



**भारत सरकार**  
**GOVERNMENT OF INDIA**  
**केंद्रीय लोक निर्माण विभाग**  
**CENTRAL PUBLIC WORKS DEPARTMENT**  
**कार्यालय कार्यपालक अभियंता गुवाहाटी मंडल**  
**OFFICE OF THE EXECUTIVE ENGINEER,**  
**GUWAHATI DIVISION,**  
**गुवाहाटी – ৭৮১০২১**  
**GUWAHATI – 781015**



**e-NIT**  
**ई-निविदा आमंत्रण सुचना**  
**ON**  
**EPC MODE-III**  
**e-NIT No. : 25/NIT/CE/GHY/2025-26**

**NAME OF WORK :** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis].

**NIT No.** : 25/ NIT / CE / GHY / 2025-26

**AMOUNT** : Rs. 364,33,25,464/-

Rs. 300,68,59,910/- (CIVIL & HORTICULTURE)

Rs. 62,97,73,379/- (ELECTRICAL)

Rs. 66,92,175/- (CAMC Charges)

**OFFICE OF :-**

**CHIEF ENGINEER, GUWAHATI**  
**CENTRAL PUBLIC WORKS DEPARTMENT**  
**GARCHUK, GUWAHATI - 78103**

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**Certified that this bid-document contains Part – A, Part – B, Part – C, Part – D, Part – E, Part – F, Part – G & Part - H having Pages from 01 to 838 is hereby approved for Rs. 364,33,25,464.00 (Rupees Three Hundred Sixty Four Crore Thirty Three Lakh Twenty Five Thousand Four Hundred Sixty Four only).**

**Assistant Engineer (C)**  
RBI Project Sub-Division-I  
CPWD, Guwahati, Assam

**Assistant Engineer (E)**  
RBI Project Elect. Sub Division – I  
CPWD, Guwahati, Assam

**Assistant Engineer (C)**  
RBI Project Sub-Division-III  
CPWD, Guwahati, Assam

**Assistant Engineer (C)**  
RBI Project Sub-Division-II  
IV  
CPWD, Guwahati, Assam

**Assistant Engineer (E)**  
RBI Project Elect. Sub Division – I  
CPWD, Guwahati, Assam

**Assistant Engineer (C)**  
RBI Project Sub-Division-  
CPWD, Guwahati, Assam

**Assistant Engineer (P)(C)**  
O/o the Guwahati Division  
CPWD, Guwahati – 21

**Assistant Engineer (P)(E)**  
O/o the Guwahati Electrical Division  
CPWD, Guwahati – 21

**Assistant Engineer (P)(C)**  
O/o the Project Division  
CPWD, Guwahati - 21

**Executive Engineer (C)**  
Guwahati Division  
CPWD, Guwahati – 21

**Executive Engineer (E)**  
Guwahati Electrical Division  
CPWD, Guwahati – 21

**Executive Engineer (C)**  
Project Division  
CPWD, Guwahati - 21

**Assistant Engineer (C) (P-II)**  
O/o Chief Engineer, Guwahati  
CPWD, Guwahati - 35

**Assistant Engineer (C)(P-III)**  
O/o Chief Engineer, Guwahati  
CPWD, Guwahati - 35

**Assistant Engineer (E) (P)**  
O/o Chief Engineer, Guwahati  
CPWD, Guwahati - 35

**Assistant Director (Hort.)**  
Horticulture Sub Division  
CPWD, Guwahati – 35

**Deputy Director (Hort.)**  
Horticulture Division  
CPWD, Guwahati – 35

**Architect**  
O/o Chief Engineer, Guwahati  
CPWD, Guwahati – 35

**Executive Engineer (P)**  
O/o Chief Engineer, Guwahati  
CPWD, Guwahati – 35

### **APPROVED**

**CHIEF ENGINEER, GUWAHATI**  
**CPWD, GARCHUK, GUWAHATI - 781035**

# PART-A

*Correction...Nil*   *Deletion...Nil*   *Insertion...Nil*   *Overwriting...Nil*       $\mathcal{AE}(C)$        $\mathcal{AE}(E)$        $\mathcal{EE}(C)$

**CENTRAL PUBLIC WORKS DEPARTMENT**  
**NOTICE INVITING e-Tender**

The Executive Engineer, Guwahati Division, (Telephone No. 94222-63095 email ID: [eegedghy@gmail.com](mailto:eegedghy@gmail.com)) C.P.W.D., Nirman Bhawan, Bamunimaidan, Guwahati-21, on behalf of the President of India, invites percentage rate online composite bids on Engineering, Procurement and Construction (EPC-III mode) turnkey basis from CPWD enlisted contractors of appropriate class in “Building & Road” (erstwhile composite / building / infrastructure) category and eligible firms/contractors of repute in two bid system for the following work:

**Name of work :** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]

**NIT No.** : 25 / NIT / CE / GHY / 2025-26

<b>Composite Estimated cost</b>	<b>Total</b> : Rs. 364,33,25,464.00 Civil & Horticulture : Rs. 300,68,59,910.00 Electrical : Rs. 62,97,73,379.00 CAMC Charges : Rs. 66,92,175.00
<b>Earnest Money</b>	<b>Rs. 3,74,33,255.00</b>
<b>Period of Completion</b>	<b>36 (Thirty-Six) Months for construction and handing over</b>
<b>Pre-bid conference</b>	Pre-bid conference shall be physically held in conference Room, office of the Chief Engineer, Guwahati, C.P.W.D., Garchuk, Guwahati-35 at 11:30 Hrs. on: <b>24 / 11 / 2025</b> Note:- Bidders are requested to send queries in advance by E-MAIL to the email given below : <a href="mailto:ce-guwahati@cpwd.gov.in">ce-guwahati@cpwd.gov.in</a>
<b>Last date &amp; time of online submission of Technical and Financial Bids</b>	15:00 Hrs on : <b>15 / 12 / 2025</b>
<b>Opening of Technical bids</b>	15:30 Hrs on : <b>15 / 12 / 2025</b>

The bid forms and other details can be obtained from the website <https://etender.cpwd.gov.in>  
 All corrigendum/ addendums shall only be available on this website and shall not be published anywhere else.

**Executive Engineer (C),**  
**Guwahati Division**  
**CPWD, Guwahati**

# PART-I

## General Information

## Information and Instructions for Bidders For e-Bidding

**The Executive Engineer, Guwahati Division, (Telephone No. 9422263095 email ID: eegcdghy@gmail.com) C.P.W.D., Nirman Bhawan, Bamunimaidan, Guwahati-21,** on behalf of the President of India, invites percentage rates online composite bids on Engineering, Procurement and Construction (EPC-III mode) turnkey basis from CPWD enlisted contractors of appropriate class in “Building & Road” (erstwhile composite / building / infrastructure) category and eligible firms/contractors of repute in two bid system for the following work:

Sl. No.	Descriptions	Details
1.	NIT No.	<b>25 / NIT / CE / GHY / 2025-26</b>
2.	Name of Work	Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]
3.	Location	Zoo-Narengi Road, Guwahati
4.	Estimated cost put to bid	<b>Total : Rs. 364,33,25,464.00</b> Civil & Horticulture : Rs. 300,68,59,910.00 Electrical : Rs. 62,97,73,379.00 CAMC Charges : Rs. 66,92,175.00
5.	Earnest Money Deposit	<b>Rs. 3,74,33,255/-</b> in favour of Executive Engineer, Guwahati Central Division, CPWD, Bamunimaidan, Guwahati - 21.
6.	Period of completion	<b>36 (Thirty-Six) Months for construction</b>
7.	Pre-Bid Conference	Pre-bid conference shall be physically held in conference Room, office of the Chief Engineer, Guwahati, C.P.W.D., Garchuk, Guwahati-35 at 11:30 Hrs. on: <b>24 / 11 / 2025</b> Note:- Bidders are requested to send queries in advance by E-MAIL to the email given below : <b>ce-guwahati@cpwd.gov.in</b>

8.	Last date & time of submission of bid, copy of receipt of deposition of original EMD and other documents as specified in NIT	Up to 15:00 Hrs on <b>15 / 12 / 2025</b>
9.	Time and date of opening of Technical Bid	At 15:30 Hrs on <b>15 / 12 / 2025</b>
10	Time and date of opening of Financial Bid	The time and date of opening will be communicated to the technically qualifying bidders at a later date.
11	Defect liability period	<b>36 Months</b> after the date of actual completion of work as recorded by Engineer-in-charge.
12	Period during which hard copies of documents shall be physically submitted	Within 7 (Seven) days after opening of the technical bid (Eligibility) documents.

1. Contractors, who fulfill the following requirements shall be eligible to apply. Joint ventures/Consortium and Special Purpose Vehicles are not accepted.

To become eligible for participating in the bid process, the bidders shall satisfy the following work experience criteria. (**Applicable for both CPWD and Non-CPWD contractors**)

a) Should have satisfactorily completed the following similar works during the last 7 (seven) years ending last date of the month previous to the one in which tenders are invited. For this purpose, cost of work shall mean gross value of the completed work including cost of material by the Government /Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/ Project Manager or equivalent.

(i) Three similar completed works each costing not less than **40% of ECPT**.

Or

Two similar completed works each costing not less than **60% of ECPT**.

Or

One similar completed work costing not less than **80% of ECPT**.

**And**

(ii) One completed work having prescribed structural system costing not less than **20% of ECPT**, completed with monolithic concrete construction with Aluminium form work as prescribed in the tender during the last 7 (seven) years ending last date of the month previous to the one in which tenders are invited.

This work can be part of eligible work at (i) above or as a separate work.

**or**

If the bidder does not have adequate experience of the above prescribed technology then the bidder can associate with contractor having requisite experience of executing work in structural system with the above prescribed technology. Bidder has to submit MoU in the prescribed format (**Form-J**) with such associate contractor, along with his tender, for structural system in prescribed technology only. The associated contractor must satisfy the eligibility criteria of having

successfully completed one work of prescribed technology having the cost of structural system not less than **20% of ECPT** during the last seven years ending last day of month previous to the one in which tender is invited.

