressure Gauge	H-Guru/ Metzer/ Bestobell/ Star Scientific / Fiebig/ Danfoss
125	Pressure Switches	Indfos / Danfoss / Honeywell / Johnson / Stefa
126	Pressure Transmitters	Honeywell/ Siemens/ Johnson Control
127	Pressurized Expansion Tank / Airseparator	Anergy/Emerald/Rapid Cool/ KEPL
128	Printer	HP/ Epson/ Samsung/Canon
129	Propeller Fans	Usha / Marathon / Khaitan / Alstom (Gec Alsthom) / Havells
130	Pufpipesupport	Malanpur/Lloyd /Bestpuf
131	Pumps (Hydrant, Sprinkler, Jockey, Booster, Drencher, Condenser Water, Chilled Water, Dewatering Etc And Any Other Pump Except Secondary Chilled Water Pump)	Grundfos/ Kirloskar / Mather & Platt (Wilo) / KSB
132	Pump (Secondary Chilled Water Pump)	Armstrong / Grundfos / ITT-Bell / Gossett
133	Raceways- Pre Galvanized / Hot Dipped Gi Under Floor Trunking&Junctionbox	OBO/Legrand/MK
134	Response Indicator	Notifier / Bosch / Johnson Control/ Siemens
135	RISing Main, Bus Duct, Tap Off Box, End Feed Unit	Legrand/L&T/ Schneider Electric / Godrej/ C&S
136	Rubber Mat	Any ISI Marked
137	Selector Switches	Kaycee / L&T / AE / BCH / Siemens
138	Sensor (Duct Temperature, Duct Humidity, Immersion Temperature, Outside Air Temperature, Room Temperature, Room Humidity)	Honeywell/ Siemens/Johnson Control
139	Sensor -Motion/Day Light, Occupancy Sensor	Legrand/Wipro/ Schneider/Philips/ Siemens/ Honeywell
140	Single Phase Preventer	Minilec / Siemens / L&T / Schneider Electric /ABB
141	Solar Water Heaters	Tata Solar Power / Bosch /Suntech /Racold / Emm-Vee / Havells
142	Speaker For Audio/ Video Package	Bose / Extron / Qsc/ Sennheiser /Shure /JBL / Honeeywell / Bosch
143	Split Ac	Mitsubishi / Toshiba / O General / Carrier Aircon / Daikin / Blue Star
144	Sprinkler	Hd / Spraysafe / Tyco / Grinnell / Viking
145	Spv Inverter	Fronus/ SMA/Delta/ Kaco
146	Spv Module	Renewsys /Goldi /Tata Power/Panasonic/Bhel / CEL /Vikram / Bosch/ Emm-Vee
147	Starters (Dol, Star Delta And Soft)	L&T / Siemens / ABB / Legrand
148	Stp Including Fmr Tank, Filter Press	Thermax/Ion Exchange/Dorr-Oliver/Eureka Forbes
149	System Integration Unit	Honeywell (Trend) / Siemens / Johnson Control

04/05/2024  
कार्यपालक अभियंता (यौ)  
Page 6 of 7  
महानगर अभियंता (सु-1)

CORRECTIONS - NIL

OMISSIONS - NIL

INSERTIONS - NIL

EE/ AE (P)

150	Telephone Socket/Tv Antenna Socket/Data Socket (RJ45 Socket)	Legrand -Arteor / Mk-Element / Schneider-Zencelo / Kolors - Krest /ABB Tivisha
151	Telephone Cable/Wire	Duly ISI Marked: Finolex/ Legrand/ Dlink/ Mollex / RR Kabels
152	Telephone Junction Box & Module	ITL / ADC Krone /Malson/GE
153	Telephone Tag Box	ADC Krone/Legrand/Cisco/ITL / D Link
154	Thermometer	H-Guru/ Metzer/ Bestobell/ Star Scientific
155	Tv Co-Axial Cable	Duly ISI Marked : RR Kabel/ Havells/ Polycab/ Finolex/ Legrand / Molex
156	Two In One Auto Cum Balancing Valves	Johnson Control / Danfoss /Flowcon /Anergy /Belimo
157	Ups	Vertiv(Emerson)/Autometers Alliances - Pegasus/ APC (Schneider)/Legrand-Numeric/ Mitsubishi / Techser / Siemens
158	U Rack	Valrack (Legrand) /Rittal/ Cisco/Wipro/ Schneider
159	Variable Frequency Drive (Vfd)	Allen Bradlly/ Danfoss/ ABB / Honeywell / Siemens/Schneider
160	Vavbox	Honeywell / Trox/ Belimo / Ruskin / Titus/ Cosmos
161	Videowall Processor	Extron/Christi/Barco
162	Volume Control Damper,	Titus / Trox/ System Air /Caryaire/
163	Fresh/ Exhaust Airlouver	Conair/ Mapro / Airmaster/ Dynacraft/ Cosmos
164	Water Curtain Nozzle	Padmini / HD Fire / Newage
165	Web Security	Zscaler/Checkpoint/Palo Alto/Cisco
166	Wifi Systems	Cisco/Impulse/Juniper/Extreme/ Cambium / Der Weiser
167	Y-Strainer , Pot Strainer	Kirloskar /Advance/Audco /Zoloto / Hammer/ Emerald / Rapidcool
168	Any Other Material Not Mentioned Above	Shall Be Approved By The Engineer-In-Charge Before Use At Site.

*Praveen*  
०५/०३/२०१५  
कार्यपालक अभियंता (या)  
का. मुख्य अभियंता (मुं-१)

**Schedule Of Quantities (Electrical)**

**Name of Work: Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri ( E), Mumbai. (Electrical work)**

S No	Description of Items	Qty	Rate	Units	Amount
	<b>Sub Head 1 : (Internal EI &amp; Fixtures)</b>				
<b>1.1</b>	Wiring for light point/fan point/exhaust fan point/call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface/recessed medium class PVC conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required.				
<b>1.1.1</b>	Group C	565	1,712.48	P. Point	9,67,551.00
<b>1.2</b>	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 PVC insulated copper conductor single core cable in surface/ recessed PVC conduit, and earthing the point with 1.5 sq. mm FRLS PVC insulated copper conductor single core cable etc. as required.				
<b>1.2.1</b>	Group C	585	1,001.22	P. Point	5,85,712.00
<b>1.3</b>	Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface/recessed medium class PVC conduit as required.				
<b>1.3.1</b>	2 X 1.5 sq. mm + 1 X 1.5 sq. mm earth wire	1200	272.44	P. Mtr.	3,26,928.00
<b>1.3.2</b>	2 X 4 sq. mm + 1 X 4 sq. mm earth wire	1200	390.17	P. Mtr.	4,68,208.00
<b>1.3.3</b>	3 X 6 sq. mm + 1 X 6 sq. mm earth wire	1000	512.77	P. Mtr.	5,12,771.00
<b>1.3.4</b>	4 X 4 sq. mm + 2 X 4 sq. mm earth wire	1000	626.61	P. Mtr.	6,26,612.00
<b>1.3.5</b>	4 X 10 sq. mm + 2 X 6 sq. mm earth wire	800		P. Mtr.	

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

			1,173.44		9,38,750.00
<b>1.3.6</b>	4 X 16 sq. mm + 2 X 6 sq. mm earth wire	600	1,593.77	P. Mtr.	9,56,264.00
<b>1.4</b>	<b>Supplying and drawing</b> following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface/ recessed steel/ PVC conduit as required.				
<b>1.4.1</b>	6 x 1.5 sq. mm	800	211.14	P. Mtr.	1,68,913.00
<b>1.4.2</b>	9 x 1.5 sq. mm	800	332.77	P. Mtr.	2,66,213.00
<b>1.4.3</b>	3 x 4 sq. mm	1000	240.33	P. Mtr.	2,40,331.00
<b>1.4.4</b>	6 x 4 sq. mm	100	462.18	P. Mtr.	46,218.00
<b>1.5</b>	Supplying and drawing following <b>pair 0.5 mm dia FRLS PVC</b> insulated annealed copper conductor, unarmored telephone cable in the existing surface/ recessed steel/ PVC conduit as required.				
<b>1.5.1</b>	2 Pair	4000	44.76	P. Mtr.	1,79,032.00
<b>1.6</b>	Supplying and fixing of following sizes of medium class <b>PVC conduit</b> along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.(CCTV/Telephone/LAN Cat 6/Speaker)				
<b>1.6.1</b>	20 mm	1000	149.84	P. Mtr.	1,49,842.00
<b>1.6.2</b>	25 mm	1500	169.30	P. Mtr.	2,53,953.00
<b>1.6.3</b>	32 mm	1200	215.03	P. Mtr.	2,58,040.00
<b>1.7</b>	Supplying and fixing following <b>modular switch/ socket</b> on the existing modular plate & switch box including connections but excluding modular plate etc. as required.				
<b>1.7.1</b>	Data cable outlet RJ-45	123	534.00	Each	65,682.00
<b>1.7.2</b>	Telephone socket outlet	48	173.19	Each	8,313.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.8</b>	Supplying and fixing following size/ modules, <b>GI box alongwith modular base &amp; cover plate</b> for modular switches in recess etc as required.				
<b>1.8.1</b>	1 or 2 Module (75mmX75mm)	123	348.33	Each	42,845.00
<b>1.9</b>	Supplying and fixing <b>call bell ding dong type</b> suitable for single phase, 230 volts, complete as required.	19	351.00	Each	6,669.00
<b>1.10</b>	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 2 Nos. 3 pin 5/6 A modular socket outlet and 2 Nos. 5/6 A modular switch, connections etc. as required. (For light plugs to be used in non residential buildings).	77	789.10	Each	60,761.00
<b>1.11</b>	Supplying and drawing of UTP <b>4 pair CAT 6A LAN 23AWG Cable</b> in the existing surface/ recessed Steel/ PVC conduit as required. (Note: 23 AWG Cable as per IT standard)				
<b>1.11.1</b>	1 run of cable	1000	121.20	P. Mtr.	1,21,200.00
<b>1.11.2</b>	2 run of cable	1200	219.00	P. Mtr.	2,62,800.00
<b>1.11.3</b>	3 run of cable	1500	316.00	P. Mtr.	4,74,000.00
<b>1.12</b>	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 2.8 Mtrs. and for 5 m diaMtrs. coverage area along with necessary fixing arrangements i/c programming at site etc. complete as required.	39	5,372.91	Each	2,09,543.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

1.13	<p>Supplying, Installation, testing and commissioning of LED recess mounted having 1500 Lumens <b>Downlighter</b> light, Pressure Die Casted Al housing body white powder coated, IP 20 with aluminium body housing ,Prismatic Diffuser/Opal-PC for glare control, minimum system efficiency of 100 lm/W and colour temperature of Minimum 4000K/5700K complete with integral driver shall be constant current /constant voltage output, power factor more than 0.95, THD less than 10%, Driver safety requirement standards: IS 15885-2-13. Certification: LM 79 for LED luminaire and LM 80 for LED source. The CRI shall be greater than 80%. Test certificates to be submitted life 50000 operating hours. All other required accessories, suitable for 140V - 270V AC single phase 50Hz power supply, i/c fixing arrangement on ceiling/wall, connections with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required. etc. complete as required.</p>	118	1,675.00	Each	1,97,650.00
1.14	<p>Supplying, Installation, Testing and Commissioning of LED <b>Mirror Light</b> with Aluminium housing having a minimum nominal system lumen minimum system efficiency of 80-90 lm/W and colour temperature minimum 4000K complete with integral driver shall be constant current /constant voltage output, power factor more than 0.95. Driver safety requirement standards: IS 15885-2-13.The CRI shall be greater than 80%. Test certificates to be submitted. All other required accessories, suitable for 240V single phase 50Hz power supply, directly on wall/ceiling with necessary fixing arrangement etc. complete as required.</p>	33	1,028.00	Each	33,924.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.15</b>	SITC of luminaire/ LED Light fitting i/c connection with 1.5 sq.mm. FRLS PVC insulated copper conductor and other accessories etc as reqd. with following technical specification :-1) Nominal size :- 595 mm X 595 mm2) Housing :- CRCA, white powder coated3) Diffuser :- OPAL4) IP Rating :- IP 205) PF > 0.96) Lumens :- 3600 Lumens7) Luminous efficacy :- >100 Lumens/Watt8) THD < 10%9) Efficiency > 90%10) Working Hours = 50000 Hrs @ L70				
<b>1.15.1</b>	600mm x 600mm (Nominal Size) Square LED	523	3,219.00	Each	16,83,537.00
<b>1.16</b>	Supplying and fixing of <b>LED Strip Light</b> IP 20 of ,Lumens shall not be less than 450 Lumens and efficacy not less than 90 LPW, SMD package with a thermal tape with high thermal conductivity. wattage should not less than 5W, along with suitable no of drivers and L shaped anodised aluminum profile with oval shaped opal diffuser above it. Life after 50,000 operating hours. CRI should not be less than 80. Colour Temp. of 4000 K color. i/c fixing it to cove etc i/c connection etc to existing point as required.				
<b>1.16.1</b>	LED Strip Light	350	207.00	P. Mtr.	72,450.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.17</b>	Supplying, Installation, Testing and Commissioning of <b>Surface Linear 4ft long</b> & min. 70mm wide with Aluminium extruded Housing white powder coated having a minimum nominal system lumen output of not less than 4000 lumens and a minimum lumens efficacy of 120 lm/w and colour temperature of 5700K complete with integral/external driver shall be constant current /constant voltage output, power factor more than 0.95, THD less than 15%, 2.5/3kV over voltage protection and radio frequency noise suppression circuit. Driver safety requirement standards: IS 15885-2-13. Average life L70B50: 50000 hrs , Certification: LM 79 for LED luminaire and LM 80 for LED source. The CRI shall be greater than 80%. fixture should have suspension arrangement, Test certificates to be submitted. All other required accessories, suitable for 240V single phase 50Hz power supply, directly on wall/ceiling with necessary fixing arrangement etc. complete as required.				
<b>1.17.1</b>	1200 MM Long	13	3,638.00	Each	47,294.00
<b>1.18</b>	Supply, Installation, Testing and Commissioning of 1200 mm sweep, BEE 5 star rated, ceiling fan with Brush Less Direct Current (BLDC) Motor, class of insulation: B, 3 Nos. blades, 30 cm long down rod, 2 Nos. canopies, shackle kit, safety rope, copper winding, Power Factor not less than 0.9, Service Value (CMM/W) minimum 6.85, Air delivery minimum 215 CMM, 350 RPM (tolerance as per IS : 374- 2019), THD less than 10%, remote or electronic regulator unit 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 Supply, earthing etc. complete as required.				