In case separate cost of structural system of a prescribed technology is not available in the experience certificate of associated contractor, it will be taken as 30% of completed cost of project / work.

Associated contractor should not have been debarred from any Ministry or any govt. organization in the last five years. The bidders have to obtain an **affidavit for Non – Black listing (Form L)** from the associated contractor to authenticate that they have not debarred from any Ministry or any govt. organization in the last five years and has to upload the affidavit along with the bid documents.

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

**Note:**

For evaluation of the cost of structural system, only the structure casted with prescribed technology will be considered and cost of structural system will comprise of cost of RCC work and shuttering work.

**“Similar work” shall mean**

Construction of RCC building with the following requirements:

Minimum one building of 8 (Eight) storeys or more storeys (including structural work) of residential/non-residential building including internal water supply & sanitary installation, internal electrical installations and any three (03) of the following specialized electrical & mechanical services but one either fire alarm system or fire-fighting system, out of the three shall be included:

- i) Lift
- ii) Fire fighting
- iii) Fire alarm system
- iv) Sub Station
- v) DG Set
- vi) HVAC
- vii) External Electrical Installation
- viii) Solar power plant and Solar water heating system.

Balance other four services could be considered even if these had been executed under a separate contract. However, these services executed under a separate contract shall be considered for the purpose of assessing technical competence only without adding its monetary value for determining the eligibility criteria.

**OR**

Completing balance construction work of one building including structural work minimum upto 8 (Eight) storeys (for calculation of height of storey: basement/s and stilt/s shall be counted as storey and shall be measured for height) including water supply, sanitary installation, Internal Electrical Installations and any three (03) of the following E&M services but one either fire alarm system or firefighting system, out of the three shall be included:-

- i) Lift

- ii) Fire fighting
- iii) Fire alarm system
- iv) Sub Station
- v) DG Set
- vi) HVAC
- vii) External Electrical Installation
- viii) Solar power plant and Solar water heating system.

Balance other four services could be considered even if these had been executed under a separate contract. However, these services executed under a separate contract shall be considered for the purpose of assessing technical competence only without adding its monetary value for determining the eligibility criteria.

**NOTE:**

- (i) The basement, stilt constructed with the building shall be construed as a storey.
  - (ii) Mumty and machine room and OHT (including supporting structure above roof) will not be counted as storey for above purpose.
  - (iii) For the purpose of similar works, works executed in India only shall be considered.
  - (iv) Qualified similar works may be physically inspected by the CPWD Engineers to ascertain the completion, performance on quality of works for finalizing the Technical bid.
  - (v) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple interest rate of 7% per annum, calculated from the date of completion to previous day of last date of submission of tenders.
  - (vi) In case, the eligible work has been executed by a Joint Venture through one or more individual firm(s), then cost of completed work shall be distributed among the individual firm(s) in proportion to their share in Joint Venture and that will be considered as work experience for individual firm(s) for prequalification in bidding.
  - b) Should have had **average Annual Financial Turn Over** (gross) of **30% of ECPT** on construction works during the immediate last three consecutive years ending **31<sup>st</sup> March 2024** in balance sheets duly audited by certified Chartered accountant. Year in which no turnover is shown would also be considered for working out the average. (Scanned copy of certificate from CA with UDIN number to be uploaded). The value of annual turnover figures shall be brought to the current value by enhancing the actual turnover figures at simple rate of 7% per annum. (**Applicable for Non-CPWD contractors only**).
- Note:** The GST effect shall be added to average annual financial turnover to bring it at par with ECPT.
- c) Should not have incurred any **loss (profit after tax should be positive)** in more than two years during available last five consecutive balance sheet ending **31<sup>st</sup> March 2024**, duly certified and audited by chartered accountant. (The balance sheet in case of Pvt./ Public Ltd. company means its standalone finance statement and consolidated financial statement both) (Scanned copy of certificate from CA with UDIN number to be uploaded (**Applicable for Non-CPWD contractors only**)

- d) Should have a **Banker's Certificate** from a Commercial Bank of **40% of ECPT** certified by his bankers or **Net worth Certificate** of minimum of **10% of ECPT**, issued by certified Chartered Accountant with UDIN number. (Scanned copy of original to be uploaded). (**Applicable for Non-CPWD contractors only**)
- e) The bidding capacity of the contractor should be equal to or more than the estimated cost of the work put to tender. The bidding capacity shall be worked out by the following formula. (**Applicable for both CPWD and Non-CPWD contractors**)

$$\text{Bidding Capacity} = \{[AxNx1.5]-B\}$$

A = Maximum turnover in construction works executed in any one year during the last seven years taking into account the completed as well as works in progress. The value of completed works shall be brought to current costing level by enhancing at a simple rate of 7% per annum

N = Number of years prescribed for completion of work for which bids has been invited.

B = Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited.

**Note: The bidder should submit bidding capacity as per Form 'C-3'.**

- f) The bidder should not have been debarred/black listed by the Central Government/State Government, or any entity controlled by it, from participating in any tender as on the Bid Due Date, such bidder would not be eligible to submit the BID. The Bidder should upload **Affidavit for Non - Black listing** in **Form-H**. (**Applicable for both CPWD & Non-CPWD contractors**)
- g) For specialized components of **Civil, E&M and Horticulture works**, the main contractor is required to associate with the specialized agency who have past experience of having satisfactorily completed the said similar works as mentioned in the bid document during the last 7 (seven) years. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to previous day of last day of submission of bids. The bidder should either himself meet the eligibility conditions as mentioned in the table below or otherwise he will have to associate with an agency meeting the eligibility requirements for specialized work. The bidder shall submit details of such agency(s) as given below to the Executive Engineer of concerned component at least three months in advance from the date of taking up the execution of the specified component.

#### **THE MINIMUM ELIGIBILITY CRITERIA FOR SPECIALIZED WORKS WHEREVER APPLICABLE**

##### **(A) Civil Works :**

SI. No	Component of SPECIALIZED / Civil works	Approximate cost of specialized work in Rs.	Eligibility requirement of the specialized agency
--------	--	--	--

1	Water Proofing Treatment for Raft, toilets, podium roof,	Rs.300.00 lakhs	The main contractor should associate with a specialized agency/agencies (not more than two agencies) who satisfy below mentioned eligibility criteria of having successfully completed during last seven years as given below with completion certificate issued by an officer not below the rank of the Executive Engineer or equivalent duly attested.
	terrace, Mumty, Balcony, swimming pool, underground and overhead water tank etc.		<p>Three similar completed works each of value not less than <b>40% of Estimated cost of the component</b></p> <p>or</p> <p>Two similar completed works each of value not less than <b>60% of Estimated cost of the component</b></p> <p>or</p> <p>One similar completed work of value not less than <b>80% of Estimated cost of the component</b></p> <p><b>Similar work shall mean water proofing treatment ”.</b></p>
2	Pile Foundation	Rs.5800 Lakhs	<p>The main contractor should associate with a specialized agency/agencies (not more than two agencies) who satisfy below mentioned eligibility criteria of having successfully completed during last seven years as given below with completion certificate issued by an officer not below the rank of the Executive Engineer or equivalent duly attested.</p> <p>Three similar completed works each of value not less than <b>40% of Estimated cost of the component</b></p> <p>or</p> <p>Two similar completed works each of value not less than <b>60% of Estimated cost of the component</b></p> <p>or</p> <p>One similar completed work of value not less than <b>80% of Estimated cost of the component</b>.</p> <p><b>“Similar work shall mean Pile Foundation”.</b></p>
3	Synthetic play area surface for games	Rs.22 lakhs	<p>The main contractor should associate with a specialized agency/agencies (not more than two agencies) who satisfy below mentioned eligibility criteria of having successfully completed during last seven years as given below with completion certificate issued by an officer not below the rank of the Executive Engineer or equivalent duly attested.</p> <p>Three similar completed works each of value not less than <b>40% of Estimated cost of the component</b></p> <p>or</p>

			<p>Two similar completed works each of value not less than <b>60% of Estimated cost of the component</b>  Or  One similar completed work of value not less than <b>80% of Estimated cost of the component</b>  <b>“Similar work shall mean Synthetic play area surface for games”.</b></p>
4	Post construction Anti-termite chemical treatment.	Rs.40 lakhs	<p>The main contractor should associate with a specialized agency/agencies (not more than two agencies) who satisfy below mentioned eligibility criteria of having successfully completed during last seven years as given below with completion certificate issued by an officer not below the rank of the Executive Engineer or equivalent duly attested.</p> <p>Three similar completed works each of value not less than <b>40% of Estimated cost of the component</b>  or  Two similar completed works each of value not less than <b>60% of Estimated cost of the component</b>  or  One similar completed work of value not less than <b>80% of Estimated cost of the component</b>  <b>Similar work shall mean Post construction Anti-termite chemical treatment.</b></p>

#### (B) Electrical & Mechanical Works :

For details of specialized agencies to be associated for specialized works of E & M Component works (Minor Component of Tender), please refer Part-C of the tender document.

#### C) Horticulture Works:

The main contractor has to engage a CPWD registered Horticulture contractor of appropriate class under Horticulture category.

Or

Any other Horticulture contractor having required experience of similar work completed in last 7 years.