CORRECTIONS - Nil

OMISSION - Nil

INSERTION - Nil

1.18.1	1200 MM BLDC Ceiling Fan	52	3,332.00	Each	1,73,264.00
1.19	Supplying and fixing following way, <b>Single Pole</b> and neutral, sheet steel, <b>MCB</b> distribution board, 240 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)				
1.19.1	6 Way Double Door	3	2,575.53	Each	7,727.00
1.19.2	8 Way Double Door	17	3,003.65	Each	51,062.00
1.19.3	12 Way Double Door	14	2,702.99	Each	37,842.00
1.20	Supplying and fixing of following ways surface/ recess mounting, <b>vertical type, 415 V, TPN MCB distribution board</b> with <b>MCCB</b> incomer of sheet steel, dust protected, duly powder painted, inclusive copper bus bar, common neutral link, earth bar, din bar for mounting MCCBs (with MCCBs and incomer of following rating ) as required .				
1.20.1	4 way (4 + 12), Double door (Light/Power DB)	12	8,769.65	Each	1,05,236.00
1.20.2	8 way (4 + 24), Double door (Equipment/Machinery DB)	5	11,866.71	Each	59,334.00
1.21	Supplying and fixing following rating & capacity in the existing <b>MCB DB</b> complete with connection, testing and commissioning etc, as required.				
1.21.1	63 A TP "C" Curve MCB	36	1,406.00	Each	50,616.00
1.21.2	For Vertical TP MCB DB	12	9,015.82	Each	1,08,190.00
1.21.3	125 A FP, 36KA MCCB	5	9,583.08	Each	47,915.00
1.21.4	63A, 30mA , FP RCCB	7	3,352.96	Each	23,471.00
1.21.5	40 A SP "C" Curve MCB	40	474.00	Each	18,960.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.22</b>	Supplying and fixing following rating, <b>Double Pole</b> (single phase and neutral), 240 V, residual current circuit breaker ( <b>RCBO</b> ), having a sensitivity current <b>30 mA</b> in the existing <b>MCB DB</b> complete with connections, testing and commissioning etc. as required. (Note: Indication of seperate for Earth Leakage and Short Circuit)				
<b>1.22.1</b>	25A , 30mA , DP	12	2,844.00	Each	34,128.00
<b>1.22.2</b>	40A , 30mA , DP	22	2,878.00	Each	63,316.00
<b>1.23</b>	Supplying and fixing Cable End Box (Loose Wire Box) suitable for <b>Triple Pole</b> and neutral, sheet steel, Vertical MCB distribution board, 415 Volts, on surface/ recess, complete with testing and commissioning etc. as required.				
<b>1.23.1</b>	For Vertical TP MCB DB	17	1,366.09	Each	23,224.00
<b>1.24</b>	Supplying and fixing following way, horizontal type <b>Three Pole</b> and neutral, sheet steel, <b>MCB</b> distribution board, 415 volts, 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) (For UPS)				
<b>1.24.1</b>	4 way (4 + 12), Double door	7	4,775.48	Each	33,428.00
<b>1.25</b>	Supplying and fixing 5 A to <b>32 A</b> 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.				
<b>1.25.1</b>	Single pole	364	298.71	Each	1,08,731.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.26</b>	Supply of following sizes of 250 mm Sweep Fresh Air PVC body Ventilation air fan with Louver suitable, for operation on single phase 230 Volt AC 50 Hz supply and including connections and earthing with 3x1.5sqm. Wire in the existing window/ opening i/c built-in louvers, etc. complete as reqd.				
<b>1.26.1</b>	250 mm Fresh Air Fan	14	1,815.00	Each	25,410.00
<b>1.27</b>	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.	5000	165.00	P. Kg.	8,25,000.00
<b>1.28</b>	Supplying and installation of DLP PVC snap trunking system with flexible cover. Trunking must be Non flame propagation and UV protected. With provision for separate fixing bracket for wiring devices Trunking should be available in size 105 X 50mm with all required accessories connected fittings for fixing on wall, ceiling and surfaces conforming standard EN 50085-2-1 of under mentioned size and refixing / resaddeling of all dismantalled UG cables/ submain inside the trunking and made connection as specified and directed.				
<b>1.28.1</b>	105mm X 50mm DLP PVC Trunking	200	538.00	P. Mtr.	1,07,600.00
<b>1.29</b>	Supplying and laying / fixing under floor GI junction box / vertical Access box to connect with M trak i/c cutting the floor / wall and finishing the same with cement, sand, etc as reqd.				
<b>1.29.1</b>	a) Under floor Height adjustable junction box along with metal cover of size 300 mm X 300 mm X 50 - 70 mm deep along with SS Metal Cover over Junction Box on Floor/Carpet area.	50	3,565.00	Each	1,78,250.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.30</b>	Supplying and laying under floor/wall compartment type GI trunking with jointing sleeve i/c cutting the floor / wall finishing the same with cement, sand of the following size etc as reqd.				
<b>1.30.1</b>	a) size 225 mm X 38 mm X 1.6mm, 3 compartments (Height 38 mm )	300	2,269.00	P. Mtr.	6,80,700.00
	<b>EARTHING</b>				
<b>1.31</b>	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 Mtrs. long etc. with charcoal/ coke and salt as required.	20	8,722.95	P. Set	1,74,459.00
<b>1.32</b>	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.	200	824.13	P. Mtr.	1,64,826.00
<b>1.33</b>	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	100	285.09	P. Mtr.	28,509.00
<b>1.34</b>	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing along with existing surface/ recessed conduit/ submain wiring/ cable as required.	1350	48.65	P. Mtr.	65,678.00
	<b>POWER CABLE</b>				
<b>1.35</b>	Supplying of followig sizes of XLPE ARMoured Cables with <b>Aluminium Conductor</b> 1100 V. Grade confrming to IS : 7098 (Pt-1) 1988 PVC insulated etc. complete as required.				
<b>1.35.1</b>	3.5 x 185 Sq.mm.	300	1,604.00	P. Mtr.	4,81,200.00
<b>1.35.2</b>	3.5 x 150 Sq.mm.	75	1,293.00	P. Mtr.	96,975.00
<b>1.35.3</b>	3.5 x 120 Sq.mm.	50	1,086.00	P. Mtr.	54,300.00
<b>1.35.4</b>	3.5 x 240 Sq.mm.	300	2,019.00	P. Mtr.	6,05,700.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

1.35.5	3.5 x 400 Sq.mm.	300	3,232.00	P. Mtr.	9,69,600.00
1.35.6	3.5 x 95 Sq.mm.	50	925.00	P. Mtr.	46,250.00
1.35.7	3.5 x 50 Sq.mm.	150	528.00	P. Mtr.	79,200.00
1.35.8	3.5 x 35 Sq.mm.	50	402.00	P. Mtr.	20,100.00
1.36	Supplying of followig sizes of XLPE ARMoured Cables with <b>Copper Conductor</b> 1100 V. Grade confrming to IS : 7098 (Pt-1) 1988 PVC inner sheathed etc. complete as required.				
1.36.1	3.5 x 25 Sq.mm. (Light/Power Floor Panel-G,1,2,3 to 4 Way VTN LDB/PDB Supply)	125	1,961.00	P. Mtr.	2,45,125.00
1.36.2	4 x 16 Sq.mm. (UPS Floor Panel-G,1,2,3 , 4 Way VTN UPSDB Supply)	25	1,320.00	P. Mtr.	33,000.00
1.36.3	4 x 10 Sq.mm. (From DG Panel to UPS Main(DG) I/C-1)	50	880.00	P. Mtr.	44,000.00
1.37	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable tray as required.				
1.37.1	Upto 35 sq. mm (clamped with 1mm thick saddle)	195	52.54	P. Mtr.	10,246.00
1.37.2	Above 35 sq. mm and upto 95 sq. mm (clamped with 25x3mm MS flat clamp)	50	107.03	P. Mtr.	5,352.00
1.37.3	Above 95 sq. mm and upto 185 sq. mm (clamped with 25/40x3mm MS flat clamp)	280	134.27	P. Mtr.	37,597.00
1.38	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on wall surface as required.				
1.38.1	Upto 35 sq. mm (clamped with 1mm thick saddle)	30	64.22	P. Mtr.	1,927.00
1.38.2	Above 35 sq. mm and upto 95 sq. mm (clamped with 25x3mm MS flat clamp)	110	151.79	P. Mtr.	16,697.00
1.38.3	Above 95 sq. mm and upto 185 sq. mm (clamped with 25/40x3mm MS flat clamp)	45	179.03	P. Mtr.	8,056.00
1.39	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.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.39.1</b>	Upto 35 sq. mm (clamped with 1mm thick saddle)	30	42.81	P. Mtr.	1,284.00
<b>1.39.2</b>	Above 35 sq. mm and upto 95 sq. mm (clamped with 25x3mm MS flat clamp)	40	66.16	P. Mtr.	2,647.00
<b>1.39.3</b>	Above 95 sq. mm and upto 185 sq. mm (clamped with 25/40x3mm MS flat clamp)	100	89.52	P. Mtr.	8,952.00
	<b>LIGHTING PROTECTION</b>				
	<b>Air Termination System</b>				
<b>1.40</b>	Supplying,Installation,Testing and Commissioning of 8mm dia Aluminium alloy Solid Round Conductor of material AlMgSi used in air termination and down conductor system . Cross sectional area of conductor should be 50 mm <sup>2</sup> . Test ParaMtrs.: a.Lightning impulse current of 100kA for 10/350 μs b.Electrical resistivity - 0.034 μΩm, c.Tensile strength - 178 MPa or N/mm <sup>2</sup> d. Salt spray - No Sign of Corrosion. Tested as per IEC 62561-2.	325	88.00	P. Mtr.	28,600.00
<b>1.41</b>	Supplying,Installation,Testing and Commissioning of Nylon Conductor Holder for Parapet wall for holding 8 mm dia Aluminium alloy round Conductor.	291	34.00	Each	9,894.00
<b>1.42</b>	Supplying,Installation,Testing and Commissioning of Nylon roof conductor holder for flat roof with concrete block for fixing 8 mm dia Aluminium alloy Solid Round Conductor in the terrace flat surface at every 1 Mtrs..	112	114.00	Each	12,768.00
<b>1.43</b>	Supplying,Installation,Testing and Commissioning of Stainless steel 304 Grade Cross Connector for 8 mm dia Aluminium alloy round conductor & 10 mm Copper bonded conductor at cross/Tee junction. Test ParaMtrs. a) Mechanical Load b) Electrical Test c) Environmental Test Tested for IEC 62561-1	55	224.00	Each	12,320.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.44</b>	Supplying,Installation,Testing and Commissioning of Expansion Joint with connector to compensate the expansion and contraction of Solid Round Al. Conductor during temperature variations. Expansion Joint should be consider at every 20 Mtrs. length of straight horizontal air termination and connected at both the end with use of straight connector conductor.	13	290.00	Each	3,770.00
<b>1.45</b>	Supplying,Installation,Testing and Commissioning of Aluminium Straight conductor connector for interconnecting 8mm Aluminium conductor to meets the requirement of IS/IEC 62305. Test ParaMtrs.s: a) Mechanical Load b) Electrical Resistivity c) Environmental Test Tested as per IEC 62561-1	8	57.00	Each	456.00
<b>1.46</b>	Supplying,Installation,Testing and Commissioning of air termination rod of 3Mtrs. length of material AlMgSi of diaMtrs. ø 16/10 mm crimped on both the ends (Tappered Type). The rod shall be mounted with stainless steel clamp and fixing accessories . Test ParaMtrs. for 3 Mtrs. vertical air terminal a)Electrical Resistivity b) Tensile Strength c) Condition of Salt Mist Tested as per IEC 62561-2. Test ParaMtrs.r for Wall clamp a) Mechanical load as per IEC 62561-1	12	3,307.00	Each	39,684.00
<b>1.47</b>	Supplying,Installation,Testing and Commissioning of air termination rod of 3 Mtrs. length of material AlMgSi of diaMtrs. ø 16/10 mm crimped on both the ends(Tappered Type). The rod shall be mounted with stone and fixing accessories . Test ParaMtrs. for 3 Mtrs. vertical air terminal a)Electrical Resistivity b) Tensile Strength c) Condition of Salt Mist Tested as per IEC 62561-2.	4	3,961.00	Each	15,844.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

1.48	Supplying,Installation,Testing and Commissioning of Stainless steel SS 304 Grade Folding Clamp as per sheet profile for 8 mm dia Aluminium alloy Solid Round Conductor for horizontal Air terminal above metal sheet to meet the requirements for IS/IEC 62305. Test a) Mechanical Load b) Environmental Test Tested as per IEC 62561-4	5	195.00	Each	975.00
<b>DOWN CONDUCTOR SYSTEM</b>					-
1.49	Supplying,Installation,Testing and Commissioning of 8mm dia Aluminium alloy Solid Round Conductor of material AlMgSi used in air termination and down conductor system . Cross sectional area of conductor should be 50 mm <sup>2</sup> . Test ParaMtrs.: a.Lightning impulse current of 100kA for 10/350 $\mu$ s b.Electrical resistivity - 0.034 $\mu\Omega$ m, c.Tensile strength - 178 MPa or N/mm <sup>2</sup> d. Salt spray - No Sign of Corrosion. Tested as per IEC 62561-2.	394	88.00	P. Mtr.	34,672.00
1.50	Supplying,Installation,Testing and Commissioning of Nylon Conductor Holder for Parapet wall for holding 8 mm dia Aluminium alloy round Conductor.	394	34.00	Each	13,396.00
1.51	Supplying,Installation,Testing and Commissioning of Aluminium Straight conductor connector for interconnecting 8mm Aluminium conductor to meets the requirement of IS/IEC 62305. Test a) Mechanical Load b) Electrical Resistivity c) Environmental Test Tested as per IEC 62561-1	28	57.00	Each	1,596.00

CORRECTIONS - Nil

OMISSION - Nil

INSERTION - Nil

<b>1.52</b>	Supplying,Installation,Testing and Commissioning of Lightning counter - LCD screen shows the number of lightning strikes, hour and date of lightning events Buttons enable TIME/DATE setting and log viewing. Replaceable battery, working life minimum five years, Complies with IEC/EN 62561-6.	1	34,640.00	Each	34,640.00
<b>1.53</b>	Supplying,Installation,Testing and Commissioning of Stainless Steel Test Joint round to round to interconnect between 8 mm Al. round conductor to 10 mm Copper conductor . Test Salt Spray Test for test joint plate -No sign of Corrosion Tested as per IEC 62561-1	15	859.00	Each	12,885.00
	<b>EARTHING</b>				
<b>1.54</b>	Supplying,Installation,Testing and Commissioning of 10 mm copper bonded Solid Steel Round Conductor with minimum coating thickness 100µm. Material should be tested Tensile strength, Electrical Resistance, salt mist, Bend & Adhesion to meet the requirements of IS/ IEC 62305 and IEC 62561-1&2.	75	217.00	Each	16,275.00
<b>1.55</b>	Supplying,Installation,Testing and Commissioning of Stainless steel SS 304 Grade Conductor Holder for fixing the 8-10 mm dia round conductor on the wall Test a) Mechanical Load b) Environmental Test Tested as per IEC 62561-4	15	209.00	Each	3,135.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

1.56	Supplying,Installation,Testing and Commissioning of UL Listed Maintenance Free Copper bonded Earth rod of 3048mm length having the dia of 14.2 mm with copper coating thickness of 254 microns. The rod has been tested for Dimension, Marking, Tensile Strength, Salt mist, coating thickness, Electrical resistivity test before and after corrosion test as per IEC 62561-2 & UL 467. Supply of earth enhancing mineral compound tested for leaching and TCLP with NABL accredited Lab as per IEC 62561-7 -25 kg, Type: PROSAN 12.5 . Supply of Earth rod clamp made for terminating cable / flat conductor. Type: ERC 1417 SS + Type: CPES 8 . Supply of Earth Chamber Inspection Pit made up of Plastic withstand load of 60kN.	15	5,543.00	Each	83,145.00
<b>LT Vertical Rising Main</b>					
1.57	Supplying, installing , 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 metal clad enclosure having IP-54 rating after fixing the tap off boxes and all accessories, made of 1.6mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos. Aluminium bus bars having current density of 130 A/ sq cm at nominal current rating, necessary joints, elbow joints & expansion joints and bends, fire barrier at each floor, provision of tapping at every Mtrs., adopter box and copper flexible for joints, continuous earthing with 2 Nos. copper strip of suitable size (one on each side) including, G.I. clamping brackets, suspenders, angle iron bracket, steel fasteners, connecting to earthing system etc. as required.				
1.57.1	200 A Isc = 15kA for 1 second	22.5	9,302.85	Each	2,09,314.00
1.57.2	400 A Isc = 30kA for 1 second	45	12,946.74	Each	5,82,603.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.58</b>	Supplying, installation, testing & commissioning of following capacity End Feed Unit for the existing Sandwich Type bus trunking/ rising mains for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply made with 1.6mm thick steel sheet enclosure (IP54) duly powder coated with provision of MCCB of following capacity , 50 KA microprocessor release complete with necessary joints including clamping brackets, angle iron bracket, steel fasteners, connecting to earthing system etc. as required.					-	-
<b>1.58.1</b>	315 A 25kA SC for 1 sec	1	11,925.09	Each		11,925.00	
<b>1.58.2</b>	400 A 30kA SC for 1 sec	2	13,217.23	Each		26,434.00	
<b>1.59</b>	Supplying, installation, testing & commissioning of following capacity Plug In/ tap off box on the existing Sandwich Type bus trunking/ rising mains for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply made with 1.6mm thick sheet steel enclosure (IP54) duly powder coated with provision of following capacity MCCB/complete etc. as required.					-	-
<b>1.59.1</b>	125 A 15kA SC for 1 sec	18	10,123.09	Each		1,82,216.00	
<b>1.59.2</b>	200 A 25kA SC for 1 sec	1	10,123.09	Each		10,123.00	
<b>1.59.3</b>	250 A 30kA SC for 1 sec	1	12,416.45	Each		12,416.00	
<b>1.60</b>	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, etc. as required.					-	-
<b>1.60.1</b>	100 A,30KA,FPMCCB	15	9,015.82	Each		1,35,237.00	
<b>1.60.2</b>	125 A,36KA,FPMCCB	2	9,583.08	Each		19,166.00	
<b>1.60.3</b>	250 A,36KA,FPMCCB	2	21,493.57	Each		42,987.00	
<b>1.60.4</b>	400 A,50KA,FPMCCB	2	49,808.84	Each		99,618.00	

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	<b>BUS-TRUNKING</b>		-		-
<b>1.61</b>	Supplying, installing, on wall or suspension on ceiling, 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 metal clad enclosure having IP-54 rating after fixing the tap off boxes and all accessories, made of 1.6mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos. Copper bus bars having current density of 130 A/ sq cm at nominal current rating, necessary joints, elbow joints & expansion joints and bends, fire barrier at each floor, provision of tapping at every Mtrs., adopter box and copper flexible for joints, continuous earthing with 2 Nos. copper strip of suitable size (one on each side) including, G.I. clamping brackets, suspenders, angle iron bracket, steel fasteners, connecting to earthing system etc. as required.				
<b>1.61.1</b>	200 A Isc = 15kA for 1 second	50	9,389.45	P. Mtr.	4,69,473.00
<b>1.62</b>	Supplying, installing, testing and commissioning of following capacity TPN distribution tap off box made of 1.6mm thick sheet steel enclosure duly painted with powder coating on existing rising mains complete with HRC fuses, interconnections, earthing etc. as required.				
<b>1.62.1</b>	32 A TPN, 2 way	10	17,556.81	Each	1,75,568.00
<b>1.62.2</b>	63 A TPN, 2 way	10	19,993.20	Each	1,99,932.00
<b>1.62.3</b>	100 A TPN	2	16,584.79	Each	33,170.00
<b>1.63</b>	Supplying and fixing following rating, four pole, (three phase and neutral), 415 volts, residual current circuit breaker (RCCB), having a sensitivity current 30 mA in the existing MCB DB complete with connections, testing and commissioning etc. as required.				
<b>1.63.1</b>	40 A FP	20	3,721.73	Each	74,435.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

1.63.2	63 A FP	20	3,352.96	Each	67,059.00
1.64	<b>Panel-1</b>				
	<b>MV Main LT Panels (As per IEC 61439)</b>				
	Supply, installation, Testing and Commissioning of dust, damp and vermin proof free floor /wall mounted, Indoor type factory built sheet steel enclosed modular construction(each bay shall be modular and shall be bolted together to form the panel board) extendable compartmentalized cubicle panel board, suitable for operation on 415 ±10% volts, 50 Hz AC 3 phase 4 wire system fabricated out of suitable sized structural sections and covered with CRCA sheet steel /GI sheet of 2mm thick for framework and covers, 3mm thick for gland plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade (or other approved superior process), complete with Aluminium bus bars, inter-connection with copper conductor wires / aluminium strips, neutral links, earth bus etc. including control wiring with 1.5sqmm. & 2.5sqmm. PVC insulated FRLS copper conductor single core cable for voltage & current respectively, cable alleys, cable gland plates in two half etc. necessary Mtrs.ing protections & indications and mounted with the following switch gears etc. complete as required. The panel board shall be IEC- 61439- Part-1 & 2 compliant and of form-4b construction.				
	(Each MCCB will have variable current setting for over current and short circuit, extended lockable handle, pad lockable in off position, indication light for ON, shrouding on incomer side, termination shall be suitable for aluminium bus bars. All MCCBs of 250 A and above shall be microprocessor based only. Current density of aluminium busbars shall not be more than 0.80 A per sq.mm.)				
	MAIN L.T PANEL Ics = 50KA				
	Incomer from Best Supply				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

2 Nos. X 1600A 4Pole EDO ACB, 50KA with microprocessor based release for over current with different time settings, short circuit with time delay & earth fault release with time delay, instantaneous setting and with communication module (MODBUS) . Suitable links to terminate 4000A Sandwich Type Bus Duct. ON/OFF/TRIP indication shall be wired through potential free contact up to terminal strip of breaker for hooking to BMS. Each incomer shall have following.				
Each Incomer shall be provided the followings:				
<b>Incomer-1</b>				
<b>1250A FP EDO ACB (50 kA)</b> with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts, Shunt Release - 1 Set				
Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 Set				
1 No.digital multi function Mtrs. to display F, PF, kW, kVA, kVAR, kWh, kVAh, kVARh, THD, Phase angles, Power demand paraMtrs.s. - 1 Set				
CT - 1250/630/5A, 5VA, Cl.-0.5 for APFC (Resin Cast) - 1 No.				
CT - 1250/630/5A, 5VA, Cl.-0.5 for AHF (Resin Cast) - 1 No.				
CT - 1250/630/5A, 5VA, Cl.-0.5 for Metering (Resin Cast) - 1 No.				
Aux. Contactor (2NO+2NC)-3 Nos.				
Phase Indicating Lamps - R, Y, B (220-240V AC)-3 Nos.				
Indicating Lamps - ON, OFF, TRIP (220-240V AC)-3 Nos.				
Aux. Contactor (2NO+2NC)-3 Nos.				
Under Voltage(27), Over Voltage(59)-1 Nos.				
Power Supply--1 Nos.				
Plug in Relay-2 Nos.				
6A SP Control MCB (10kA) C Curve-6 Nos.				
Surge Protection Device (Type-2)-1 Nos.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	63A FP MCCB (25kA) with built-in Thermal Magnetic Based Release (O/C, S/C) Protection-1 Nos.				
	Interlocking for incomer ACBs of section-- 01, 02, & buscoupler				
	Sound Alarm Hooter - 230V AC, Accept/Reset Push Button, Microprocessor Based Annunciator Window				
	<b>Incomer-2</b>				
	<b>1250A FP EDO ACB (50 kA)</b> with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts, Shunt Release - 1 Set				
	Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 Set				
	1 No.digital multi function Mtrs. to display F, PF, kW, kVA, kVAR, kWh, kVAh, kVARh, THD, Phase angles, Power demand paramMtrs.s.- 1 Set				
	CT - 1250/630 /5A, 5VA, Cl.-0.5 for APFC (Resin Cast)- 1 Nos.				
	CT - 1250/630 / 5A, 5VA, Cl.-0.5 for AHF (Resin Cast)- 1 Nos.				
	CT - 1250/630/ 5A, 5VA, Cl.-0.5 for Metering (Resin Cast)- 1 Nos.				
	Aux. Contactor (2NO+2NC)-3 Nos.				
	Phase Indicating Lamps - R, Y, B (220-240V AC)-3 Nos.				
	Indicating Lamps - ON, OFF, TRIP (220-240V AC) - 3 Nos.				
	Aux. Contactor (2NO+2NC) - 3 Nos.				
	Under Voltage(27), Over Voltage(59) - 1 No.				
	Power Supply - 1 No.				
	Plug in Relay - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 6 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	<b>Outgoing-1</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	630A FP MCCB (50kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 630/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	<b>Outgoing-2</b>				
	400A FP MCCB (50kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 400/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-3</b>				
	400A FP MCCB (50kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 400/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-4</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	400A FP MCCB (50kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 400/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-5</b>				
	250A FP MCCB (36kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 250/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	<b>Outgoing-6</b>				
	250A FP MCCB (36kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 250/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	<b>Outgoing-7</b>				
	160A FP MCCB (25kA) with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 160/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	<b>Outgoing-8</b>				
	125A FP MCCB (25kA) with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts - 1 No.				
	Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 125/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
		1	21,51,782.00	P. Job	21,51,782.00
<b>1.65</b>	<b>PANEL-2</b>				
	<b>INDOOR DG Set (Essential Panel)</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

	<p>Supply, installation, Testing and Commissioning of dust, damp and vermin proof free floor /wall mounted, Indoor type factory built sheet steel enclosed modular construction(each bay shall be modular and shall be bolted together to form the panel board) extendable compartmentalized cubicle panel board, suitable for operation on 415 ±10% volts, 50 Hz AC 3 phase 4 wire system fabricated out of suitable sized structural sections and covered with CRCA sheet steel /GI sheet of 2mm thick for framework and covers, 3mm thick for gland plates i/c cleaning &amp; finishing complete with 7 tank process for powder coating in approved shade (or other approved superior process), complete with Aluminium bus bars, inter-connection with copper conductor wires / aluminium strips, neutral links, earth bus etc. including control wiring with 1.5sqmm. &amp; 2.5sqmm. PVC insulated FRLS copper conductor single core cable for voltage &amp; current respectively, cable alleys, cable gland plates in two half etc. necessary Mtrs.ing protections &amp; indications and mounted with the following switch gears etc. complete as required. The panel board shall be IEC- 61439- Part-1 &amp; 2 compliant and of form-4b construction.</p>				
	<p>(Each MCCB will have variable current setting for over current and short circuit, extended lockable handle, pad lockable in off position, indication light for ON, shrouding on incomer side, termination shall be suitable for aluminium bus bars. All MCCBs of 250 A and above shall be microprocessor based only. Current density of aluminium busbars shall not be more than 0.80 A per sq.mm.)</p>				
	<p><b>INCOMING</b></p>				
	<p>630A FP MCCB (50 kA) with built-in Microprocessor Based Release (O/C, S/C &amp; E/F) Protection, ROM, Spreader link, Aux. &amp; Trip Contacts, - 2 Nos.</p>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	Phase Indicating Lamps - R, Y, B (220-240V AC) - 6 Nos.				
	Indicating Lamps - ON, OFF, TRIP (220-240V AC) - 6 Nos.				
	6A SP Control MCB (10kA) C Curve - 8 Nos.				
	C/O INCOMER ATS				
	630A FP ATS Changeover (50 kA) (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts,-1 Nos.				
	SUB. INCOMER				
	<b>Outgoing-1</b>				
	250A FP MCCB (36kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 250/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	<b>Outgoing-2</b>				
	250A FP MCCB (36kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 250/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	<b>Outgoing-3</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	250A FP MCCB (36kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 250/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-4</b>				
	100A FP MCCB (25kA) with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 100/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 Set				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-5</b>				
	100A FP MCCB (25kA) with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 100/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-5</b>				
	100A FP MCCB (25kA) with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts - 1 No.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 100/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-5</b>				
	<b>63A FP MCCB (25kA)</b> with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts - <b>1 No.</b>				
	Digital Multifunction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT -63/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	<b>Outgoing-6 (Spare)</b>				
	25A DP MCB (10kA) C urve - 10 Nos.	1	9,11,416.00	P. Job	9,11,416.00
<b>1.66</b>	<b>PANEL-4</b>				
	<b>MAIN UPS PANEL</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