Three similar completed works each of value not less than **40% of Estimated cost of the component.**

Or

Two similar completed works each of value not less than **60% of Estimated cost of the component**

Or

One similar completed work of value not less than **80% of Estimated cost of the component.**

**“Similar work means execution of Landscaping & Horticulture works”.**

- h) The bidders shall have to furnish an affidavit as under:

I/We undertake and confirm that eligible similar works(s) has/have not been got executed through another contractor on **back-to-back basis**. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for 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 Deposit/Performance Guarantee. (Scanned copy of this undertaking to be uploaded by bidder(s) at the time of submission of bid). **(Form-I) (Applicable for both CPWD and Non-CPWD contractors).**

- i) The agency shall submit within 4 (four) months after award of work and undertaking from the OEMs for specialized E&M work of HVAC, DG set, Lifts, EPBAX, STP, CCTV, Solar PV System, UPS and others as included in the NIT that “OEM shall unconditionally support the lowest bidder technically throughout the execution of contract as well as for Maintenance/Comprehensive Maintenance Contract for the useful life of the system, and they shall also provide all the spares required for the healthy functioning of the equipment for at least seven years from the date of supply of equipment”. This undertaking is to be given in **Form- G**.
2. 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.
3. This information and Instructions for bidders posted on website shall form part of the bid document.
4. The bid document consisting of Plans, Specifications, Bill of Quantities, Detail Schedule of Item 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 [www.cpwd.gov.in](http://www.cpwd.gov.in) free of cost.
5. But 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 and uploading the mandatory scanned documents such as Insurance Surety Bonds, Account Payee Demand draft or Bankers Cheque or Fixed Deposit Receipts or/ and Bank Guarantee (as prescribed) from any of the Commercial Bank towards EMD in favor of **Executive Engineer, Guwahati Central Division, C.P.W.D., Bamunimaidan, Guwahati-21**, receipt for deposition of original EMD to division office of any Executive Engineer (including NIT issuing EE/AE), CPWD and other documents as specified.
6. Those contractors who are not registered or have not updated their profile on the website mentioned above, are required to get registered/update their profile beforehand. The

necessary training materials including the videos with step-to-step process are available on download section of <https://etender.cpwd.gov.in>.

7. The intending bidder must have valid class-III digital signature certificate with encryption key (combo type) to perform any operations/transactions on the e-tendering portal / website and the bidder should download and install the eMsigner on their system as per instruction available on download section of <https://etender.cpwd.gov.in>.
8. On opening date, the contractor can login and see the bid opening process. After opening of bids he will receive the competitor bid sheets.
9. Contractor can upload documents in the form of JPG format and PDF format.
10. **Certificate of Financial Turn over :** At the time of submission of bid, contractor has to upload Affidavit / Certificate of CA with UDIN number mentioning Financial Turnover of last seven years or for the period as specified in the bid document and further details if required may be asked from the contractor after opening of technical bids. There is no need to upload entire voluminous balance sheet.
11. Bidders shall quote his Item rate as per various terms and conditions of the bid and in the prescribed format which will form part of the agreement. If a tenderer quotes nil rates, the tender shall be treated as invalid and will not be considered as lowest tenderer.

The column meant for quoting rate in figure appears in yellow color and the moment rate is entered, it turns sky blue.

In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as “0” (ZERO). Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as “0” (ZERO). However, if a tenderer quotes NIL against each item in item rate tender or does not quote any % above / below on the total amount of the tender or any section head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

12. Bidder must ensure to quote rate of each item. The column meant for quoting rate in figures appears in pink colour and the moment rate is entered, it turns sky blue. In addition to this, while selecting any of the cells, a warning appears that if any cells left blank, the same shall be treated as “0”. Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as “0” (Zero).
13. The **Technical cum Eligibility bid** shall be opened first on due date and time as mentioned above. The time and date of opening of financial bid of tenderers qualifying the technical bid shall be communicated to them at a later date.
14. **Pre-bid conference** shall be held with the intending bidders in the office of the **Chief Engineer, Guwahati, C.P.W.D., Garchuk, Guwahati-35** at 11:30 Hrs. on **24 / 11 / 2025** to clear the doubt of intending bidders, if any. Bidders should send all their queries by email to the **Executive Engineer, Guwahati Division, C.P.W.D., Bamunimaidan, Guwahati-21** (Email: [eegcdghy@gmail.com](mailto:eegcdghy@gmail.com)) & to the CE, Guwahati also on Email : [ce-guwahati@cpwd.gov.in](mailto:ce-guwahati@cpwd.gov.in) latest by 15.00 hrs. on **21 / 11 / 2025** As a result of pre-bid conference, certain modifications etc. may be required. All

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

15. ~~When bids are invited in three stage system and if it is desired to submit revised financial bid then it shall be mandatory to submit revised financial bid. If not submitted then the bid submitted earlier shall become invalid.~~
16. After submission of bid, the agency can resubmit revised bid any numbers of times but before last time and date of submission of bid as notified.
17. While submitting the revised bid, the agency can revised the rate of one or more items any numbers of times but before last time and date of submission of bid as notified.
18. The department reserves the right to reject any prospective application without assigning any reason and to restrict the list of qualified contractors to any number deemed suitable by it, if too many bids are received satisfying the laid down criterion.
19. This work requires engaging more than 20 nos. of labours / workers and therefore all necessary licenses such as Labour license, EPFO and ESI, BOCW welfare registration etc., shall be taken by contractor within the time limits as prescribed under Clause 1 of Schedule- 'F'.
20. Samples of all materials being used in the work, methodology and sample of work of all items shall be got approved from the Engineer-in-charge well in advance.
21. All the testing charges of all materials shall be borne by the contractor including all incidental charges like cost of material, packing and transportation etc. all as per the required frequency of testing as per CPWD specification and as per direction of the Engineer-In-Charge. This condition will supersede if anywhere in this document it is mentioned that the testing charges shall be paid by the department.
22. Corrigendum/addendum to this bid invitation shall be issued online through website <https://etender.cpwd.gov.in>
23. Intending bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent upon any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that he has read this notice and all other pages of contract documents and has made himself aware of the scope and specifications of the work to be done and local conditions and other factors having a bearing on the execution of the work.

24. The bid submitted shall become invalid and e-bidding processing fee shall not be refunded if:
- (i) The bidder is found ineligible.
  - (ii) The bidder does not deposit EMD with division office of any Executive Engineer, CPWD.
  - (iii) The bidder does not upload all the documents as listed at **Sl. No. 26** below.
  - (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 bidder in the office of bid opening authority.
  - (v) Integrity Pact: The bidder shall download the Integrity Pact, which is a part of the tender document, affix his signature in the presence of a witness, and upload the same while submitting the online bid. In the event of his failure to sign the Integrity Pact along with other bid documents, his bid shall be cancelled.
25. The following conditions, which already form part of the tender conditions, are specially brought to his notice for compliance while submitting the tender online. They are requested to comply following instructions:
- (a) Tenders with any condition including that of conditional rebates shall be rejected forthwith.
  - (b) GST, work contract tax, Labour-Cess etc. as applicable shall be borne by the contractor himself. The contractor shall quote his rates considering all such taxes and hence their quoted rates should be inclusive of all the tax components.
  - (c) It will be obligatory on part of the contractor/ bidder to tender for and sign the tender documents for all the component parts. The department reserves right to accept tender in full or in part without assigning any reasons.
26. **List of Documents to be scanned and uploaded within the period of bid submission.**
- A. For Non-CPWD Contractors :**
- a) Scanned copy of Account Payee Demand Draft / Banker's Cheque / FDR / Bank Guarantee (**as per Annexure – II**) including e-bank guarantee (for balance amount as prescribed) of any Commercial Banker Insurance Surety Bonds against EMD.
  - b) Copy of receipt for deposition of original EMD issued from division office of any Executive Engineer (i/c NIT issuing EE/AE CPWD) in **Annexure - I**.
  - c) The agency must upload the undertaking for ERP training from CPWD appropriate authority in **Form K**.
  - d) Letter of Transmittal in **Form – T-1**.
  - e) **Integrity Pact & undertaking** (both including) signed by the bidder in the presence of witness.
  - f) Certificate of Financial Turnover from CA in **Form – A**.
  - g) Banker's certificate in **Form – B** or Net worth certificate in **Form – B1**.
  - h) Details of Eligible Similar Nature of Works Completed During the Last Seven Years

Ending Previous Day of Last Day of Submission of Tenders in **Form - C**. If private works shown in support of eligibility, then certified copy of Tax Deducted at Source (TDS) certificate (Form 16A & 26A) shall be submitted along with experience certificate and the TDS amount shall tally with the actual amount of work done. Otherwise, the amount that tally with the TDS shall only be considered for eligibility.

- i) List of all ongoing works in hand with the bidder as on last date of submission of bid in **Form – C1**.
- j) Details of work in support of having successfully completed with the Structural System Technology proposed to be used in the work in **Form – C2**.
- k) In case of association with other firm, format of MoU between main contractor and associated contractor for opted technology in **Form – J**.
- l) Details of existing commitments on all ongoing works and calculation of bidding capacity in **Form – C3**.
- m) Performance report of work (Referred in Form-C) in **Form – D**.
- n) Certificate of experience in support of having successfully completed with the Structural System Technology proposed to be used in the work (submitted in Form C-2) in **Form – D2**. In case of association, the same shall be of the associate firm.
- o) Structure and Organization of the bidder in **Form – E**.
- p) Permanent Account Number (PAN) as issued by the Income Tax Department.
- q) Undertaking on Structural stability and Soundness as per format **Form – F**.
- r) An undertaking from the OEMs for specialized E&M works in **Form – G**
- s) Affidavit for non-blacklisting for main contractor as per **Form – H**.
- t) Affidavit for non-blacklisting for Associate for Structural System Technology as per **Form – L** if applicable.
- u) Affidavit stating that similar works have not been got executed through another contractor on back-to-back basis in **Form – I**.
- v) GST Registration Certificate.

If the bidder has not obtained GST registration as applicable, then he shall scan and upload following undertaking along with bid documents:

“If work is awarded to me, I/We shall obtain GST registration certificate, as applicable, within one month from the date of receipt of award letter or before release of any payment by CPWD, whichever is earlier, failing which I/We shall be responsible for any delay in payments which will be due towards me/us on account of work executed and/or for any action taken by CPWD or GST department in this regard”.