	<p>Supply, installation, Testing and Commissioning of dust, damp and vermin proof free floor /wall mounted, Indoor type factory built sheet steel enclosed modular construction(each bay shall be modular and shall be bolted together to form the panel board) extendable compartmentalized cubicle panel board, suitable for operation on 415±10% volts, 50 Hz AC 3 phase 4 wire system fabricated out of suitable sized structural sections and covered with CRCA sheet steel /GI sheet of 2mm thick for framework and covers, 3mm thick for gland plates i/c cleaning &amp; finishing complete with 7 tank process for powder coating in approved shade (or other approved superior process), complete with Aluminium bus bars, inter-connection with copper conductor wires / aluminium strips, neutral links, earth bus etc. including control wiring with 1.5sqmm. &amp; 2.5sqmm. PVC insulated FRLS copper conductor single core cable for voltage &amp; current respectively, cable alleys, cable gland plates in two half etc. necessary Mtrs.ing protections &amp; indications and mounted with the following switch gears etc. complete as required. The panel board shall be IEC- 61439- Part-1 &amp; 2 compliant and of form-4b construction.</p>				
	<p>(Each MCCB will have variable current setting for over current and short circuit, extended lockable handle, pad lockable in off position, indication light for ON, shrouding on incomer side, termination shall be suitable for aluminium bus bars. All MCCBs of 250 A and above shall be microprocessor based only.Current density of aluminium busbars shall not be more than 0.80 A per sq.mm.)</p>				
	<p><b>INCOMING</b></p>				
	<p><b>250A FP MCCB (25kA)</b> with built-in Microprocessor Based Release (O/C, S/C &amp; E/F) Protection, ROM, Spreader link, Aux. &amp; Trip Contacts, Shunt Release - 1 No.</p>				
	<p>Aux. Contactor (2NO+2NC) - 2 Nos.</p>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	Phase Indicating Lamps - R, Y, B (220-240V AC) - 3 Nos.				
	Indicating Lamps - ON, OFF, TRIP (220-240V AC) - 3 Nos.				
	Power Supply - 1 No.				
	Plug in Relay - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	63A FP MCB (10kA) C Curve Fro SPD - 1 No.				
	<b>OUTGOING</b>				
	63A FP MCB (10kA) Curve - 5 Nos.				
	40A FP MCB (10kA) Curve - 5 Nos.	1	1,34,570.00	P. Job	1,34,570.00
<b>1.67</b>	<b>PANEL-5</b>				
	<b>HVAC CHILLAR PANEL LT Panel</b>				
	Supply, installation, Testing and Commissioning of dust, damp and vermin proof free floor /wall mounted, Indoor type factory built sheet steel enclosed modular construction(each bay shall be modular and shall be bolted together to form the panel board) extendable compartmentalized cubicle panel board, suitable for operation on 415 ±10% volts, 50 Hz AC 3 phase 4 wire system fabricated out of suitable sized structural sections and covered with CRCA sheet steel /GI sheet of 2mm thick for framework and covers, 3mm thick for gland plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade (or other approved superior process), complete with Aluminium bus bars, inter-connection with copper conductor wires / aluminium strips, neutral links, earth bus etc. including control wiring with 1.5sqmm. & 2.5sqmm. PVC insulated FRLS copper conductor single core cable for voltage & current respectively, cable alleys, cable gland plates in two half etc. necessary Mtrs.ing protections & indications and mounted with the following switch gears etc. complete as required.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	The panel board shall be IEC- 61439- Part-1 & 2 compliant and of form-4b construction. (Each MCCB will have variable current setting for over current and short circuit, extended lockable handle, pad lockable in off position, indication light for ON, shrouding on incomer side, termination shall be suitable for aluminium bus bars. All MCCBs of 250 A and above shall be microprocessor based only, Current density of aluminium busbars shall not be more than 0.80 A per sq.mm.)				
	INCOMING				
	<b>630A FP EDO type ACB (50 kA)</b> with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Aux. & Trip Contacts, Shunt Release - 1 Set				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 Set				
	1 No.digital multi function Mtrs. to display F, PF, kW, kVA, kVAR, kWh, kVAh, kVARh, THD, Phase angles, Power demand paraMtrs.s.- 1 Set				
	CT - 630/5A, 5VA, Cl.-0.5 for APFC (Resin Cast) - 1 No.				
	CT - 630/5A, 5VA, Cl.-0.5 for AHF (Resin Cast) - 1 No.				
	CT - 630/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 3 Nos.				
	Phase Indicating Lamps - R, Y, B (220-240V AC) - 3 Nos.				
	Indicating Lamps - ON, OFF, TRIP (220-240V AC) - 3 Nos.				
	Aux. Contactor (2NO+2NC) - 3 Nos.				
	Under Voltage(27), Over Voltage(59) - 1 No.				
	Power Supply - 1 No.				
	Plug in Relay - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 6 Nos.				
	Surge Protection Device (Type-2) - 1 No.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	<b>Outgoing-1,2,3 (HVAC Chillar Unit Panel) - 3 Nos. (2W + 1S Chiller)</b>				
	400 A FP MCCB (36 kA) with built-in Microprocessor Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - <b>3 Nos.</b>				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - <b>3 Nos.</b>				
	CT - 400/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 3 Nos.				
	Aux. Contactor (2NO+2NC)-6 Nos.				
	6A SP Control MCB (10kA) C Curve--12 Nos.				
	Surge Protection Device (Type-2)-3 Nos.				
	<b>Outgoing-2 (Spare)- 1 No.</b>				
	100 A FP MCCB (36 kA) with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 1 No.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 1 No.				
	CT - 400/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 1 No.				
	Aux. Contactor (2NO+2NC) - 2 Nos.				
	6A SP Control MCB (10kA) C Curve - 4 Nos.				
	Surge Protection Device (Type-2) - 1 No.				
	<b>Outgoing-3 (Pump/Motor Chillar unit 15KW VFD Starter) - 4 Nos.</b>				
	63 A FP MCCB (36 kA) with built-in Thermal Based Release (O/C, S/C & E/F) Protection, ROM, Spreader link, Aux. & Trip Contacts - 4 Nos.				
	Digital Multifuction Mtrs. with RS-485 communication port, Accuracy Cl.-0.5 (96mmX96 mm) (I, V, KW, KWH, KVA, PF, HZ, MDI) (EM6400NG) - 4 Nos.				
	CT - 63/5A, 5VA, Cl.-0.5 for Mtrs.ing (Resin Cast) - 4 Nos.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	Ground Fault Module - 4 Nos., 63A Semi-Conductor Fuse - 12 Nos.				
	Aux. Contactor (2NO+2NC)-8 Nos.				
	6A SP Control MCB (10kA) C Curve-- 16 Nos.				
	Motor Protection Circuit Breaker (MPCB) Device - 4 Nos.				
	2C/O Auxiliary Relay 230V AC - 8 Nos.				
	3C/O Auxiliary Relay 24V AC - 4 Nos.				
	4C/O Auxiliary Relay 24V AC - 4 Nos.				
	Control Transformer 230V / 24V DC - 4 Nos.				
	ON/OFF/TRIP Indication Lamp 230V AC - 4 Nos.				
	Start Push Button - 4 Nos.				
	Stop Push Button - 4 Nos.				
	Local/Remote Selector Switch - 4 Nos.				
	6A SP 10KA MCB - 8 Nos.				
	6" Ventilation Fan with Filter - 4 Nos.				
	15KW VFD Drive - 4 Nos.				
	Auxiliary Control Relay 230V AC - 8 Nos.				
	<b>Outgoing-4 (RoofTop Solar PV System)</b>				
	40A DP MCB (10kA) C curve- 2 Nos.				
	5- 32 A SP MCB (10kA) C Curve-12 Nos.	1	9,20,634.00	P. Job	9,20,634.00
<b>1.68</b>	<b>Feedar Mechanical Basement Ventillation Panel</b>				
	Design, fabrication, supply, installation, testing and commissioning of LT Panel / Sub-distribution panels fabricated out of 2mm thick for structural members and 1.6mm thick for door and covers CRCA sheet in cubicle compartmentalize free standing floor mounted, dust and vermin proof Cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process before painting as per specifications 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3-phase, 4-wire, 50Hz supply system and lifting hooks shall also be provided in case of large panels. Degree of ingress protection of IP-54.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	<b>Incomer (1 No.):</b>				
	1 No.- 160 A , 50 kA FP MCCB Thermal Magnetic				
	<b>Mtrs.ing:</b>				
	0-500 Volts, digital VoltMtrs. and shall be protected by 2Amps MCBs.				
	0-200 Amps digital AmMtrs. and 200/5A, 10VA, CL-1 CTs and selector switch. Phase indicating lamps and shall be protected by 2Amps MCBs.ii) Intelligent multifunction digital Mtrs. to read V, A, KVA, KWH,THD, PF Hz etc. having RS 485 port and compatible to PC with modbus protocol with 3 Nos. resin cast CTs of 200/5 A class 1.0 accuracy and 15 VA burden. - 1 Set				
	<b>Bus Bars: 250 Amps Capacity</b>				
	Supplying and fixing suitable size GI/PVC box with modular plate and cover in front on surface or in recess, including providing and fixing 2 Nos. 3 pin 5/6 A modular socket outlet and 2 Nos. 5/6 A modular switch, connections etc. as required. (For light plugs to be used in non residential buildings).				
	<b>OUTGOING-1</b>				
	<b>Ventilation Fan for Basement (Exhaust system)</b>				
	1 No.+ 1 No. SPARE - 6 pole MCB Star Delta starter for 15 kw Motor/Fan ON/OFF indication lamps and push buttons, Digital amMtrs. with CTs and selector switch, potential free contacts for remote operation in each feeder and Auto Manual Selector Switch as required including auxiliary contacts for signal. 2no+2nc (FAN)				
	2 Nos. Toggle switch				
	<b>2 Nos. MCB 63 A FP MCB + 1 No. SPARE SWITCH MCB 63 A FP MCB</b>				
	<b>OUTGOING-2</b>				
	<b>Ventilation - Centrifugal Jet Fans (Dual mode)</b>				

	12 Nos.+ 2 Nos. SPARE - 4 pole/8 pole MPB DOL/SD starter for 1.5 - 4.0 kw ON/OFF indication lamps and push buttons, Digital amMtrs. with CTs and selector switch, potential free contacts for remote operation in each feeder and Auto Manual Selector Switch as required including auxiliary contacts for signal. 2no+2nc (FAN)				
	12 Nos. Toggle switch				
	12 Nos. - MCB 20 A FP MCB + 2 Nos. - SPARE SWITCH MCB 20 A FP MCB				
	<b>OUTGOING-3</b>				
	<b>Pressurization panel - LIFT</b>				
	2 Nos.+1 No. SPARE- 4 pole MPCB Star Delta/DOL starter for 3.7/5.0 kw ON/OFF indication lamps and push buttons, Digital amMtrs. with CTs and selector switch, potential free contacts for remote operation in each feeder and Auto Manual Selector Switch as required including auxiliary contacts for signal.2no+2nc (FAN)				
	2 no Toggle switch				
	<b>2 Nos. - MCB 32 A FP MCB + 1 No. - SPARE SWITCH MCB 32 A FP MCB</b>	1	6,76,951.00	P. Job	6,76,951.00
	<b>NOTE:- Panel shall be installed at 800 mm above basement floor level to avoid flooding situation at basement.</b>				
<b>1.69</b>	<b>PANEL-7</b>				
	<b>LIFT PANEL</b>				
	Indoor Single Front Fixed Type, Floor Mounted with aluminium Busbar of 200A capacity				
	<b>INCOMER</b>				
	100A TP MCCB (15 kA) with built-in Microprocessor Based Release for (O/C, S/C, E/F Protection) & ROM - 1 Nos.				
	TP Surge protection device Zinc Oxide Varistor (MOV) 1 No.				
	Digital Multifunction Mtrs., Class-1.0, 96X96 Sq. mm, with RS485 Communication Port - 1 No.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	CTs 100A/5A Class- 1.0, 15VA for Mtrs.ing (Resin Cast) - 1 No.				
	Auxiliary Contactor 2NO+2NC - 1 No.				
	Indicating lamps - R/Y/B - 1 No.				
	2A SP MCB (10KA) - 1 No.				
	Surge Protection Device (Type-2) - 1 No.				
	In-built Auto Phase Sequence Correction Device				
	12V Battery Charger for Lift Essential Power Back Up (Space for battery also)				
	<b>OUTGOINGS</b>				
	63 A TP MCCB (25kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) & ROM - 2 Nos. (1+1 SPARE SUPPLY For 1 No. Lifts)				
	40 A DP MCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) & ROM - 1 No. and 4 Nos., 5-32A C Curve SP MCB (For Lighting shaft)	2	1,93,229.00	P. Job	3,86,458.00
<b>1.70</b>	<b>PANEL-8</b>				
	<b>AHU PANEL</b>				
	Indoor Single Front Fixed Type, Floor Mounted with aluminium Busbar of 100A capacity				
	<b>INCOMER</b>				
	63A FP MCCB (15kA) with built-in Thermal Based Release for (O/C, S/C, E/F Protection) & ROM - 1 No.				
	TP Surge protection device Zinc Oxide Varistor (MOV) 1 No.				
	Digital Multifunction Mtrs., Class-1.0, 96X96 Sq. mm, with RS485 Communication Port - 1 No.				
	CTs 100A/5A Class- 1.0, 15VA for Mtrs.ing (Resin Cast) - 1 No.				
	Auxiliary Contactor 2NO+2NC - 1 No.				
	Indicating lamps - R/Y/B - 1 No.				
	2A SP MCB (10KA) - 1 No.				
	Surge Protection Device (Type-2)-1 No.				
	In-built Auto Power Cut Relay for Synchronize with Fire Alarm System (Fire Module)				
	<b>OUTGOINGS</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	40 A TP MCCB (25kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) & ROM - 1 No.				
	20 A DP MCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) - 1 No. and with 4 Nos., 5-32A C Curve SP MCB	5	1,14,304.00	P. Job	5,71,520.00
	<b>Hot Dipped Galvanized Iron Cable Tray</b>				
<b>1.71</b>	Supplying and installing following size of perforated Hot Dipped Galvanized 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.				
<b>1.71.1</b>	150 mm width X 50 mm depth X 1.6 mm thickness	500	835.81	P. Mtr.	4,17,904.00
<b>1.71.2</b>	300 mm width X 50 mm depth X 1.6 mm thickness	500	1,123.82	P. Mtr.	5,61,908.00
<b>1.72</b>	Wiring for twin control light point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, 2 way modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required.	6	1,823.40	P. Point	10,940.00
<b>1.73</b>	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.				
<b>1.73.1</b>	Above 185 sq. mm and upto 400 sq. mm	75	134.27	P. Mtr.	10,071.00
<b>1.74</b>	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.				
<b>1.74.1</b>	3.5 x 240 Sq.mm. (62 mm)	4	1,198.74	Each	4,795.00
<b>1.74.2</b>	3.5 x 400 Sq.mm. (82 mm)	4	1,816.59	Each	7,266.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>1.75</b>	Supplying and making outdoor end termination with cast resin compound including aluminium lugs and other jointing materials for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required.				
<b>1.75.1</b>	3.5 x 240 Sq.mm.	4	3,223.55	Each	12,894.00
<b>1.75.2</b>	3.5 x 400 Sq.mm.	4	4,110.93	Each	16,444.00
	<b>Sub Head 2 : (Fire Fighting &amp; Fire Alarm System)</b>				
<b>2.1</b>	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.				
<b>2.1.1</b>	2 Loop Panel	1	2,79,279.22	Each	2,79,279.00
<b>2.2</b>	Supplying, installation, testing & commissioning of central graphical fire alarm management system to centrally monitor and operate the fire alarm system complete as required.	1	2,34,200.13	Each	2,34,200.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>2.3</b>	Supplying, installation, testing & commissioning of repeater panel with 320 character/ Touch screen LCD display with inbuilt reset, acknowledge and silence switches complete as required.	1	1,26,886.01	Each	1,26,886.00
<b>2.4</b>	Supplying, installation, testing & commissioning of intelligent analog addressable photothermal detector complete with mounting base complete as required.	200	3,336.42	Each	6,67,283.00
<b>2.5</b>	Supplying, installation, testing & commissioning of intelligent addressable thermal detector with rate of rise cum fixed temperature thermistor complete with base as required.	50	3,182.68	Each	1,59,134.00
<b>2.6</b>	Supplying, installation, testing & commissioning of addressable manual call point complete as required.	26	4,519.59	Each	1,17,509.00
<b>2.7</b>	Supplying, installation, testing & commissioning of fault isolator complete with base as required.	15	3,817.08	Each	57,256.00
<b>2.8</b>	Supplying, installation, testing & commissioning of addressable horn cum strobe complete as required.	26	4,093.41	Each	1,06,429.00
<b>2.9</b>	Supplying, installation, testing & commissioning of response indicator on surface/recessed MS Box having two LED, metallic cover complete with all connections etc as required.	43	322.06	Each	13,849.00
<b>2.10</b>	Supplying, installation, testing & commissioning of addressable fire control module complete as required.	10	3,505.72	Each	35,057.00
<b>2.11</b>	Supplying, installation, testing & commissioning of addressable phone control module complete as required.	12	3,814.16	Each	45,770.00
<b>2.12</b>	Supplying, installation, testing & commissioning of fire fighter telephone handset complete as required.	12	6,701.05	Each	80,413.00
<b>2.13</b>	Supplying, installation, testing & commissioning of fire fighter phone jack complete as required.	12	10,350.77	Each	1,24,209.00

CORRECTIONS - Nil

OMISSION - Nil

INSERTION - Nil

2.14	Supplying & laying of 2 x 1.5 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 and capable to work for 2Hrs rating at 250Degree Celcius, complete as required.	3000	419.36	P. Mtr.	12,58,089.00
2.15	Supply & Fixing of Fire Extinguisher Mono Ammonium Phosphate Powder , <b>ABC Type Fire Extinguisher Cap. 6 kg</b> Filled with Mono Ammonium Phosphate Powder 50% conforms to IS 4308, Stored Pressure Type, UGTS Pressure Gauge, Gross Weight 8.9 Kg, Empty Weight 2.9 Kg, Can Height 530 mm, DiaMtrs. 150 ± 10mm, Discharge Time 24 Sec, Controllable discharge mechanism, Jet Range 5 Mtrs.s, Average Discharge is 92%, applicable on Class A,B & C and electrically started Fire, Fire Rating 4A:144B, Can Construction : Deep drawn & MIG welded, EPDM Rubber Hose with both end Aluminum crimped, Internal & External - Pure Polyester Powder coating (UV Resistant), Brass forged valves with safety Pin is of SS material, Made up from 1.6mm thick sheet, ISI Approved IS 15683:2018 etc complete as reqd.				
2.15.1	6 Kg Capacity	20	3,779.00	Each	75,580.00
2.16	Supply & Fixing of <b>CO2 High Pressure Portable 4.5 kg FireExtinguisher</b> , filled with Co2 Gas as per IS 15222, Gross Weight 16.4, empty weight 11.9 Kg, Control discharge mechanism fitted with 1 Mtrs. WireBraided Hose & Flat Horn with Diffuser Nozzle for dispersed discharge of CO2, Discharge Time 12Sec, Average Discharge is 95%, Applicable onClass B, C and electrically started Fire, Fire Rating55B etc complete as reqd.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