- w) Copy of Electrical Contractor License.

If the bidder has not obtained Electrical Contractor License **as applicable**, then he shall scan and upload following undertaking along with bid documents.

"If work is awarded to me, I/we shall obtain Electrical Contractor License, or if I/we do not possess in my/our name a valid electrical license as required, I/we shall associate an agency having such a license required for execution of work as applicable, within one month from the date of receipt of award letter or before release of any Payment by CPWD, whichever is earlier, failing which I/we shall be responsible for any delay in payments which will be due towards me/us on account of the work executed and/or for any action taken by CPWD or concerned competent authority in this regard".

- x) Any other document as specified in the NIT.

**If any document not scanned and uploaded strictly in the format given in respective forms, while submitting bid, the bid submitted shall become invalid and will not be considered in e-Tender process and the bidders shall be summarily rejected.**

**B. For CPWD Enlisted Contractors of appropriate class in "Building & Road / Composite category :**

- a) Scan copy of Account Payee Demand Draft / Banker's Cheque / FDR / Bank Guarantee (**as per Annexure – II**) including e-bank guarantee (for balance amount as prescribed) of any Commercial Banker Insurance Surety Bonds against EMD.
- b) Copy of receipt for deposition of original EMD issued from division office of any Executive Engineer (i/c NIT issuing EE/AE CPWD) in **Annexure – I**.
- c) Copy of Enlistment order for CPWD Contractor who are enlisted in appropriate class of "B&R" / Composite Category.
- d) The agency must upload the ERP training Certificate regarding successful completion of ERP training from ERP portal.
- e) Letter of Transmittal in **Form – T-1**.
- f) **Integrity Pact & undertaking** (both including) signed by the bidder in the presence of witness.
- g) Details of Eligible Similar Nature of Works Completed During the Last Seven Years Ending Previous Day of Last Day of Submission of Tenders in **Form - C**. If private works shown in support of eligibility, then certified copy of Tax Deducted at Source (TDS) certificate (Form 16A & 26A) shall be submitted along with experience certificate and the TDS amount shall tally with the actual amount of work done. Otherwise, the amount that tally with the TDS shall only be considered for eligibility.
- h) List of all ongoing works in hand with the bidder as on last date of submission of bid in **Form – C1**.
- i) Details of work in support of having successfully completed with the Structural System Technology proposed to be used in the work in **Form – C2**.
- j) Details of existing commitments on all ongoing works and calculation of bidding capacity in **Form – C3**
- k) Performance report of work (Referred in Form-C) in **Form – D**.

- l)** Certificate of experience in support of having successfully completed with the Structural System Technology proposed to be used in the work (submitted in Form C-2) in **Form-D2**. In case of association, the same shall be of the associate firm.
- m)** In case of association with other firm, format of MoU between main contractor and associated contractor for opted technology in **Form – J**.
- n)** Structure and Organization of the bidder in **Form – E**.
- o)** Permanent Account Number (PAN) as issued by the Income Tax Department.
- p)** Undertaking on Structural stability and Soundness as per format **Form – F**.
- q)** An undertaking from the OEMs for specialized E&M works in **Form – G**.
- r)** Affidavit for non-blacklisting for main contractor as per **Form – H**.
- s)** Affidavit for non-blacklisting for Associate for Structural System Technology as per **Form – L** if applicable.
- t)** Affidavit stating that similar works have not been got executed through another contractor on back-to-back basis in **Form – I**.
- u)** GST Registration Certificate.

If the bidder has not obtained GST registration as applicable, then he shall scan and upload following undertaking along with bid documents:

“If work is awarded to me, I/We shall obtain GST registration certificate, as applicable, within one month from the date of receipt of award letter or before release of any payment by CPWD, whichever is earlier, failing which I/We shall be responsible for any delay in payments which will be due towards me/us on account of work executed and/or for any action taken by CPWD or GST department in this regard”.

- v)** Copy of Electrical Contractor License.

If the bidder has not obtained Electrical Contractor License **as applicable**, then he shall scan and upload following undertaking along with bid documents.

“If work is awarded to me, I/we shall obtain Electrical Contractor License, or if I/we do not possess in my/our name a valid electrical license as required, I/we shall associate an agency having such a license required for execution of work as applicable, within one month from the date of receipt of award letter or before release of any Payment by CPWD, whichever is earlier, failing which I/we shall be responsible for any delay in payments which will be due towards me/us on account of the work executed and/or for any action taken by CPWD or concerned competent authority in this regard”.

- w)** Any other document as specified in the NIT.

**If any document not scanned and uploaded strictly in the format given in respective forms, while submitting bid, the bid submitted shall become invalid and will not be considered in e-Tender process and the bidders shall be summarily rejected.**

**GOVERNMENT OF INDIA**  
**CENTRAL PUBLIC WORKS DEPARTMENT**  
**CPWD-6 FOR e-BIDDING**

1. The **Executive Engineer, Guwahati Division, (Telephone No. 94222-63095 email ID: eegcdghy@gmail.com) C.P.W.D., Nirman Bhawan, Bamunimaidan, Guwahati-21**, on behalf of the President of India, invites percentage rate online composite bids on Engineering, Procurement and Construction (**EPC-III mode**) turnkey basis from CPWD enlisted contractors of appropriate class in “Building & Road” (erstwhile composite / building / infrastructure) category and eligible firms/contractors of repute in **two bid system** for the following work :

**Name of work:** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis].

The enlistment of the contractors should be valid on the last date of submission of bids.

In case the last date of submission of bid is extended, the enlistment of contractor should be valid on the original date of submission of bids.

- 1.1 The work is estimated to cost **Rs. 364,33,25,464/-** this estimate, however, is given merely as a rough guide. **The bidders are required to conduct their own market survey to obtain latest prevailing rates in the market and to work out their tendered rates accordingly.**
- 1.1.1 The authority competent to approve NIT for the combined cost and belonging to the major discipline will consolidate NITs for calling the bids. He will also nominate Division which will deal with all matters relating to the invitation of bids. For composite bid, besides indicating the combined estimated cost put to bid, should clearly indicate the estimated cost of each component separately. The eligibility of bidders will correspond to the combined estimated cost of different components put to bid.
- 1.2 Intending bidders are eligible to submit the bid provided he has definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below:
- 1.2.1. Criteria of eligibility for submission of bid documents. Joint venture & SPV are not accepted (**Applicable for both CPWD and non CPWD contractors**)
  - a) Should have satisfactorily completed the following similar works during the last 7 (seven) years ending last date of the month previous to the one in which tenders are invited. For this purpose, cost of work shall mean gross value of the

completed work including cost of material by the Government /Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/ Project Manager or equivalent.

- (i) Three similar completed works each costing not less than **40% of ECPT**.

Or

Two similar completed works each costing not less than **60% of ECPT**.

Or

One similar completed work costing not less than **80% of ECPT**.

**And**

- (ii) One completed work having prescribed structural system costing not less than **20% of ECPT**, completed with monolithic concrete construction with Aluminium form work as prescribed in the tender during the last 7 (seven) years ending last date of the month previous to the one in which tenders are invited.

This work can be part of eligible work at (i) above or as a separate work.

*or*

If the bidder does not have adequate experience of the above prescribed technology then the bidder can associate with contractor having requisite experience of executing work in structural system with the above prescribed technology. Bidder has to submit MoU in the prescribed format (**Form-J**) with such associate contractor, along with his tender, for structural system in prescribed technology only. The associated contractor must satisfy the eligibility criteria of having successfully completed one work of prescribed technology having the cost of structural system not less than **20% of ECPT** during the last seven years ending last day of month previous to the one in which tender is invited.

In case separate cost of structural system of a prescribed technology is not available in the experience certificate of associated contractor, it will be taken as 30% of completed cost of project / work.

Associated contractor should not have been debarred from any Ministry or any govt. organization in the last five years. The bidders have to obtain an **affidavit for Non – Black listing (Form L)** from the associated contractor to authenticate that they have not debarred from any Ministry or any govt. organization in the last five years and has to upload the affidavit along with the bid documents

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

**Note :** For evaluation of the cost of structural system, only the structure casted with prescribed technology will be considered and cost of structural system will comprise of cost of RCC work and shuttering work.

**“Similar work” shall mean**

Construction of RCC building with the following requirements:

Minimum one building of 8 (Eight) storeys or more storeys (including structural work) of residential/non-residential building including internal water supply & sanitary installation, internal electrical installations and any three (03) of the following specialized electrical & mechanical services but one either fire alarm system or fire fighting system, out of the three shall be included:

- i) Lift
- ii) Fire fighting
- iii) Fire alarm system
- iv) Sub Station
- v) DG Set
- vi) HVAC
- vii) External Electrical Installation
- viii) Solar power plant and Solar water heating system.

Balance other four services could be considered even if these had been executed under a separate contract. However, these services executed under a separate contract shall be considered for the purpose of assessing technical competence only without adding its monetary value for determining the eligibility criteria.

OR

Completing balance construction work of one building including structural work minimum upto 8 (Eight) storeys (for calculation of height of storey: basement/s and stilt/s shall be counted as storey and shall be measured for height) including water supply, sanitary installation, Internal Electrical Installations and any three (03) of the following E&M services but one either fire alarm system or firefighting system, out of the three shall be included:-

- i) Lift
- ii) Fire fighting
- iii) Fire alarm system
- iv) Sub Station
- v) DG Set
- vi) HVAC
- vii) External Electrical Installation
- viii) Solar power plant and Solar water heating system.

Balance other four services could be considered even if these had been executed under a separate contract. However, these services executed under a separate contract shall be considered for the purpose of assessing technical competence only without adding its monetary value for determining the eligibility criteria.

**NOTE:**

- (i) The basement, stilt constructed with the building shall be construed as a storey.
- (ii) Mumty and machine room and OHT (including supporting structure above roof) will not be counted as storey for above purpose.
- (iii) For the purpose of similar works, works executed in India only shall be considered.
- (iv) Qualified similar works may be physically inspected by the CPWD Engineers to ascertain

- the completion, performance or quality of works for finalizing the Technical bid.
- (v) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple interest rate of 7% per annum, calculated from the date of completion to previous day of last date of submission of tenders.
  - (vi) In case, the eligible work has been executed by a Joint Venture through one or more individual firm(s), then cost of completed work shall be distributed among the individual firm(s) in proportion to their share in Joint Venture and that will be considered as work experience for individual firm(s) for prequalification in bidding.

**To become eligible for issue of bid, the bidders shall have to furnish an affidavit as under:**

“I/We undertake and confirm that eligible similar works(s) has/have not been got executed through another contractor on back-to-back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for 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 Deposit/Performance Guarantee (Scanned copy to be uploaded at the time of submission of bid).

**Form – I** (Applicable for both CPWD and Non-CPWD contractor).

2. Agreement shall be drawn with the successful bidders on **prescribed Form of General Condition of Contract 2024 for EPC projects** as amended upto last date of submission of bid (or other Standard Form as mentioned) which is available as a Govt. of India Publication and also available on website [www.cpwd.gov.in](http://www.cpwd.gov.in). Bidders shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.
3. The time allowed for carrying out the work will be **36 (Thirty Six)** 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. (**This period is inclusive of normal monsoon rains, festive season and no hindrances will be considered during the stipulated period of the contract towards any hindrances due to normal monsoon rains**).
4. The site for the work is available.
5. The bid document consisting of plans, specifications, the schedule of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents except Standard **General Condition of Contract 2024 for EPC projects** Form can be seen on website [www.tenderwizard.com/CPWD](http://www.tenderwizard.com/CPWD) or [www.cpwd.gov.in](http://www.cpwd.gov.in) free of cost.
6. After submission of the bid the contractor can re-submit revised bid any number of times or withdraw it before last date and time of submission of bid as notified. No post-tender modification is allowed by the tenderers except through negotiations, if required. In case, any tenderer does so, the tender will be rejected and the tenderer will be debarred for future tendering in CPWD for two years by the concerned enlisting authority (in case of CPWD enlisted contractor) and by the concerned CE/SE (in case of non-enlisted contractor).
7. While submitting the revised bid, bidder can revise the quoted rates of one or more items any number of times (he need not re-enter rate of all items) but before last time and date of submission of bid as notified.

8. The bidder shall upload an EMD deposit receipt in the Proforma given in **Annexure – I**.
9. Earnest Money in the form of Insurance Surety Bonds, Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee including e- Bank Guarantee (for balance amount as prescribed) from any of the Commercial Banks (drawn in favour of '**Executive Engineer, Guwahati Central Division, CPWD, Guwahati-21**') shall be scanned and uploaded on the e-Tendering website within the period of bid submission. The original EMD should be deposited either in the office of Executive Engineer inviting bids or division office of any Executive Engineer, CPWD within the period of bid submission. The EMD receiving Executive Engineer (including NIT issuing EE/AE) shall issue a receipt of deposition of earnest money deposit to the bidder in a prescribed format (enclosed) uploaded by tender inviting EE in the NIT. This receipt shall be scanned and uploaded to the e-bidding web site within the period of bid submission.

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 lac, whichever is less, shall have to be deposited in shape prescribed above, and balance may be deposited in shape of Bank Guarantee including e- Bank Guarantee of any Commercial bank having validity for a period of 90 days for single bid works and 180 days for two bid system or more from the last date of receipt of bids which is to be scanned and uploaded by the intending bidders.

Online bid documents submitted by intending bidders shall be opened only of those bidders, whose original EMD deposited with any division of CPWD including its receipt and other documents scanned and uploaded are found in order.

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

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

10. The technical bid shall be opened at 03:30 PM on **15 / 12 / 2025**

The bid submitted shall become invalid and e-Tender processing fee shall not be refunded if:

- (i) The bidder is found ineligible.
- (ii) The bidder does not upload scanned copies of all the documents stipulated in the bid document.

- (iii) If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the bidder in the office of bid opening authority. (hard copy to be submitted within a week from last date of submission of bid).
  - (iv) If a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above / below on the total amount of the tender or any section / sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.
  - (v) **Integrity Pact:** The bidder shall download the integrity pact, which is a part of the tender documents, affix his signature in the presence of a witness, and upload the same while submitting online bids. In the event of his failure to sign and upload the Integrity Pact along with other documents, his bid shall be rejected.
11. (A) 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 (50% of Performance Guarantee shall be retained as security deposit which will be returned after successful completion of defect liability period). This guarantee shall be in the form of or Deposit at Call receipt of any scheduled bank/ Banker's cheque of any scheduled bank/ Demand Draft of any scheduled bank/ Pay order of any Scheduled 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 Scheduled 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.
- (B) The contractor whose bid is accepted will also be required to furnish either copy of applicable licenses/ registrations or proof of applying for obtaining licenses, registration with GST, EPFO, ESIC and BOCW Welfare Board including Provident Fund Code No. If applicable and also ensure the compliance of afore said provisions by the sub-contractors, if any engaged by the contractor for the said work and program chart (Time and Progress) within the period specified in Schedule 'F'.
- (C) The contractor has to submit bank guarantee to the local body of amount as required by local body as a refundable security deposit within one month from the date of award of work for the purpose of ensuring compliance of the waste management plan/debris management plan approved by the municipal corporation from time to time, till grant/issuance of the occupation certificate. This security will not be reimbursed to contractor by CPWD.
- (D) The Program chart (Time & Progress) shall be submitted with in the period specified in Schedule-F as given below.

**Program chart:-**

The Agency shall prepare an integrated programme chart 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 fulfilment of the programme within the stipulated period and submit the same for approval of the Engineer-In-Charge within four weeks of the award of the contract.

- (i) The programme chart should include the following: -
  - a) Descriptive note explaining sequence of various activities.
  - b) Network (PERT / CPM / BAR-CHART) prepared on M.S. Project 98 /Prima Vera P3 which will indicate resources in financial terms, manpower and specialized equipment for every important stage.
  - c) Programme for procurement of materials by the contractor.
  - d) Programme of procurement of machinery / equipment having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the Agency.
- (ii) If at any time, it appears to the Engineer-in-Charge that the actual progress of work does not conform to the approved programme referred above, the Agency shall produce a revised programme showing the modifications to the approved programme by additional inputs to ensure completion of the work within the stipulated time.
- (iii) The submission for approval by the Engineer-in-Charge of such programme or the furnishing of such particulars shall not relieve the Agency of any of his duties or responsibilities under the contract. This is without prejudice to the right of Engineer-in-Charge to take action against the Agency as per terms and conditions of the Agreement.

## 12. The description of the work is as follows:

**“Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”**

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, **making proper approach road to the site for smooth operation**, 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. 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 bidder 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.

Intending Bidders are advised to get familiarized with the local body rules. Firefighting GMC rule, tree cutting authorities, environment clearances, orders passed by any court on the environment issues, any other issue related to obtaining commencement certificate & occupancy certificate and satisfy themselves before submitting their bids as to the status, nature of the rules and regulations and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. Bidder shall be deemed to have full knowledge of such rules and regulations whether he has read it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. In case of reduction of scope of work or no work is possible to carry out on account of such issues, no cost shall be payable to them. Submission of a bid by the bidder implies that he has read this notice and all other documents and has made himself aware of the Local Body Byelaws and other factors having a bearing on the execution of the work.

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

Government of India as aforesaid before submission of the bid or engagement in the contractor's service.

18. The bid for the works shall remain open for acceptance **for a period of 75 (seventy-five) days from the date of opening of technical bids. Further**
  - i) If any tenderer withdraws his tender within 7 days after last date and time (24 hours) basis of submission of bids, then the Government shall without prejudice to any other right or remedy, be at liberty to forfeit 50% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.
  - ii) If any tenderer withdraws his tender after expiry of 7 days after last date and time (24 hours basis) of submission of bids, then the Government shall without prejudice to any other right or remedy, be at liberty to forfeit 100% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.
  - iii) Withdrawal of the tender, by the tenderer, shall only be made through e-tender portal. Any other method i.e. through letter / e-mail etc. shall not be considered.
  - iv) In case of forfeiture of earnest money as prescribed in para (i) and (ii) above, the bidders shall not be allowed to participate in the rebidding process of the same work and also the Government shall, without prejudice to any other right or remedy, be at liberty to suspend the agency for one year and shall not be eligible to bid for CPWD tenders from date of issue of suspension order.
19. This notice inviting Bid shall form a part of the contract document. The successful bidders/contractor, on acceptance of his bid by the Accepting Authority shall within 15 days from the stipulated date of start of the work, sign the contract consisting of:
  - (a) The Notice Inviting Bid, all the documents including additional conditions, specifications and drawings, 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 of **General Condition of Contract 2024 for EPC Projects** as amended upto last date of submission of tender or other Standard C.P.W.D. Form

## **20. For Composite Bids:**

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

- 20.1.2 The bid document will include the following seven components:

**Part A:-** CPWD-6, Tender Form CPWD – EPC including schedule A to F, Standard **General Conditions of Contract 2024 for EPC Projects** for CPWD as amended/modified up to date.

**Part B:-** General / specific conditions, Item wise requirement, Detailed Schedule of items, specifications applicable to Civil component of the work.