2.16.1	4.5 Kg Capacity	20	7,043.00	Each	1,40,860.00
2.17	Supply & Fixing of <b>Wet Chemical (Stored Pressure) "F" Type</b> ISI marked IS: 15683 Capacity <b>6 litre Fire Extinguisher</b> . Complete with SS body, squeeze grip release valve, locking arrangement, pressure gauge, operation manual and bracket. Complete in all respect for Kitchen Fire SS Body Construction Deep Drawn with MIG Welding technology, Brass forged sprinkler valves with Nozzle is specially designed to give more than 99% discharge.				
2.17.1	6 Kg SS "F" Type Fire Extinguisher (Kitchen type)	15	10,258.00	Each	1,53,870.00
2.18	Supply & Fixing of Automatic type following capacity in kg Fire Extinguishers HFC-236fa, Applicable fire classes A,B & C, UGTS Pressure Gauge, Empty Weight 2.64 kg, Full weight 7.64 kg, Can Height 370mm, DiaMtrs. 230 ± 10mm, Made up from 2 mm thick sheet,, Body Construction Deep Drawn with MIG Welding technology, Brass forged sprinkler valves with Nozzle is specially designed to give more than 99% discharge. Together with orifice characteristic to cover adequately fire risks with scattering cone of 40 to 45° Angle. Internal & External External Pure polyester (UV Resistant) powder coated, Heat Sensitive Glass bulb of 68 °C. Area covered will be 2-2.5 m2 and volume of coverage is 7 m3.				
2.18.1	5 Kg Capacity (Modular type)	5	5,174.00	Each	25,870.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>2.18.2</b>	15 Kg Capacity (Modular type)	2	15,267.00	Each	30,534.00
	<b>PUBLIC ADDRESS SYSTEM</b>				
<b>2.19</b>	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	1,47,575.88	Each	1,47,576.00
<b>2.20</b>	Supplying, installation, testing & commissioning of 1.5/3/6W ceiling speaker complete as required.	95	1,126.73	Each	1,07,040.00
<b>2.21</b>	Supplying, installation, testing & commissioning of digital audio amplifier 75 Watt, 25V rms operating at 240 Volt AC Supply complete as required.	2	1,70,203.00	Each	3,40,406.00
<b>2.22</b>	Supplying, installation, testing & commissioning of Voice command keypad 6 zone, with microphone assembly complete as required.	1	95,444.49	Each	95,444.00
<b>2.23</b>	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.				
<b>2.23.1</b>	speaker cable Single pair, 2-core, 1.5 sqmm	500	63.25	P. Mtr.	31,623.00
<b>2.23.2</b>	speaker cable Two pair, 2-core, 1.5 sqmm	250	104.11	P. Mtr.	26,028.00
<b>2.24</b>	Supplying and fixing of compact LED surface display type Emergency light unit having inscription as per Engineer-in-Charge between transperant aperture with 5 Hrs inbuilt battery back up with Ni-Cd rechargeable battery and charging arrangement suitable for working on 230V 50Hz single phase AC supply i/c suspension arrangement, connection, testing and commissioning as per specifications etc. complete as required.				
<b>2.24.1</b>	LED Emergency Signage	20	6,370.00	Each	1,27,400.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

2.25	Providing and fixing hanging/wall mounted signages comprising of rigid not less than 3 mm thick ARS/ Acrylic /Al Sheet Single Side Non Toxic non radio active maintenance free self-glowing exit sign or any other fire or emergency signs , comprising zinc sulphide chargeable crystals which glow in dark printed on u-1000 photoluminescent with u-v stabilized coating sheet <b>PHOTOLUMINESCENT SAFETY SIGNAGES</b> high intensity luminous properties i/c printed graphics symbols and written message etc. in different languages and in different sizes as 150mm X 150mm, 200 X 200, 100 X 300, 200mm X 250mm, 250mm x 375mm, 150mm X 300mm , 200 X 400mm, 300X300 mm,150X400 mm, 450x300 mm etc. if required as per Engineer-in-Charge as per specifications complete as required.	10000	26.00	P. Sq. inch	2,60,000.00
2.26	Fabricate, supply and fixing directly on wall/surface as per Engineer-in-Charge of <b>Evacuation Plan</b> of size 420mm x 594mm made of high intensity luminous material with ultra violet protection layer i/c printed graphics symbols and written message etc. in different languages if required on rigid ARS sheet as per specifications etc. complete as required.				
2.26.1	Fire Evacuation Plan	1000	30.00	P. Sq. Inch	30,000.00
	<b>Fire Fighting Wet Riser cum Downcomer and Sprinkler System</b>				
2.27	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 : including dismantling the existing system & remove from the site in very phase manner as per instruction of Engineer-in-charge				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>a</b>	Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal to ensure a minimum pressure of 3.5 kg/sq.cm. at highest and farthest outlet at specified flow of 2280 LPM at 55 Mtrs.s m. head conforming to IS 1520				
<b>b</b>	Suitable HP, 1500 RPM water cooled with radiator diesel engine conforming to relevant BS & IS standard complete with auto starting mechanism 24 Volts electric starting equipment, Diesel Tank, exhaust pipe extended upto 1m. 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 specification, stop solenoid for auto indications, painted with post office red colour etc. as reqd				
<b>c</b>	M.S.fabricated Common base plate, coupling, coupling guard, 150 mm Foot Valve, foundation bolts etc.as required				
<b>d</b>	Suitable cement concrete foundation duly plastered with anti vibration pads.				
<b>2.27.1</b>	<b>2280 LPM , 56 Mtrs. Head</b>	1	7,11,451.00	Each	7,11,451.00
<b>2.28</b>	Supplying Installation, testing and Commissioning of electric driven <b>Main Fire Pumps (Hydrant Pump + Sprinkler Pump)</b> suitable for automatic operation and consisting of following Complete in all respect complete as required: including dismatling the existing system & remove from the site in very phase manner as per instruction of Engineer-in-charge				
<b>a</b>	Horizontal type, multistage, centrifugal, split casing pump of cast iron body and bronze impeller with stainless steel shalf, mechanical seal to ensure a minimum pressure of 3.5 kg/sq.cm. at highest and farthest outlet at specified flow of 2280 LPM at 55 Mtrs.s head conforming to IS 1520.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>b</b>	Suitable HP SQ cage induction motor, TEFC, synchronous speed 1450 RPM, suitable for operation on 415 volts, 3 phase 50 Hz. AC with IP 55 protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS-325				
<b>c</b>	M.S. fabricated Common base plate, coupling, 150mm foot valves, coupling guard, foundation bolts etc. as required.				
<b>d</b>	Suitable cement concrete foundation duly plastered with anti vibration pads				
<b>2.28.1</b>	<b>2280 LPM at 56 Mtrs.s head</b>	2	3,87,554.66	Each	7,75,109.00
<b>2.29</b>	Supplying, Installation, Testing and Commissioning of electric driven <b>pressurisation pump (Jockey Pump)</b> suitable for automatic operation and consisting of following complete in all respect as required : including dismatling the existing system & remove from the site in very phase manner as per instruction of Engineer-incharge				
<b>a</b>	Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal and flow of 180 LPM at 55 Mtrs. head conforming to IS:1520				
<b>b</b>	Suitable HP SQ cage induction motor TEFC type suitable for operation on 415 volts, 3 phase 50 HZ. AC with IP 55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS : 325.				
<b>c</b>	M.S.fabricated Common base plate, coupling, coupling guard, foundation bolts etc. as required				
<b>d</b>	Suitable cement concrete foundation duly plastered with anti vibration pads. (1W+1S)				
<b>2.29.1</b>	<b>180 LPM at 56 Mtrs. head</b>	2	95,857.04	Each	1,91,714.00
<b>2.30</b>	Supplying, installation, testing and commissioning of electric driven <b>Terrace Pump</b> suitable for automatic operation and consisting of following, complete in all respects, as required: (Terrace Pump)				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	Horizontal type, Monoblock pump of cast iron body & bronze impeller with stainless steel shaft, mechanical confirming to IS : 1520				
	Suitable HP squirrel cage induction motor TEFC type suitable for operation on 415 volts, 3 phase, 50 Hz, AC supply with IP55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS-325				
	M.S.fabricated common base plate, coupling, coupling guard, foundation bolts etc.as required				
	Suitable cement concrete foundation duly plastered and with anti vibration pads				
<b>2.30.1</b>	<b>450 lpm at 35 m Head</b>	2	1,00,636.42	P. Set	2,01,273.00
<b>2.31</b>	Fabrication, supply, Installation testing & commissioning of Electrical control panel of cubical construction, floor mounted type, fabricated out of 2mm thick CRCA sheet, compartmentalised with hinged lockable doors, dust and vermin proof, powder coated of approved shade after 7 tank treatment process, cable alley, inter-connection 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 Outgoings, suitable for operation on 415V, 3 phase, 50Hz Ac Supply with enclosure protection class IP 42 as required.				
	100 Amp. 4 pole, MCCB of 16 KA B.C.- 1 No.				
	LED type Phase indicating lamps R,Y,B,- 1 Set. With protection of 2 Amp., SP MCB (03 Nos.)				
	VAF Mtrs. with CTs & Selector switch - 1 set				
	32 Amp. 3 pole, MCB of 10 KA B.C.- 2 Nos.				
	Star-Delta Starter with suitable rating Contactor-2 Set				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	LED type On , off , Indicating lamps - 2 Sets.				
	Over load relay - Suitable range - 2 Nos.				
	Selector Switch for Local / Remote, Auto / Manual / OFF Operation etc. - 1 Set.	1	87,359.00	P. Set	87,359.00
<b>2.32</b>	Providing, laying, testing & commissioning of 'C' class heavy duty MS pipe 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 :				
<b>2.32.1</b>	25 mm dia	400	868.89	P. Mtr.	3,47,556.00
<b>2.32.2</b>	32 mm dia	300	993.43	P. Mtr.	2,98,030.00
<b>2.32.3</b>	50 mm dia	200	1,495.50	P. Mtr.	2,99,100.00
<b>2.32.4</b>	65 mm dia	150	1,884.70	P. Mtr.	2,82,705.00
<b>2.32.5</b>	80 mm dia	150	2,200.93	P. Mtr.	3,30,139.00
<b>2.32.6</b>	100 mm dia	100	2,983.22	P. Mtr.	2,98,322.00
<b>2.32.7</b>	150 mm dia	200	4,172.22	P. Mtr.	8,34,445.00
<b>2.32.8</b>	200 mm dia ( Wall thickness 6.3 mm)	10	6,378.02	P. Mtr.	63,780.00
<b>2.33</b>	Supplying and fixing single headed internal hydrant valve with instantaneous Gunmetal/Stainless Steel coupling of 63 mm dia with cast iron wheel ISI marked conforming to IS 5290 (Type -A) with blank Gunmetal/Stainless Steel cap and chain as required :				
<b>2.33.1</b>	Single headed Stainless steel	7	7,167.12	P. Set	50,170.00
<b>2.34</b>	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required :				
<b>2.34.1</b>	80 mm dia	16	5,816.59	P. Set	93,066.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>2.34.2</b>	150 mm dia	6	10,459.75	P. Set	62,759.00
<b>2.34.3</b>	200 mm dia	1	17,753.36	P. Set	17,753.00
<b>2.35</b>	Supplying, fixing, testing & commissioning of double flanged sluice valve of rating PN 1.6 with non rising spindle, bronze/gun metal seat, ISI marked complete with nuts, bolts, washers, gaskets and conforming to IS 780 of following sizes as required :				
<b>2.35.1</b>	80 mm dia	2	12,486.51	P. Set	24,973.00
<b>2.35.2</b>	150 mm dia	7	10,459.75	P. Set	73,218.00
<b>2.35.3</b>	200mm dia	2	45,917.82	P. Set	91,836.00
<b>2.36</b>	Supplying, fixing, testing & commissioning of double flanged Y-Strainer of rating PN 1.6 with non rising spindle, bronze/gun metal seat, ISI marked complete with nuts, bolts, washers, gaskets and conforming to IS 780 of following sizes as required :				
<b>2.36.1</b>	80 mm dia	2	5,498.42	P. Set	10,997.00
<b>2.36.2</b>	200 mm dia	2	25,992.72	P. Set	51,985.00
<b>2.37</b>	Providing, installation, testing and commissioning of non-return valve of following sizes confirming to IS: 5312 complete with rubber gasket, GI bolts, nuts, washers etc.as required :				
<b>2.37.1</b>	80 mm dia	13	8,978.84	P. Set	1,16,725.00
<b>2.37.2</b>	150mm dia	6	20,763.82	P. Set	1,24,583.00
<b>2.37.3</b>	200mm dia	1	34,184.41	P. Set	34,184.00
<b>2.38</b>	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.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	20 mm nominal internal dia water hose thermoplastic (Textile reinforced) type -2 as per IS: 12585				
	20 mm nominal internal dia gun metal globe valve & nozzle.				
	Drum and brackets for fixing the equipments on wall. Connections from riser with 25 mm dia stop gun metal valve & M.S. Pipe and socket.				
<b>2.38.1</b>	40m	7	14,094.88	P. Set	98,664.00
<b>2.39</b>	Supplying and fixing of hose cabinet of size 750 mm X 600 mm X 250 mm made of 2 mm thick 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 Mtrs. Long Hose pipe 1 No. branch pipe, mounted on wall or raised brick platform and duly painted with Post office red externally and white internally with synthetic enamel paint complete in all respect, for external hydrant, as required. ( For Extnal Hydrant )	6	3,974.00	P. Set	23,844.00
<b>2.40</b>	Supplying and fixing 63 mm dia Stainless Steel(SS) branch pipe with 20 mm (nominal internal diaMtrs.) size Gun Metal nozzle conforming to IS 903, suitable for instantaneous connection to inter connect hose pipe coupling as required (SS 304 Grade)	13	1,940.16	P. Set	25,222.00
<b>2.41</b>	Supply,Installation,Testing, of 63 mm dia, 15 Mtrs.. Long RRL Hose Pipe with S.S. Male -female Coupling.	26	5,192.90	Each	1,35,015.00
<b>2.42</b>	Supplying and fixing of fire brigade connection of cast iron body with gun metal male instantaneous inlet couplings complete with cap and chain as reqd. for suitable dia MS pipe connection conforming to IS 904 as required :				
<b>2.42.1</b>	2 way - 100 mm dia M.S. Pipe	2	7,870.60	P. Set	15,741.00
<b>2.42.2</b>	4 way - 150 mm dia M.S. Pipe	1	16,313.32	P. Set	16,313.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

2.43	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.	2	21,298.97	P. Set	42,598.00
2.44	Providing, fixing, testing & commissioning of 15mm dia quartzoid bulb type sprinklers of rating 68 degree centigrade with required accessories :				
2.44.1	Pendent Sprinkler	415	609.10	Each	2,52,776.00
2.45	Providing & fixing of Pressure Switch in M.S. pipe line including connection etc. as required.	3	1,804.92	Each	5,415.00
2.46	Providing and fixing in position the industrial type pressure gauges with gun metal / brass valves complete as required.	13	1,396.26	Each	18,151.00
2.47	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 following sizes as Required.				
2.47.1	150mm dia	1	56,272.48	P. Set	56,272.00
<b>Sub Head 3 : (Lift System)</b>					
3.1	Supplying, installation, testing & commissioning of <b>16 person/ 1088 Kgs passenger lift Machine Room type</b> as per site feasibility) detailed specifications enclosed including Chasing and making holes/ Fixing arrangements on wall/slab with steel beams / R.S. Joist, grouting, making good of the same etc as required.				
i)	Speed :- 1 MPS				
ii)	Floors : 5 (G+4) Floors				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>iii)</b>	Travel : 19.50 Mtrs.s (approx..)				
<b>iv)</b>	Stops & opening : 5 Stops, 5 Opening on same side				
<b>v)</b>	Available size of lift well - 2500mm x 2200 mm (Approx)				
<b>vi)</b>	Pit Depth : 1500mm (Approx)				
<b>vii)</b>	Controller: VF Regener ative / Variable Voltage Variable Frequency Gearless Drive with Microprocessor based automatic push button Simplex Selective collective Control operation with / without attendant.				
<b>viii)</b>	Power - 415V, +/-10%, 3 phase, 50Hz				
<b>ix)</b>	Type of doors as per NBC - 2016				
<b>a)</b>	Car: Clear inside size of lift car as per NBC- 2016 with Power operated automatic centre opening horizontal sliding door of 120 min fire rating with 1.5 mm thick stainless steel 304 grade moon rock/ hairline/ honeycomb finish (scratch proof) with multi-beaminfrared / ultrasonic door detector.				
<b>b)</b>	Landing doors: 2000 mm high Power operated automatic centre opening horizontal sliding door of 120 min fire rating with 1.5mm thick stainless steel304 grade moon rock/ hairline/ honeycomb finish (scratch proof) with door opening of 800-900mm				
<b>c)</b>	AS Shandrail not less than 600 mm long at 900mm above floor level to be fixed on all three sides in the lift car and minimum 15 mm thick Granite Flooring.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

d)	Automatic Rescue Device complete with dry Maintenance free batteries, Overload warning indicator, Pit Ladder, Battery operated emergency light and alarm bell, full height Infra red door screen, 8 mm thick Mirror, Firemen Switch etc., Internal car lighting should provide minimum level of illumination of 150 lux level at floor level, uniformly distributed, and avoiding the spotlights with LED light fitting and suitable size Cross flow Fan inside the car etc as per specifications, Hands free press & speak 3-WAY Intercom system etc, engraved control switches with accessibility features like Braille signage inside the car and lobby, pit ladder etc.				
e)	Voice announcement system in the car along with a visual display to indicate the floor level to announce the position of the elevator in the hoistway as the car passes or stops at a floor served by the elevator and Lift in Use / Out of Order Sign, as per technical specification.	1	24,31,445.00	P. Job	24,31,445.00
3.2	Supplying, installation, testing & commissioning of <b>Goods Lift / 2500 Kgs Machine Room type</b> as per site feasibility) detailed specifications enclosed including Chasing and making holes/ Fixing arrangements on wall/slab with steel beams / R.S. Joist, grouting, making good of the same etc as required.				
i)	Speed :- 0.5 MPS				
ii)	Floors : 6 (B+G+4) Floors				
iii)	Travel : 19.50 Mtrs.s (approx.)				
iv)	Stops & opening : 6 Stops, 6 Opening on same side				
v)	Available size of lift well - 2900mm x 3300 mm (Approx)				
vi)	Pit Depth : 1600mm (Approx)				
vii)	Controller: VF Regener ative / Variable Voltage Variable Frequency Gearless Drive with Microprocessor based automatic push button Simplex Selective collective Control operation with / without attendant.				

CORRECTIONS - Nil

OMISSION - Nil

INSERTION - Nil

<b>viii)</b>	Power - 415V, +/-10%, 3 phase, 50Hz				
<b>ix)</b>	Type of doors as per NBC - 2016				
<b>a)</b>	Car: Clear inside size of lift car as per NBC- 2016 with Power operated automatic centre opening horizontal sliding door of 120 min fire rating with 1.5 mm thick stainless steel 304 grade moon rock/ hairline/ honeycomb finish (scratch proof) with multi-beam infrared / ultrasonic door detector.				
<b>b)</b>	Landing doors: 2000 mm high Power operated automatic centre opening horizontal sliding door of 120 min fire rating with 1.5mm thick stainless steel 304 grade moon rock/ hairline/ honeycomb finish (scratch proof) with door opening of 800-900mm				
<b>c)</b>	AS Shandrail not less than 600 mm long at 900mm above floor level to be fixed on all three sides in the lift car and minimum 15 mm thick Granite Flooring.				
<b>d)</b>	Automatic Rescue Device complete with dry Maintenance free batteries, Overload warning indicator, Pit Ladder, Battery operated emergency light and alarm bell, full height Infra red door screen, 8 mm thick Mirror, Firemen Switch etc., Internal car lighting should provide minimum level of illumination of 150 lux level at floor level, uniformly distributed, and avoiding the spotlights with LED light fitting and suitable size Cross flow Fan inside the car etc as per specifications, Hands free press & speak 3-WAY Intercom system etc, engraved control switches with accessibility features like Braille signage inside the car and lobby, pit ladder etc.				
<b>e)</b>	Voice announcement system in the car along with a visual display to indicate the floor level to announce the position of the elevator in the hoistway as the car passes or stops at a floor served by the elevator and Lift in Use / Out of Order Sign, as per technical specification.	1	44,94,344.00	P. Job	44,94,344.00
	<b>Sub Head 4 : (DG Set)</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

4.1	Supply, installation, testing and commissioning of silent type, turbo-charged, water cooled 200 kVA DG set with AMF panel conforming to latest environment protection regulations for emission(CPCB IV+) and noise level comprising of radiator, governor, multi-cylinder diesel engine equipped with flywheel etc. having Prime Power Rating of 200 KVA at 0.8 lagging power factor, 415 volt 50 Hz, 3 phase power at 1500 RPM suitable for 0.85 Load Factor and consisting of the followings:				
	<b>Diesel Engine:</b>				
	4 stroke, radiator water cooled, electric start , In line fuel pump with electronic goner (Class A1) of suitable BHP at 1500 RPM suitable for above output of alternator at 40 Degree C, 50% R/H & at 1000 Mtrs. MSL and conforming to BS:5514/BS:649/IS:10000, capable of taking 80% block load at the start and 10% over loading for one hour after 12 hours of continuous operation. The engine shall be fitted complete with all the required accessories.				
	<b>Engine mounted instrument Panel fitted with digital display for following as per OEM:</b>				
	Start-stop switch push button type/ with key				
	Water temperature indication				
	Lubrication oil pressure indication				
	Lubrication oil temperature indication				
	Battery charging indication				
	RPM indication				
	Over speed indication				
	Low lub. Oil trip indication				
	Engine Hours indication				
	<b>Alternator :</b>				

	Synchronous alternator rated for 200 kVA, 415 Volts at 1500 RPM , 3 phase 50 Hz, AC supply with 0.8 lagging power factor at 40 Degree C. The alternator shall be having SPDP enclosure, brushless, continuous duty, self-excited and self-regulated through electronic AVR, IP-23 environment protection, conforming to IS:4722/ IEC:34/ BS:2613 as ammended upto date, suitable for tropical conditions and with class 'H' insulation.				
	<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 with AVM. The DG set is to be installed in the indoor/ outdoor conditions having existing CC flooring and roofing. Necessary civil work (Foundation) shall be carried out as per requirement of the site within the scope of work.				
	<b>Fuel Tank :</b>				
	Daily service fuel tank of minimum 50 litre capacity , 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.				
	<b>Exhaust System</b>				
	Dry exhaust manifold with hospital exhaust silencer and with catalytic convertor.				
	<b>Starting System</b>				
	12/24V DC starting system comprising of starter motors: voltage regulator and arrangement for initial excitation complete with suitable number and AH of batteries (capacity as per the recommendation of the OEM). Control Cabling from ATS to DG Set is included in the scope of work for which nothing extra shall be paid.				
	<b>Accoustic Enclosure</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	Acoustic and weather proof enclosure with arrangement for fresh air intake for cooling of the engine & alternator, extraction, discharging hot air into the atmosphere as per specifications.				
	<b>Foundation:</b>				
	Installation of D.G. sets on the foundation complete including making RCC foundation(1:3:6), providing necessary anti- vibration mountings, MS equal angle of 50x50x6mm on all sides, HDPE/ GI pipe for cable entry, etc. including first filling of lub oil, first filling of diesel for testing & commissioning & necessary load for testing & commissioning. (Foundation drawing shall be as per manufacturer/ CPWD specifications keeping the load bearing capacity of soil into consideration and shall be got approved from engineer-in charge)				
	<b>AMF Panel</b>				
	Fabrication and Supply of AMF Panel for Automatic mains failure control including auto and arrangement of by pass panel suitable for <b>200KVA</b> silent type DG set complete with 4-pole 400 A MCCB-50 kA Microprocessor type, Contactor, Timer, Voltage monitoring relays, Auxillary relays, MCBs, battery charger, control cabling from AMF panel to Diesel engine etc as per OEM recommendation.	2	25,67,831.00	P. Set	51,35,662.00
	<b>Sub Head 5 : (UPS System)</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

5.1	Supplying, installation, testing and commissioning of online double conversion fully microprocessor based online UPS 160 KVA , three phase input 415 Volts +/- 10%, 50+/-1 Hz, and Three phase output 415 Volts± 1%, 50 Hz, 160 KVA UPS with isolation transformer , efficiency(double conversion mode) > =93%, automatic UPS by pass arrangement on overload or UPS failure, capable to handle overload of <=110% for 10min,<=125% for 1min, <=150% for 30-60 sec , with network/ Modbus card to monitor the operation of UPS, IP 20 or more rated cabinet, suitable ventilation arrangement, with suitable Nos. of SMF - VRLA batteries to provide 30 minute backup(Battery sizing shall be based on 0.9 PF and cut off voltage 10.2 V) ,with battery racks made-up of metal channels to place above batteries, suitable capacity battery circuit breaker, AC/DC power and control cables, other accessories set & synchronising kit as per specification complete as required.(Note:- The work includes all minor/ major items which may not have been mentioned above but are essential to install above UPS and batteries )	1	25,75,365.00	P. Set	25,75,365.00
<b>Sub Head 6 : (Central AC Plant System)</b>					
6.1	AIR CONDITIONING CHILLER PLANT TOTAL CAPACITY: 120 TR X 2 Nos. (Working Unit) , Design Temp.7/12 Deg C', and Ambient 37 deg C.				
	Twin screw direct driven compressor with semi hermetically sealed suction gas cooled motor working on 415 Volts, 3 Phase, and 50 Hz supply.				
	Refrigerant cooled, squirrel cage 2 pole induction motor with step less capacity control from 25-100% load for individual compressor.				
	First charge of oil and environment friendly HFC-134a refrigerant. (Factory Charged).				
	Dual compressor & dual Refrigerant circuit and chiller shall be AHRI certified.				
	BEE rating shall 4 star and above.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	Evaporator shall be flooded type and ASME stamping on evaporator.				
	Condenser shall be of copper coil and aluminium fins with Gold fin coating & Condenser Fans of composite material.				
	Microprocessor based unit control panel.				
	Type of Starter unit mounted VFD Starter	2	51,33,312.00	P. Job	1,02,66,624.00
	<b>Chilled Water Pumps</b>				
6.2	Chiller Water Circulating Centrifugal Pumps:- Primary Circulating Supply, installation, testing and commissioning of in line axial Split Coupled PN 16 centrifugal pumps with CI casing and Bronze/steel Impeller complete with CED coating, externally flushed outside type balanced Mechanical Seal and non overloading motor, as per specifications. Suitable HP, TEFC permanent magnet motor with min. Efficiency IE3, class 'F' insulation operating on 415 + 10% volts, 3 phase, 50 cycles AC supply for each pump. Pump should be provided with compatible for VFD for sensor less/wireless control. To maintain the redundancy of VSPS(Variable Speed Pumping System), separate Controller must be provided with IP54 protection. Controller should be capable of controlling the two way modulating valve at by-pass line to ensure the minimum flow to the chillers in case of load variation. Controller must have BMS compatibility via Modbus/BACNET connectivity. The controller should stage/destage the variable pumps basis the best efficiency points (BEP) for the optimum efficiency of variable speed pumping system (VSPS). Each pump shall comprise of following as required as per specifications.				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

	2 Nos. - pressure and temperature gauges , Suitable size of ball valve for drain and reducer to be consider, flexible connection of 2 nos of suitable size and Connecting chilled water pipe with same insulation for completion of piping network. Mounting frame with antivibration pads (In case pumps are inline, anti vibration system shall be as per Manufacturers recommendation)				
	Flow: 75 M Cu/Hr				
	Head: 30 Mtrs.	4	1,41,795.00	P. Set	5,67,180.00
<b>6.3</b>	Supply, Installation, Testing and commissioning of factory built floor mounted chilled water double skin type horizontal/vertical air handling units made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation factory injected between them by injection moulding machine, complete with blower section with blower suitable for static pressure as required, minimum 2 bend GSS/PVC eliminators, cooling coil section with aluminium finned copper tubes (tubes thickness not less than 0.5mm) cooling coil of 6 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air prefilters, belt drive package with TEFC drive motor of efficiency class IE3 suitable for 415 ± 10% volts, 50Hz, 3 Phase AC supply suitably designed for variable frequency drive applications, drain connections, stainless steel (18G) drain pan with PUF insulation, 150 mm dia. dial type pressure gauges (2 Nos.) and industrial type thermoMtrs.s (2 Nos.) at the inlet and outlet of coil, auto purge valve wherever required, necessary vibration isolation arrangement etc. complete as per specification and of following capacities.				
<b>6.3.1</b>	6710 CFM, 16 TR ,AHU for Basement floor (11900 CMH) {2800+410+3500=6710 CFM}	1	2,64,662.81	Each	2,64,663.00
<b>6.3.2</b>	9100 CFM, 25 TR, AHU for Ground floor (15300 CMH)	1	3,22,215.76	Each	3,22,216.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

6.3.3	16800 CFM, 40 TR, AHU for First floor (28900 CMH)	1	4,68,812.81	Each	4,68,813.00
6.3.4	19200 CFM, 48 TR, AHU for Second , Third (34000 CMH)	2	5,19,605.35	Each	10,39,211.00
6.3.5	16280 CFM, 29 TR, AHU for Fourth Floor (28900 CMH)	1	4,68,812.81	Each	4,68,813.00
	<b>INSULATED CHILLED WATER PIPING (Nitrile rubber insulation)</b>				
6.4	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled water piping inside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive complete including repairing of damage to building etc. as per specifications and as required complete in all respect.				
	Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel \pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.				
6.4.1	200mm NB (32mm Insulation)	100	7,286.80	P. Mtr.	7,28,680.00
6.4.2	150mm NB (32mm Insulation)	100	4,994.41	P. Mtr.	4,99,441.00
6.4.3	125mm NB (32mm Insulation)	40	4,368.77	P. Mtr.	1,74,751.00
6.4.4	100mm NB (32mm Insulation)	75	3,478.48	P. Mtr.	2,60,886.00
6.4.5	80mm NB (32mm Insulation)	150	2,598.88	P. Mtr.	3,89,832.00
6.4.6	65mm NB (32mm Insulation)	150	2,093.90	P. Mtr.	3,14,084.00
6.4.7	50mm NB (32mm Insulation)	200	1,812.70	P. Mtr.	3,62,540.00
6.4.8	40mm NB (32mm Insulation)	10	1,467.28	P. Mtr.	14,673.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