**Part C:-** General/specific conditions, specifications applicable to E&M component of the work

**Part D:-** General/specific conditions, specifications applicable to Horticulture component of the work.

**Part E :-** Stage payment, Bill of quantities.

**Part F :-** Project Management, Safety, Health and Environment Aspects & Appendices

**Part G :-** List of Civil and E&M Drawings.

**Part H :-** Typical Drawings.

- 20.1.3 The bidders must associate him with agencies as per NIT conditions.
  - 20.1.4 The eligible bidders shall quote rates for all items in percentage above/ below on the total amount of tender in percentage rate tender.
  - 20.1.5 After acceptance of the bid by competent authority, the EE in charge of Civil component of the work shall issue letter of award on behalf of the President of India. After the work is awarded, the main contractor will have to enter into one agreement with EE in-charge of civil component and has also to sign two more copies of agreement for EE and DDH in-charge of electrical and horticulture components respectively. One such signed set of agreement shall be handed over to EE and DDH in-charge of electrical and horticulture components. EE of civil component will operate Part A, Part B and Part E of the agreement. Engineer-in-charge of electrical components shall operate Part C along with Part A and Part E of the agreement. DDH in-charge of horticulture component shall operate Part D along with Part A and Part E of the agreement.
  - 20.1.6 Entire work under the scope of composite bid including civil, electrical and horticulture components shall be executed under one agreement.
  - 20.1.7 Security Deposit will be worked out separately for each component corresponding to the estimated cost of the respective component of works.
  - 20.1.8 The main contractor has to associate agencies for specialized components (s) conforming to eligibility criteria as defined in the bid document and has to submit detail of such agency(s) to Engineer-in-charge of relevant component(s) within prescribed time. Name of the agency(s) to be associated shall be approved by Engineer-in-charge of relevant component(s).
- The main contractor has to engage the CPWD registered Class II contractor under Horticulture category for execution of Horticulture work.**
- 20.1.9 In case the main contractor intends to change any of the above agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge of relevant specialized component(s).  
The new agency/agencies shall also have to satisfy the laid down eligibility criteria. Incase Engineer-in-charge is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
  - 20.1.10 The main contractor has to enter into MoU with agency(s) associated by him. Copy of such MoU shall be submitted to EE / DDH in charge of each relevant

component as well as to Engineer-In-Charge of civil component. In case of change of associate contractor, the main contractor has to enter into MoU/ agreement with the new contractor associated by him.

- 20.1.11 Running payments for the components shall be made by Engineer-in charge / DD (H) of respective component to the main contractor. Running payment for minor components shall be made by the Engineer-in-Charge of the discipline of minor component directly to the main contractor. The CMB / EMB shall be maintained independently by Engineer-In-Charge of major and minor components.
- 20.1.12A. The composite work shall be treated as complete when all the components of the work are complete. The completion certificate of the composite work shall be recorded by Engineer-in-charge of civil component after record of completion certificate of all other components.
- 20.1.12B. Final bill of whole work shall be finalized and paid by the EE of civil component. Engineer(s) in charge of other component(s) will prepare and pass the final bill for their component of work and pass on the same to the EE of civil component for including in the final bill for composite contract.
- 21. **Integrity Pact:** The contractor shall download the Integrity Pact, which is a part of tender documents, affix his signature in the presence of a witness, and upload the same while submitting online bids for all works of estimated cost put to tender equal or more than the threshold value given in Schedule-F. In the event of his failure to sign and upload the Integrity Pact along with other bid documents, his bid shall be rejected.
- 22. The intending bidders are required to update their profile in CPWD e-tender portal and to upload their bids well in advance of last date of submission of tender. Any issue related to updating profile/uploading tender can be resolved through the concerned Executive Engineer/ Assistant Engineer (e-mail Id: eegcdghy@gmail.com) or ERP helpline no. 18001803286 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.

**Executive Engineer (C)  
Guwahati Division  
CPWD, Guwahati - 21**

**PART-II**  
**TECHNICAL BID**  
**(ELIGIBILITY CRITERIA)**

**GLOSSARY**

AAI	Airport Authority of India
ADG	Additional Director General
AE / AEE	Assistant Engineer / Assistant Executive Engineer
APDCL	Assam Power Distribution Company Limited
BIM	Building Information Management
BIS	Bureau of Indian Standards
C & D Waste	Construction & Demolition Waste
COA	Council of Architecture
CPI	Consumer Price Index
CPWD	Central Public Works Department
DBR	Design Basis Report
DLP	Defects Liability Period
DSR	Delhi Schedule of Rates
EE (C)	Executive Engineer (Civil)
EE (E)	Executive Engineer (Electrical)
EMD	Earnest Money Deposit
EPC	Engineering Procurement & Construction
GCC	General Conditions of Contract
GHAR	Green Habitat Accomplished Rating
HSE	Health Safety & Environment
IGBC	Indian Green Building Council
IS	Indian Standard
MAS	Material at Site
MEP	Mechanical Electrical Plumbing
MT	Metric Ton
MTC	Material Testing Certificate
NBC	National Building Code
NGT	National Green Tribunal
NIT	Notice Inviting Tender
OEM	Original Equipment Manufacturer
PPE	Personal Protection Equipment
SAP	Safety Action Plan
SE	Superintending Engineer
SOP	Schedule of Payment / Standard Operating Procedure issued by CPWD
BOQ	Bill of Quantities
STP	Sewage Treatment Plant
TDS	Tax Deduction at Source
TPQAA	Third Party Quality Assurance Agency
WPI	Wholesale Price Index
WTP	Water Treatment Plant

## Section-I

### BRIEF PARTICULARS OF THE WORK

1. Salient details of the work for which bids are invited are as under:

Name of Work	<b>Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&amp;C Quarters, 12 Nos. Grade D &amp; Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche &amp; Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts &amp; Podium Parking including all development works for Civil, E&amp;M, Horticulture and services on EPC (Mode-III) basis].</b>
Estimated cost put to tender	<b>Rs. 364,33,25,464.00</b>
Earnest Money Deposit	<b>Rs. 3,74,33,255.00</b>
Time allowed for Completion	<b>36 (Thirty-Six) Months</b>

2. The work is situated at Zoo-Narengi Road Colony Quarters, Guwahati.

3. General features and major components of the work are as under:

- (i) The site falls under the jurisdiction of Guwahati Metropolitan Development Authority and Guwahati Municipal Corporation. The present tender is for demolition of existing buildings and construction of Residential buildings, club houses and other utility buildings along with related development and other allied works for the disciplines civil, electrical & mechanical and horticulture works on Engineering, Procurement and Construction (EPC-III mode) on turnkey basis in accordance to the Specifications and standard laid down in the tender document.
- (ii) **The brief scope of work is as under :-** The scope of work includes demolition of existing buildings and execution of work as per Good for Construction (GFC)/ approved drawings including foundation, structure, finishing complete in all respects and services as per schedule for the intended buildings and handing over the assets after making them habitable and fit for the intended purpose with laid down quality and within specified time. **The work is to be executed on EPC Mode -III basis.**
- (iii) For residential buildings, club houses, utility buildings, boundary wall, security guard rooms and Development and Bulk services, the Architectural, Structural, all MEP services GFC drawings are being issued by Department along with NIT, however after correlation of the drawings and specifications, if any minor / major components are missing then a separate design/ drawing shall be issued by the

department. However, all shop drawing wherever required shall be prepared by the bidder and get approved from Engineer-in-Charge before execution. E elevational and other minor elements which are inadvertently missing in structural drawings but shown in 3d views/ architectural drawings are included in the scope and detailed element details will be issued subsequently wherever required.

- (iv) The demolition of existing buildings (39 Nos. Blocks) including disposal of C & D waste at appropriate and authorized place as per local govt. guidelines and bylaws.
- 4. The cost of labour, material, tools & plants and machinery required for execution of the whole project as per attached layout plans and drawings is within the scope of this work.
- 5. The buildings and other services are planned to have minimum Platinum rating from IGBC and the contractor to execute the work and documentation accordingly.
- 6. It shall be deemed that the Agency has satisfied himself with the nature and location of the work, general and local conditions and particularly those pertaining to transport including restriction of movement of traffic/vehicles etc., handling, availability and storage of materials, availability of labour, weather conditions at site and general ground/sub soil conditions. Agency is expected to quote their rates accordingly and nothing extra shall be payable for any reason/s whatsoever it may be later on. Engineer-in-Charge shall bear no responsibility for the lack of such knowledge and also the consequences thereof to the Agency.
- 7. The information and site data shown in the drawings and mentioned in the tender documents are furnished for general information and guidance only. The Engineer-in-Charge in no case shall be held responsible for the accuracy thereof or/and deductions, interpretations or conclusions drawn there from by the Agency and no claim shall be entertained whatsoever on this account, if the site conditions/information is different or otherwise incorrect. It will be presumed that the Agency has satisfied himself for all possible contingencies, situations, bottlenecks and acts of coordination which may be required between the different agencies. No hindrance shall be entertained because of these constraints, if so, occurs at any stage.
- 8. During execution, if any deviations in GFC drawings from the NIT are required by the Engineer-in-charge, the same shall be governed as per Clause-12 of contract. The quoted rates of the bidder is deemed to be inclusive of cost of labour, material, tools and plants & machinery required for execution of the whole project as per approved layout plan and GFC Drawings and nothing extra shall be payable unless otherwise specified in the contract.
- 9. CPWD specifications, relevant IS codes, National Building code 2016, IGBC green building rating, CPWD green rating Manual 2021, GHAR Rating standards specifications shall be followed in general except otherwise mentioned in bid document. Manufacture specification shall be followed in case of items for which specifications is not available in the tender documents.
- 10. The defects and deficiencies found during the defect liability period of three years period shall be made good by the Agency at his own cost as per clause 17 of **General Condition**

**of Contract 2024 EPC projects** and modified upto last date of submission of the bid. The contractor shall have obligation to rectify all defects in the structural elements or any other part of building/structure/road etc. due to design deficiency at his own cost for 10 (ten) years from the date of completion as recorded in the completion certificate by the Engineer-in-Charge. Such defects shall be made good by the contractor at his own cost after getting instructions/ notice from the Engineer-in-Charge within the time period specified in such instructions/notice and as per the methodology duly approved by the Engineer-in-Charge.

11. **Electrical & Mechanical Works** :- Details of E&M works are given in Part C of the tender document.
12. Samples of the materials of approved make or otherwise shall be got approved from the Engineer-in-Charge in advance before use in the work.
13. **Detailed Survey** :- Contractor shall conduct detailed survey of the entire area of land with respect to nearest available permanent benchmark, where proposed buildings and all other services like roads, paths, cycle track, drains, and water bodies are located / passes out. However topographical survey of the concerned areas where proposed buildings and roads and other development features/items are to be located is attached with bidding documents for pre knowledge of topography of the site. Contractor has to verify authenticity of attached topographical survey himself. No claim for extra /additional payments owing to/ about the change in site condition shall be entertained in future.
  - (a) Proper Strom Water Drainage arrangement shall be made during execution of the work, so that there is no water logging. It shall be the responsibility of contractor to make necessary arrangement so.
  - (b) It shall be responsibility of the contractor to make proper approach road to the site for smooth operation.
14. Construction of Multi-Storied RCC framed structure Residential Buildings with aluminum form work and compound wall, security guard rooms, utility rooms including foundation as per drawings attached with this tender.
15. The general parameters for built-up area as per scope of work mentioned are as below:

S.NO.	Description	Parameter
(i)	Total Plot Area	40149 sqm (9.92 Acres)
(ii)	Class – III (2 Blocks) & Class – IV (2 Blocks) Quarter	BUA 40292.74 sqm
(iii)	Grade A Officers Quarters (2 Blocks), Grade B & C (2 Blocks) and Grade D Quarters (1 Block) RD Bungalow	BUA 38915.02 sqm
(iv)	Club House & Creche for Staff, Watch Man Cabin 1 , Watch Man Cabin 2, Pump Room, LT Panel & Meter	BUA 1484.37 sqm
(v)	Club House and Creche for officers and Pool changing room.	BUA 1402.60 sqm

16. Miscellaneous & Allied Works in accordance to the CPWD Specifications and standards laid down in NBC 2016 and as mentioned elsewhere in this document:
- a) All civil structure i/c foundation work, masonry work, finishing work, flooring, roofing, false ceiling, door & window work along with fillings, railings, waterproofing work, internal Plumbing, Sanitary and drainage Works.
  - b) External Water Supply & Sewerage, Storm Water, Drainage System, Rain Water Harvesting including trough trenches, Recharge pits and recharge storage tank, disposal of excess overflow etc. Plumbing and sanitary underground services etc.
  - c) Modular kitchen and factory-fitted cupboards.
  - d) Regenerative Lifts.
  - e) Internal electrification & External electrification.
  - f) Electric substation and other allied service as per requirements of service provider or regulatory body.
  - g) Electrical Substation: HT substation LT distribution system, DG sets, rising mains, UPS, GI Cable tray, aviation obstruction lights, Earthing, Lightening arrester etc.
  - h) VRF/VRV system and mechanical ventilation system i/c lift and staircase pressurization.
  - i) Fire Fighting system, Fire Alarm system & PA cum car hailing system.
  - j) Underground water tank with pump house.
  - k) Site Development including Leveling, Roads, Foot paths, Walkways, etc. as per final approved lay out plan.
  - l) Sewage Treatment Plant including recycled water line and organic waste composter.
  - m) Centralized intercom system i/c EPBAX, LAN System, System to take TV Connection, Video phone and CCTV system.
  - n) Rainwater harvesting Modular type including recharge wells, Trenches or Ducts for services.
  - o) External lighting, landscaping lighting, Signage works, CCTV cameras at main entrance points of each tower and common areas as mentioned in this bid document.
  - p) Water supply & Pumps.
  - q) Site development & Landscaping including roads, foot paths, walkways, cycle tracks, sports facilities, water bodies, Horticulture works & irrigation system.
  - r) Grid interactive roof top solar photo voltaic power generation system, Rooftop Solar water Heating System.
  - s) Boom Barrier.
  - t) External service connections for electricity, water supply, sewerage system and other services etc.
  - u) Boundary wall as per design, gates and security posts.

- v) Barricading of all the areas as per requirement of NGT guidelines etc. and dismantling of its foundation, barricading and their removal after completion of work.
  - w) Horticulture works.
  - x) Development of site: levelling, internal roads & paths, filtered water supply, road marking, street lighting, sign board, water treatment plant, external electrical service connection, Solar lighting, Solar water heating system, internal signages & external signages.
  - y) Raising of existing entire plot with hard soil including required rolling of same by vibratory rollers upto the required density as per formation level given in the drawings.
17. Excavation for foundations in all types soil/rock including demolition of RCC structures below ground levels, etc. and disposal of same to designated sites.
18. Shifting /Removal of Services and Statutory Approvals: Contractor shall take all necessary measures required to be taken to remove any live or dead service lines running through the plot area without any extra cost. After completion of the work and commissioning of building(s) along with services, he shall enable project architect/ consultant appointed by CPWD for obtaining completion certificate /occupation certificate, NOC from fire department and any other statutory approval related to building for handing over the assets. Engineer-in-charge and client i.e. RBI shall extent necessary support, as per statutory requirements, to the contractor for these approvals. The Contractor shall seek and provide help in obtaining statutory approvals for all Electrical and Lift Installations. The Contractor shall be bound to abide by all the clauses of all statutory and other approvals.  
The permission for cutting of trees and / or Transplanting of the trees, approval from GMDA, FIRE Deptt., GMC already have been obtained by the consultant of the project.
19. Other Works: Apart from above mentioned works following works are also in the scope of work.
- (a) Contractor shall prepare and submit shop drawings for plumbing, drainage, sewerage, MS grills, SS railings, UPVC windows, all types of door frames and shutters, structural steel work, aluminum work structure glazing work, modular kitchen and wardrobes etc. and detailed layout drawings including 3-D views for all civil and electrical services (duly checked and verified by suitable software), duly supported with design as required by the Engineer-in-charge.
  - (b) Contractor shall submit item wise detailed measurements (RA& final bill) for record and other purpose as per the CPWD specifications and mode of measurement as per direction of Engineer in charge.
20. The contractor shall obtain all service connections like Water Supply, Sewerage, Drainage, Electric Supply, associate in applying for LAN/WAN, Telephone Lines, etc. from the main lines of the respective authorities/service providers and this shall be deemed to be included in the quoted price.
21. The Agency is required to connect all the external services like Water Supply, Sewerage,

Drainage, Electric Supply, LAN/WAN, Telephone Lines, Gas pipe line etc. to the main lines of the authorized service providers like GJB/ GMC / MTNL / IGGL or any other agency and this shall be considered as integral part of scope of work and such cost deemed to be included in the quoted price of the agency.

22. Site shall be handed over to the agency on as & where it is basis. All existing assets for the purpose of demolition, if any, shall be handed over with the fixtures in the existing structures/ premises except the property of services provided such as city services passing through the site such as property of BSNL, GJB, APDCL, IGGL etc. Guidelines issued from time to time by the competent authority for demolition and handling of C & D waste, if any, shall be followed by the agency for which nothing extra shall be payable.
23. The agency shall handover the assets after completion of the work with as built drawings, as built BIM Model, services route plans, maintenance manual, warranties / guarantees or any other document required by the Engineer-in-Charge for maintaining these establishments.
24. Scope of the work also including comprehensive maintenance of some of E&M services. For this purpose, the EPC contractor shall ensure the supplementary contract between OEM / agency supplying and installing of these systems with the client for providing all-inclusive comprehensive annual maintenance service contract for the estimate life (as given) of respective equipment/ system at quoted rate with rate escalation every year on the basis of the price escalation formulae given in the part C of the tender. The OEM will attend the complaint within reasonable period and also routine visit of skilled manpower to check status of the equipment on regular basis during the AMC period.  
The following services under this contract included for comprehensive annual maintenance service contracts are as follows:
  - i) Fire Alarm System – 8 years
  - ii) Lifts – 20 years
  - iii) Centralized intercom system i/c EPBAX and Video Door Phone – 8 years
  - iv) Solar Power and solar heating System – 10 years
  - v) UPS system – 8 years
  - vi) VRF System – 5 years
  - vii) CCTV system (including UPS) – 8 years.
  - viii) STP – 10 years.
25. Testing, commissioning of all services, fittings and fixtures, equipment's and handing over.
26. **Completeness of Work:**
  - a. All Civil, Horticulture and E&M installations shall be completed in all respects and put in to operation even where certain details have not been mentioned / left out in the contract documents and conditions.
  - b. All Civil, Horticulture and E&M works and services shall be declared as completed by Engineer-in-charge after completion of trial run of 1 month or date of completion and handing over of whole / full work under the contract agreement, whichever is later.
  - c. However, If any building, upon completion of all works in it but before completion and

handover of full works under the contract, is taken over by client deptt for their use owing of exigencies, the Engineer-in-charge shall issue a part completion for such building(s)/work(s) provided all Civil and E & M works in said building(s) are completed and fulfill requirement of SITC including fire safety and lift safety NOC/approvals by authorized bodies. However, Security deposit, performance guarantees and any other deposits or recoveries etc. shall be released only on completion of full work under the contract agreement as per terms of **CPWD General conditions of contract 2024 for EPC Projects** amended upto the last date of submission of the bid.

Defect Liability period (DLP) / Guarantees/ Warranty period of all works / machineries/ equipment's/ items shall commence from date of completion of full work (project) under the contract.