6.4.9	32mm NB (19mm Insulation)	20	1,222.09	P. Mtr.	24,442.00
6.4.10	25mm NB (19mm Insulation)	20	1,014.84	P. Mtr.	20,297.00
<b>VALVES FOR CHW LINE</b>					
	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications.				
6.5	Supplying, fixing, testing and commissioning of <b>BUTTERFLY VALVE (MANUAL)</b> with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/hot eater circulation as specified				
6.5.1	150 mm Dia.	5	9,728.05	Each	48,640.00
6.5.2	125 mm Dia.	8	8,894.19	Each	71,154.00
6.5.3	100 mm Dia.	21	7,751.89	Each	1,62,790.00
6.5.4	80 mm Dia.	2	5,657.02	Each	11,314.00
6.5.5	50 mm Dia.	7	4,820.24	Each	33,742.00
6.6	Supplying, fixing, testing and commissioning of <b>BALANCING VALVE WITH BUILT IN MEASURING FACILITY</b> with C I body flanged construction with EPDM coated disc with long pitch with protected out pipe insulation & PN 16 pressure rating for chilled / hot water circulation as specified.				
6.6.1	125 mm Dia.	3	30,909.29	Each	92,728.00
6.7	Supplying, fixing, testing and commissioning of <b>Y - STRAINER</b> of Ductile CI Body flanged ends with stainless steel strainer for chilled / hot water circulation including insulation as specified.				
6.7.1	125 mm Dia.	5	25,594.77	Each	1,27,974.00
6.7.2	100 mm Dia.	3	17,146.21	Each	51,439.00
6.7.3	80 mm Dia.	2		Each	

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

			11,536.86		23,074.00
<b>6.7.4</b>	50 mm Dia.	1	6,878.14	Each	6,878.00
<b>6.8</b>	Supplying, fixing, testing and commissioning of <b>NON - RETURN VALVE</b> with duel plate of C I body SS plates vulcanized NBR seal flanged end & PN 16 pressure rating for chilled / hot water circulation including insulation as specified.				
<b>6.8.1</b>	125 mm Dia.	3	9,184.15	Each	27,552.00
<b>6.8.2</b>	100 mm Dia.	5	7,191.44	Each	35,957.00
<b>6.8.3</b>	80 mm Dia.	5	4,987.60	Each	24,938.00
<b>6.9</b>	Supply & Installation of <b>AIR RELEASE VALVE i/c barrel nipple</b> of below mentioned sizes				
<b>6.9.1</b>	25 mm Dia.	9	2,105.00	Each	18,945.00
<b>6.10</b>	Providing and fixing <b>GUN METAL GATE VALVE</b> with C.I. wheel of approved quality (screwed end)				
<b>6.10.1</b>	25 mm Dia.	13	622.40	Each	8,091.00
<b>6.10.2</b>	40 mm Dia.	9	826.10	Each	7,435.00
<b>6.11</b>	Supply & Installation of <b>Ball Valve &amp; Ball valve with stainer</b> of below mentioned sizes				
<b>6.11.1</b>	32 mm Dia.	10	3,343.00	Each	33,430.00
<b>6.12</b>	<b>AHU Valve Station , 3way Motorised Modulating Valves</b>				
	Supply, installation, testing & commissioning of heavy duty <b>3 Way Motorised Modulating valves</b> with Butterfly valve, Filters, insulation & cladding as specified and shown on the drawing complete with:				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	a) Flanges for valves, Require Support b) Thermostat, 500VA -transformer, mounting plate etc. c) Union, nut bolts, gaskets or any other special fittings as required. d) With Controller, Sensor, Thermostat, Mounting Brackets etc.				
<b>6.12.1</b>	80 mm Dia.	5	84,666.00	Each	4,23,330.00
<b>6.13</b>	Providing and fixing in position the <b>Industrial type pressure gauges</b> with gun metal / brass valves complete as required.	22	1,396.26	Each	30,718.00
<b>6.14</b>	Providing & fixing in position the mercury in <b>glass industrial type thermosts.</b>	16	1,217.22	Each	19,476.00
<b>6.15</b>	Supply & Installation of <b>flexible connections</b> (Rubber Bellows) for pumps with accessories to complete the installation				
<b>6.15.1</b>	125 mm Dia.	8	13,362.00	Each	1,06,896.00
<b>6.15.2</b>	150 mm Dia.	2	16,809.00	Each	33,618.00
	Supply & Installocation of 5000 litres capacity PVC expansion tank for chilled water makeup. NOTE: Tank are insulated with 25mm thick nitrile rubber				
<b>6.16</b>	Providing and placing on terrace (at all floor levels) PVC 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. (Note: Expansion tank for chilled water makeup and Tank shall be insulated with 25mm thick nitrile rubber with excluded cost in DSR item.)	5000	11.00	P. Ltr.	55,000.00
	<b>SITC OF SHEET METAL WORK (AIR CONDITIONING) As per the specifications</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>6.18</b>	Supply, installation, balancing and commissioning of factory 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.				
<b>6.18.1</b>	0.63 MM (24G)	2000	1,261.01	P. Sq. Mtr.	25,22,016.00
<b>6.18.2</b>	0.80 MM (22G)	1000	1,474.10	P. Sq. Mtr.	14,74,095.00
<b>6.18.3</b>	1.00 MM (20G)	400	1,612.26	P. Sq. Mtr.	6,44,904.00
<b>6.18.4</b>	1.25 MM (18G)	150	2,143.52	P. Sq. Mtr.	3,21,528.00
	<b>THERMAL INSULATION</b>				
<b>6.19</b>	Supplying and fixing of following thickness duly laminated aluminum foil of mat finish closed cell Nitrile rubber (Class "O" insulation on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specifications and as required.				
<b>6.19.1</b>	19 mm	3500	880.57	P. Sq. Mtr.	30,81,978.00
<b>6.19.2</b>	Supplying and fixing of 25 mm thickness duly laminated aluminum foil of mat finish closed cell Nitrile rubber (Class "O" insulation on existing top floor Ceiling surface after applying suitable adhesive for Nitrile rubber alongwith GI wire mesh etc. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specifications and as required.	900	1,048.00	Sq.mtr	9,43,200.00
	<b>ACOUSTIC INSULATION</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>6.20</b>	Supplying and fixing 50 mm thick aluminium foil faced resin bonded fibre glass insulation (on duct ) of density 24 kg/cu.m or mineral wool insulation(non combustible) of density 44 kg/cu m after applying two coats of cold setting adhesive (CPRX compound) sealing all joints with self adhesive aluminium tape & covering with 0.63mmx19mm GI wire mesh netting butting all joints and laced with GI wire complete as per specifications and as required. (for indoor applications).	500	653.86	P. Sq. Mtr.	3,26,928.00
<b>6.21</b>	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	10	8,225.74	P. Sq. Mtr.	82,257.00
<b>6.22</b>	Supply, installation, testing and commissioning of Motorized (ON-OFF Type) duct mounted GI volume control damper with enthalpy sensor and necessary control wire (minimum 1.5 sqmm) for integration within AHU room		-		-
<b>6.22.1</b>	Damper	3	10,254.45	P. Sq. Mtr.	30,763.00
<b>6.22.2</b>	Actuator	3	10,266.12	P. Sq. Mtr.	30,798.00
<b>6.23</b>	Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications.	40	10,629.05	P. Sq. Mtr.	4,25,162.00
<b>6.24</b>	SITC of Extruded aluminium powder coated Collar Damper along with Thermostate etc complete as required.	60	5,833.00	P. Sq. Mtr.	3,49,980.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>6.25</b>	Supplying, Fixing,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring,the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as required and as per specifications.				
<b>6.25.1</b>	Fire Damper	2.5	12,443.70	P. Sq. Mtr.	31,109.00
	<b>EXHAUST AIR FANS FOR BASEMENT VENTILATION IN FIRE MODE</b>				
<b>6.26</b>	Supplying, installing, testing and commissioning of smoke spill Tube axial fans. Fan, casing, motor, drive shall be suitable for smoke exhaust application & thermally rated for 250°C for 2 hours as per [BS-7346 Part-2 : 1090] Class-H. Motors shall be High Temperature resistance smoke venting type suitable for 415+10% volts, 50 cycles , 3 phase AC supply with IP 55 protection, static pressure shall be as indicated. Each fan shall be with TEFC squirrel cage induction motors, all fan shall be with flexible fire proof connection at inlet and outlet. Suitable spring isolators to provided along with the fans. Spring mount Isolater to have Efficiency of above 90%. Quoted price to include MS structural work required for mounting the fans as indicated in the drawing. All Normal mode fans to have IE 3 Motors & Fire mode fans to have IE 1 motor.				
	Selection as per partition/wall, required fan shall be provide and these fans shall operate during Normal as well as fire mode.				
	BASEMENT				
<b>6.26.1</b>	CFM :17500 CFM	1	1,56,882.00	Job	1,56,882.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

6.26.2	CFM :6500 CFM	2	78,166.00	Each	1,56,332.00
6.26.3	CFM :9500 CFM	2	98,087.00	Each	1,96,174.00
	<b>JET FAN</b>				
6.27	SITC of Centrifugal backward curved Jet fans with bottom suction. Fan shall be AMCA certified for Air & Sound performance. Fan shall be complete with GSS casing with two mounting brackets ( 220 GSM ), Aluminium impeller, Motor Class H and totally enclosed non-ventilated (TENV) high temperature rated motor certified for 250 Deg C for 2 Hrs - 415/3P/50Hz. Complete assembly shall be certified for 250 Deg C for 2 Hrs. fire rating as per BS EN 12101-3:2002 F200, F300 & F400, certified by TUV SUD PSB & the copy of the Fire-test report has to be submitted for the approval. The Locationing of the jet fans has to be done in such a way that the Air velocity at any point on the plane of 1m from the ground level should not be less than 0.25m/s during the normal mode.				
	These fans shall operate at low speed during Normal mode & at high speed during fire mode.				
6.27.1	CFM :1500 CFM	5	69,786.00	Each	3,48,930.00
	<b>Toilet Inline Fans</b>				
6.28	Supply, installation, testing and commissioning of AMCA certified for sound and air performance (FEG) Centrifugal Inline fan complete with casing in MS standard construction powder coated, aluminium impeller with adjustable blade angles, vibration isolator and directly coupled to TEFC Sq.cage induction motor, suitable for 415V±10%, 50 Hz. 3 phase electric supply complete with required hardware etc. ( For Toilet Exhaust)				
6.28.1	<b>700 CFM INLINE FAN</b>	5	16,000.00	Each	80,000.00
6.28.2	<b>600 CFM INLINE FAN</b>	5	17,333.00	Each	86,665.00
6.28.3	<b>500 CFM INLINE FAN</b>	5	16,000.00	Each	80,000.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	<b>VRF Outdoor Unit (Standby Unit in 4th Floor for Barrier Laboratory)</b>				
<b>6.29</b>	Supply Installation, Testing & Commissioning of modular type Variable Refrigerant Flow/Variable Refrigerant Volume air cooled Outdoor units suitable for cooling and heating, having all hermetically sealed inverter type Scroll Compressor(s), minimum two compressors for above 14 HP modules, microprocessor based Controller, top discharge type condensing unit(s), with R 410 A Refrigerant, vibration isolators, with suitable foundation etc. complete as required. The unit shall deliver the rated capacity at AHRI Conditions and work even at 50°C ambient temperature without tripping. The unit shall be suitable to work on 400V +/- 10%, 3 Phase, 50Hz AC power supply. The unit shall be filled with first charge of the refrigerant and ready for use as required. The COP at AHRI conditions shall not be less than 3.1 and IEER not less than 6.5 .	18	22,162.99	P. HP	3,98,934.00
	<b>VRF Indoor Unit (Ductable Type)</b>				
<b>6.30</b>	Supply, installation, testing and commissioning of following minimum capacity and external static pressure VRF/VRV ceiling mounted 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, other necessary supports etc., suitable for operation on single phase AC supply 230V ±10%, 50Hz complete as required. The unit shall have automatic force shutdown provision in case of fire on receiving signal from BMS System. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19 Degree C WB temperature.				
	<b>High Static Ductable units (minimum 110 pascal external static pressure)</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

6.30.1	5.5 TR	2	1,15,795.76	Each	2,31,592.00
<b>Sub Head 7 : (Solar Photo Voltaic Power Generation System)</b>					
7.1	<p>Supply, Installation, Testing and Commissioning of ongrid Solar Photovoltaic Power Plant conforming to MNRE specifications as amended, consisting of Mono/Poly Crystalline silicon solar cells, net Mtrs.ing facility, necessary protections, earthing, mounted on Aluminium/GI structure of suitable strength with following components complete as required:-</p> <p>a) 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 16.5%. 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.</p>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

	<p>b) Power Conditioning Unit (PCU) of 350-800 V DC Input voltage range and 400 V AC, three phase, 4 wire, 50Hz +/- 2.5 Hz, output voltage suitable to generate AC Power with efficiency not less than 97%, total harmonic distortion less than 3% and suitable for ambient temperature from 0 to 50 degree C. The PCU shall adjust the voltage and frequency level to suit the Grid Voltage Frequency.</p> <p>c) Data Monitoring System complete with accessories.</p> <p>d) Fixing of Array junction box &amp; 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.</p> <p>e) Lightning and surge voltage protection.</p> <p>f) Connections &amp; Interconnections by supplying &amp; fixing required size XLPE insulated copper conductor 1.1 kV grade armoured power and control cables between solar modules, main power cable to grid supply PCU unit along with supplying &amp; fixing of necessary channel/conduit lugs and other accessories etc. as required.</p>	80	82,439.37	P. kWp.	65,95,150.00
	<b>Sub Head 8 : (CCTV System)</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

<p><b>8.1</b></p>	<p>Supply, Installation, Testing &amp; Commissioning of <b>IP Dome Camera</b> with (1/2.7"- 1/3") / 0.357 Inch <b>2 Megapixel</b> progressive scan CMOS lens, 25/30 frames@1080 resolutions, Min. Illumination required color 0.25 lux &amp; B/W 0.05 lux, 120dB WDR, Min. Pixels 1920 X 1080, varifocal lens 3 mm - 10 mm / 2.8-12 mm motorized focus / zoom lens, multiple stream, Back light compensation, noise reduction facility , Privacy Mask, IR with upto 25 m IR distance, SDHC/SDXc/micro SD card Memory of 32 GB, H.265, H.264 and MJPEG of video compression, PoE, IP 66, IK 10 vandal proof, Aluminum housing, Analytics: Video Tamper, Scene Change, Smart Motion Detection, IP address filtering &amp; HTTPS Encrypted data transmission protocol, Alarm I/O, Audio I/O, with 10/100 Base T (RJ 45 port) interface, built in /external microphone, ON-VIF Profile S &amp; Profile Gcompliant to third party integration,Compatible drivers and software, IS:13252 certified, including cable termination, power supply and fixing accessories complete in all respect etc as required.</p>	<p>34</p>	<p>22,558.00</p>	<p>Each</p>	<p>7,66,972.00</p>
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8.2	Supply, Installation, Testing & Commissioning of <b>IP Bullet / Box Camera</b> Outdoor type with (1/2.7"-1/3") / 0.357 Inch <b>2 Megapixel</b> progressive scan CMOS @ 25/30 fps, Min. Illumination required 0.36 lux , mono 0.01 lux,92dB WDR, Min. Pixels 1920 x 1080 p, multiple stream, varifocal lens 3 mm - 10 mm / 2.8-12 mm motorized focus / zoom lens, Back light compensation, noise reduction facility , Privacy Mask, IR with upto 50m IR distance, SDHC/SDXc/micro SD card 256 GB, Analytics: Video Tamper, Scene Change, Smart Motion Detection, IP address filtering & HTTPS Encrypted data transmission protocol, Alarm, I/O,Audio I/O, H.265, H.264 and MJPEG of video compression, PoE , IP 66, IK 10, Aluminum housing, with 10/100 Base T (RJ 45 port) interface, built in /external microphone, ONVIF Profile S & Profile G compliant to third party integration, Compatible drivers and software, IS:13252 certified, including cable termination, power supply and fixing accessories complete in all respectetc as required.	4	23,236.00	Each	92,944.00
8.3	Supply, Installation, Testing & Commissioning of <b>2 MP 25x Lighthunter Network PTZ Dome Camera</b> having 1/2.8", 2.0 megapixel, progressive scan, CMOS, Min Illumination required Colour : 0.001 Lux (F1.5, AGCON) 0 Lux with IR, Smart IR with upto 150 m IR distance, Advance Video Compression technology such as ultra 265, H265, H.264, MJPEG, Motion detection, Audio detection, Tampering Alarm, 360^ (endless) Pan Range, -15 90 (auto reverse) Tilt Range, Preset speed : 80/s (Tile Speed), Preset speed : 180/s (Pan Speed), 256GB SD card support, DC12V+10%. PoE + (IEE802.3 at). IP 66, UL, FCC, CE regulatory, CE-RoHS, etc as required.	1	80,385.00	Each	80,385.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

8.4	Supply, installation, testing and commissioning of minimum licensed <b>32 IP channel</b> stand alone <b>NVR (Network Video Recorder)</b> / VMS based system with preinstalled software and Viewer license, High RAID 5/6 , record bit rate 256 Mbps with min storage provision for 64 TB , with min 1 HDMI, min 3 USB ports, H.265, H.264 and MJPEG coding / decoding capability, View 4/8/16 channels simultaneously with synchronized real-time playback on monitor , Compatible drivers and software, etc as required.	2	43,237.00	Each	86,474.00
8.5	Supply, installation, testing and commissioning of <b>10 TB Surveillance Hard Disk S V SERIES</b> -offer high capacities, durable reliability and performance tuned to the high-write workloads of today's 24x7 video surveillance systems as required.	2	30,319.00	Each	60,638.00
8.8	Supply, installation, testing and commissioning of <b>55" LED signage display</b> includes Screen size :55" Diagonal Size, Direct LED BLU technology, 3840*2160 (4K UHD) resolution, Contrast Ratio 4000:1 , 300 nit brightness, Viewing Angle (H/V) 178/178 , Response Time(G-to-G) 8ms(Typ.) ,Color Gamut (NTSC) 72% ,Maximum Pixel Frequency 594MHz, Built in Speaker(10W + 10W) , inputs :- HDMI 2.0 (2) ,HDCP 2.2, Stereo Mini Jack, HDMI/Audio , etc required.	1	47,333.00	Each	47,333.00
<b>Sub Head 9 : (Access Control System)</b>					

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

9.1	<p>SITC of <b>Face and EM Card based Time-Attendance</b> and Access Control Terminal, Offline database backup shall be available. The time zones support will be a minimum of 127 with 128 access levels and 255 holidays. Controller should be UL certified. Access control with following :-</p> <ol style="list-style-type: none"> <li>1) Face, EM Prox Card, PIN and Mobile Phone (BLE)</li> <li>2) 2MP Surveillance-grade Network Camera</li> <li>3) 3.5" LCD with Touch Panel and Gorilla Glass, IK06, IP65 Rated</li> <li>4) Ethernet, PoE, Wi-Fi, USB, BLE and 3G/4G/LTE (External Dongle)</li> <li>5) Door Lock, Door Sense, Exit Reader, Exit Switch, Wiegand</li> <li>6) 50,000 Users, 200,000 Face Templates (1:1 and 1:N matching &lt;1 sec); 500,000 Events</li> <li>7) Live Face Detection with 2MP IR Camera</li> <li>8) Surface and Flush Mount Options</li> </ol>	17	37,933.00	Each	6,44,861.00
9.2	<p>Supply &amp; commissioning of <b>Time Attendance</b> License with following data :-</p> <ol style="list-style-type: none"> <li>1) Add 300 Time-Attendance Users (Perpetual)</li> <li>2) Comprehensive Time-Attendance, Leave Management and Shift Schedule Software Module</li> <li>3) Attendance Calculation for Normal, Flexible and Executive Users</li> <li>4) Attendance Policy, Overtime, Leave, Shift Schedule Configuration</li> <li>5) Attendance Summary, Shift Schedule, Holiday Schedule, Leave Credit/ Debit/ Encashment, Past Adjustment and Manual Attendance Correction</li> <li>6) Leave/Tour/Short-leave/Official Application/Attendance Correction/OT Application and Approval</li> <li>7) Integration with Payroll, Tally, Active Directory and HRM</li> <li>8) Statutory Reports, Attendance/Leave Registers and Charts Generation</li> </ol>	1	1,900.00	Each	1,900.00
9.3	<p>Supply, installation, testing &amp; commissioning of <b>600 lbs Em Lock</b> with LED Monitored Lock-600 LBS etc complete as required.</p>	17	2,410.00	Each	40,970.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

9.4	Supply, installation, testing & commissioning of <b>U/L Brackets for 600lbs EM Lock Series</b> surface type standard door etc complete as required.	17	466.00	Each	7,922.00
<b>Sub Head 10 : (Water Supply System)</b>					
10.1	Supply of <b>3HP, De-watering pump Portable automatic</b> operation type set capable of delivering at a head 14-22 Mtrs., 27000-10800 LPH with Mechanical Seal, Del. Size 50 mm, F-Insulation, 2900 RPM , Energy efficient, TEFC IE2 type motor suitable for 415 volt, Three phase, 50 HZ Ac supply with Float switch for auto operation, body in Cast Iron body , for application of dewatering application in basement flooding situation etc. complete as reqd.	5	40,366.00	P. Set	2,01,830.00
10.2	Supplying, installing, Testing and commissioning of <b>12.5 HP, MONOBLOC pump</b> set, Head 30 Mtrs., 2800 RPM, Suc Del. Size 80 mm X 65 mm, with class F insulation IP 55 protection having CI impaler, CI motor body, SS pump shaft with mechanical ceiling, TEFC , Energy efficient motor , minmium 900 LPM, TEFC Energy Efficient type motor, electric motor suitable for 415 volt, Three phase, 50 HZ Ac supply, with suitable M.S. Angle foundation, nut and bolt etc. complete as reqd.	2	60,300.00	P. Set	1,20,600.00
<b>Sub Head 11 : (LAN System)</b>					
11.1	Supply, installation, testing and commissioning of <b>24-port 1/10G SFP+ Layer-3 Stackable Managed Switch</b> having 4 x 1000/10G/25G Base X SFP28 ports, Switch Capacity 680Gbps, Redudant power supply, cloud Managed via single dashboard etc complete as required.	2	4,75,731.00	Each	9,51,462.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

11.2	SITC of <b>10-Port Gigabit Smart Managed PoE Switch with 8 PoE+ ports and 2 combo ports</b> , with a minimum PoE budget of 130W, the minimum switching capacities are 14.88 Gbps, minimum of 8,000 MAC addresses and offers Layer 2 features such as LACP, STP, IGMP Snooping, and Port Mirroring, provide minimum static routing for Layer 3 functionality, as well as minimum QoS features, including 802.1p CoS and DiffServ, for security, each switch includes minimum ACLs, 802.1X, and Port Security, the minimum management capabilities are GUI, CLI, SNMP, and SSH access, the minimum certifications include CE, FCC, and IC etc, as required.	1	28,504.00	Each	28,504.00
11.3	Supply, installation, testing and commissioning of suitable <b>Multimode Fiber Module</b> having 1000BASE-SX SFP transceiver for multimode fiber, 50/125µm in distances up to 550m, Hot swappable, 20 dBm receiver sensitivity , etc complete as required.	32	8,012.00	Each	2,56,384.00
11.4	Supply, installation, testing and commissioning of <b>Indoor High Capacity Wi-Fi Access Point</b> with minimum 4X4 MU-MIMO with 5.4Gbps, Dual Band 2.4GHz and 5GHz: 802.11a/n/ac/ax radios, Support 2.5Gbps Ethernet port with 802.3af/at PoE standard , Deployed with centralised managed controllers AP & Switches, BSS coloring , support captive portal, including 5 years license, etc. complete as required.	33	25,914.00	Each	8,55,162.00
11.5	Supply, installation, testing and commissioning of <b>24-port PoE</b> with 190W, 1G Layer-2 Managed Switch having 2 x 1000 Base X SFP ports, Switch Capacity 52Gbps, static Routing, zero-touch provisioning, cloud Managed via single dashboard etc complete as required.	16	59,601.00	Each	9,53,616.00

CORRECTIONS - Nil

OMISSION - Nil

INSERTION - Nil

11.6	Supplying and commissioning of <b>wall mounting 12 U rack</b> with Front Door with Toughened Glass quality. Adjustable Mounting rails - Front and Back, Ac axial Fan , bottom cable entry provides Optimal flexibility for cable management, suitable no of power sockets i.e PDU unit , Frame structure with max loading capacity etc as required.	10	6,465.00	Each	64,650.00
11.7	Supplying and commissioning of <b>Floor mounting 42 U rack</b> with Front Door with Toughened Glass quality. Adjustable Mounting rails - Front and Back, AC axial Fan, bottom cable entry provides Optimal flexibility for cable management, suitable no of power sockets ie PDU Unit , Frame structure with max loading capacity etc as required.	2	37,867.00	Each	75,734.00
11.8	Supply, installation, testing and commissioning of <b>24 Port cat-6 Patch panel</b> available with Identification: ID plate, PVC, Transparent color with paper, Six Port RJ45 modules .etc as required.	3	10,452.00	Each	31,356.00
11.9	Supply, installation, testing and commissioning of <b>1Mtrs. cat-6 patch cord</b> for connecting Patch panel to switches, etc complete as required.	240	255.00	Each	61,200.00
12.10	Supply, installation, testing and commissioning of <b>3Mtrs. cat-6 patch cord</b> for connecting Patch panel to switches, etc complete as required.	150	341.00	Each	51,150.00
11.11	Supply, installation, testing and commissioning of suitable single mode <b>Fiber Patch Cord having LC-SC type 3 Mtrs.</b> Length , etc complete as required.	100	3,023.00	Each	3,02,300.00
11.12	Supply, installation, testing and commissioning of suitable <b>LC Pigtail MM OM3</b> Length , etc complete as required.	15	468.00	Each	7,020.00
11.13	Supplying and drawing of <b>6 core single mode armored OFC cable</b> in the existing / recessed steel/ PVC conduit/surface , etc complete as required.	300	171.00	P. Mtr.	51,300.00
	<b>Sub Head 12 : (IP Based EPABX System)</b>				

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

12.1	SITC of <b>IP PBX System</b> with <b>128 channel</b> with 1 No. PRI Cards having T1E1 ports , 8 port CO Card, 4 Digital 56 analog extension having built-in applications such as, SIP Standard, IPv6 Ready, Redundancy of CPU & Power Supply, Support Proprietary Digital Key Phone's, Multi-protocol Support, Supports multiple type of TDM interfaces, (FXS /FXO/ENM/ E1/PRI/ GSM/RADIO), Modular architecture for easy scalability, Toll grade voice compression, Echo cancellation, Jitter Buffer, VAD and CNG, Complies with latest version (RFC3261) SIP protocols, Enhanced capabilities which include MWI, Mtrs.ing tones, Best suitable for SIP based, hosted communications and centralized IP-PBX applications, Supports all standards telephony features such as Call Hold, Call Transfer, Message Wait Lamp, Call Waiting, do not disturb, Caller Id presentation, Conference, Hotline, Etc. Matured Call & In Progress Call recovery in HA mode, Heart-beat Functionality, Inbuilt SIP Registrar, Dual Gigabit Ethernet Port, Self-Survivability for Analog, Digital & IP Phones, Link/Network Redundancy etc as required.	1	1,40,279.00	Each	1,40,279.00
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CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

12.2	Supply, Installation, Testing & Commissioning of <b>IP phone</b> is equipped with advanced audio features, including support for a variety of codecs such as G.722, G.711(A/μ), G.729, G.726, G.723, OPUS, and iLBC, alongside DTMF signaling via In-band, RFC 2833, and SIP INFO, its full-duplex speakerphone incorporates Acoustic Echo Cancellation (AEC), complemented by Voice Activity Detection (VAD), Comfort Noise Generation (CNG), Adaptive Jitter Buffer (AJB), Automatic Gain Control (AGC), and Hearing Aid Compatibility (HAC), supporting up to two SIP accounts, the phone offers comprehensive call management features like call hold, transfer, forwarding, waiting, muting, and 3-way local conferencing, its graphical LCD screen, dual DSS keys with LED indicators, and a range of dedicated navigation and operational keys enhance usability, connectivity includes dual 10/100 Mbps Ethernet ports with PoE, RJ9 handset and headset ports, and support for protocols like SIP v2, VLAN tagging, and NAT traversal, robust security features such as HTTPS, TLS, SRTP, AES encryption, and network protections like DoS and ARP spoofing safeguards are standard, the device is designed for versatile use with options for desk or wall mounting, operating efficiently across a wide range of environmental conditions and adhering to global safety, EMC, and eco-design standards,etc as required.	10	5,615.00	Each	56,150.00
12.3	SITC of <b>Analog Phone with Handset</b> and numerical key pad, minimum 2 line LCD display and call log facility, caller id compatibility, speaker phone for hands free conversation, with all accessories,etc, as required.	38	1,122.00	Each	42,636.00

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

<b>12.4</b>	Supplying & fixing <b>Telephone intermediate distribution (MDF) box</b> made of CRCA sheet duly powder coated having locking arrangement & back mount frame wall mounting type with krone modules of suitable size for multi core telephone cable and shall accommodate suitable size tin plated phosphor bronze connectors, connection with both incoming and outgoing available number of lines with testing of lines for continuity, i/c pair identification, extension identification, cross crimping, testing, Commissioning, etc, as required.				
<b>12.4.1</b>	500 Pair DB with modules.	1	11,056.00	Each	11,056.00
<b>12.4.2</b>	100 Pair DB with modules.	5	2,764.00	Each	13,820.00
<b>12.5</b>	Supplying and fixing of PVC insulated <b>jelly filled armoured telephone cable 0.5 sq.mm</b> copper conductor size of following number of pairs on surface / cable tray / duct etc as required.				
<b>12.5.1</b>	100 Pair	100	1,308.00	P. Mtr.	1,30,800.00
<b>Grand Total=</b>					<b>9,38,41,077.00</b>

**Executive Engineer (E) –I,  
CPWD, Mumbai-20.**

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil

EE / AE (P)

**PART - D**  
**PRICE BID**

CORRECTIONS - Nil

OMMISSION - Nil

INSERTION - Nil


**Central Public Works Department**

**NIT No.01/CE-I/EE/Mumbai-I/2025-26**
**Name of Work:-**Construction of B + G + 4 floor, World Class Laboratory building on plot no. E-2 in Marol Industrial Area for Indian Institute of Packaging, Andheri (E), Mumbai.

**PRICE BID**
**Name of the Contractor**

Sr.No.	Name of component	Estimated cost	Percentage above or below the estimated cost	% in Figures	Total Cost
1	Civil and Electrical Works	Rs.34,95,96,698/-			
	<b>GRAND TOTAL</b>	<b>Rs.34,95,96,698/-</b>			
	<b>GRAND TOTAL IN WORDS (Rupees Thirty-Four Crores Ninety Five Lakhs Ninty Six Thousand Six Hundred Ninty Eight Only)</b>				

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CORRECTIONS - Nil

OMISSION - Nil

INSERTION - Nil

EE / AE (P)