27. Work shall be executed according to **General Conditions of Contract 2024 for EPC Projects** corrected upto last date of submission of bid, for Central P.W.D. Works available separately at printer's outlets and on cpwd.gov.in-cpwd publications.
28. **List of all Architectural, Structural, Services, E&M drawings are given at Part-F & Part-G of the tender document.**
29. Project Management-Building Information Modelling (BIM)
  - i) 3D BIM model for entire complex shall be developed by the Agency before taking up execution. It will be developed from advanced detailed drawings on Revit/Architectural CAD software. Co-ordinated construction drawings shall be issued from BIM model for architectural, structural, all multiple services such as HVAC, Fire safety works, Electrical, Plumbing, Sanitary and External services etc. in the building before start of execution of work at site. Consultant should prepare BIM model to combine all services of the building to see if there is any clashes and to remove all those clashes and then issue good for construction drawings.
  - ii) A detailed BIM Execution Plan (BEP), clearly establishing the methodology to implement BIM in the Project Design and Monitoring, is submitted upon award of Contract to the EPC contractor.
  - iii) The EPC contractor shall engage a specialized BIM Consultant duly approved by the Engineer in charge for the development of BIM Model to successfully facilitate the generation of as planned design drawings, construction documents, coordination, scheduling, phasing of the work and handover processes.
  - iv) The overall design work (Structural, Architectural, mechanical, Electrical, Plumbing and other supporting infrastructure facilities) of work shall be done by the specialized agency. The specialized agency is expected to take up the BIM model in line with completed design work to a LOD 350 level to be utilized for construction and operation & maintenance Phases.
  - v) All files and folders generated and prepared on BIM shall be handed over to the RBI. No additional payment should be made in this regard.
30. The scope given above is indicative and suggestive only. The EPC Contractor have to

execute all the required works as per sound engineering practice including all the fittings, fixtures etc. as covered in the scope of work stated in preceding paras above, for making the buildings habitable and fit for occupation and functional use by the user complete in all respects. It is deemed that the rates quoted by the agency are inclusive of the required activities and items to accomplish completion of the works and no extra payment, whatsoever, shall be payable to the agency on this account later on.

### **31. Royalty Clause**

#### **31.1 Deduction of Royalty**

Royalty and other ancillary charges on all minor minerals (such as sand, stone, earth, clay, boulders, aggregates, etc.) used in execution of the works shall be recovered from the Contractor's Running Account Bills and Final Bill at the rates prescribed in the Third Schedule of the Assam Minor Mineral Concession Rules, 2013, as amended by the Assam Minor Mineral Concession (Amendment) Rules, 2021 vide (Gazette notification No. PEM.130/2021/40 dated 07.10.2021), and as may be further revised by the Government from time to time.

#### **31.2 Basis of Recovery**

Recovery of royalty shall be made in proportion to the prescribed percentage of the total project cost, excluding taxes such as GST, Income Tax, etc., as notified in the said Rules.

#### **31.3 Mode of Deposit**

The amounts so recovered on account of royalty and ancillary charges shall be deposited by the Department into the appropriate Government Head of Account or Bank Account as notified by the Government of Assam.

#### **31.4 Responsibility of Contractor**

- (a) It shall be the responsibility of the Contractor to ensure that all minor minerals used in the works are sourced from authorized quarries/mines with valid permits.
- (b) Where the Contractor procures minor minerals through suppliers, it shall be his duty to ensure that due royalty and ancillary charges have been paid by such suppliers. In case of non-payment, the Department shall recover the same from the Contractor's bills.
- (c) No final payment shall be released until satisfactory proof of compliance with royalty payment obligations has been furnished or recovery thereof has been made from the Contractor's bills.

#### **31.5 Applicability**

This clause shall be applied to this tender due for the commencement of the Assam Minor Mineral Concession (Amendment) Rules, 2021.

**Section-II**  
**INFORMATION AND INSTRUCTION FOR BIDDERS**

**1.0 General:**

- 1.1 Letter of transmittal and forms for deciding eligibility are given in Section III.
- 1.2 All information called for in the enclosed forms should be furnished strictly against the relevant columns in the forms. If for any reason, information is furnished on a separate sheet, this fact should be mentioned against the relevant column. If any particulars/query is not applicable in case of the bidder, it should be stated as “not applicable. The bidders are cautioned that not giving complete information called for in the application forms or not giving it in clear terms or making any change in the prescribed forms or deliberately suppressing the information may result in the bid being summarily disqualified. Bids made in any other method than specified in e-tendering process by e-mailed or telegram or telex and those received late will not be entertained.
- 1.3 The bidder should sign each page of application, forms and documents before scanning and uploading.
- 1.4 Over writing should be avoided. Corrections, if any, should be made by neatly crossing out, initialling, dating and rewriting. Pages of the eligibility criteria document are numbered. Additional Sheets, if any, added by the Bidder should also be numbered by him. They should be submitted as a package with signed letter of transmittal.
- 1.5 References, information and certificates from the respective clients certifying suitability, technical knowledge or capability of the bidder should be signed by an officer not below the rank of Executive Engineer/project manager or equivalent.
- 1.6 The bidder may furnish any additional information which he thinks is necessary to establish his capabilities to successfully complete the envisaged work. He is, however, advised not to furnish superfluous information. No information shall be entertained after submission of eligibility criteria document unless it is called for by the Employer.
- 1.7 No information/documents shall be entertained after submission of bid unless it is required to clarify the query raised by Employer. No fresh/revised mandatory document is permitted at this stage.
- 1.8 If private works are shown in support of eligibility, certified copy of the tax deducted at source certificate (TDS) shall be submitted along with the experience certificate and the TDS amount shall tally with the actual amount of work done.

**2.0 Definitions:**

- 2.1 In this document the following words and expression have the meaning here by assigned to them.
- 2.2 Employer means the President of India, acting through the Executive Engineer (C), Guwahati Division, CPWD, Guwahati or its successor as decided by CPWD Directorate.
- 2.3 CPWD Directorate includes Director General / Special Director General / Additional Director General / Chief Project Manager / Chief Architect / Chief Engineer / Chief Engineer-Executive Director / Project Manager / Superintending Engineer /

Superintending Engineer - Project Director / Director (Horticulture).

- 2.4 Bidder / Agency / Contractor / Firm / Applicant means the individual, proprietary firm, firm in partnership, limited company, private or public or corporation. Joint venture and SPV are not acceptable as bidder.
- 2.5 “YEAR” means “Financial year” unless stated otherwise.
- 2.6 “Client Department” means “Reserve Bank of India”
- 2.7 Wherever mentioned in the tender document, GST shall mean Goods and Service Tax-Central, State and Inter State.
- 3.0 **Method of Application (Authorized Signatory)**
  - 3.1 If the bidder is an individual, the application shall be signed by him above his full typewritten name and current address.
  - 3.2 If the bidder is a proprietary firm, the application shall be signed by the proprietor above his full typewritten name and the full name of his firm with its current address.
  - 3.3 If the bidder is a firm in partnership, the application shall be signed by all the partners of the firm above their full typewritten names and current addresses, or, alternatively, by a partner holding power of attorney for the firm. In the latter case a certified copy of the power of attorney should accompany the application. In both cases a certified copy of the partnership deed and current address of all the partners of the firm should accompany the application.
  - 3.4 If the bidder is a limited company or a corporation, the application shall be signed by a duly authorized person holding power of attorney for signing the application accompanied by a copy of the power of attorney. The bidder should also furnish a copy of the Memorandum of Articles of Association Attested by a Public Notary.
- 4.0 **Final decision-making authority**

The employer reserves the right to accept or reject any bid and to annul the process and reject all bids at any time, without assigning any reason or incurring any liability to the bidders.
- 5.0 **Particulars provisional**

The particulars of the work given in Section-I are provisional. They are liable to change and must be considered only as advance information to assist the bidder.
- 6.0 **Site visit**

The bidder shall visit the site of work, at his own cost, and examine it and its surroundings to satisfy himself, collect all information that he considers necessary for proper assessment of the prospective assignment and for quoting their rate judiciously.
- 7.0 **Initial Criteria for Eligibility (Technical Bid)**
  - 7.1 The Bidder should have satisfactorily completed following similar works during the last Seven years ending last day of the month previous to the one in which tenders are invited. For this purpose, cost of work shall mean gross value the completed work including cost of

material supplied by the Government/Client but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent (Applicable for both CPWD and Non-CPWD contractors).

(i). Three similar completed works each costing not less than of **40% of ECPT**.

*or*

Two similar completed works each costing not less than of **60% of ECPT**.

*or*

One similar completed work costing not less than of **80% of ECPT**

**And**

(ii). One completed work having prescribed structural system costing not less than of **20% of ECPT**, completed with monolithic concrete construction with Aluminium form work as prescribed in the tender during the last 7 (seven) years ending last date of the month previous to the one in which tenders are invited.

This work can be part of similar eligible work above or as a separate work

*or*

If the bidder does not have adequate experience of the above prescribed technology then the bidder can associate with contractor having requisite experience of executing work in structural system with the above prescribed technology. Bidder has to submit MoU in the prescribed format (**Form-J**) with such associate contractor, along with his tender, for structural system in prescribed technology only. The associated contractor must satisfy the eligibility criteria of having successfully completed one work of prescribed technology having the cost of structural system not less than of **20% of ECPT** during the last seven years ending last day of month previous to the one in which tender is invited.

In case separate cost of structural system of a prescribed technology is not available in the experience certificate of associated contractor, it will be taken as **30% of completed cost of project/work**.

Associated contractor should not have been debarred from any Ministry or any govt. organization in the last five years. The bidders have to obtain an **affidavit for Non – Black listing (Form L)** from the associated contractor to authenticate that they have not debarred from any Ministry or any govt. organization in the last five years and has to upload the affidavit along with the bid documents.

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

#### **Note:**

For evaluation of the cost of structural system, only the structure casted with prescribed technology will be considered and cost of structural system will comprise of cost of RCC work and shuttering work.

#### **“Similar work” shall mean**

Construction of RCC building with the following requirements:

Minimum one building of 8 (Eight) storeys or more storeys (including structural work) of residential/non-residential building including internal water supply & sanitary installation,

internal electrical installations and any three (03) of the following specialized electrical & mechanical services but one either fire alarm system or fire fighting system, out of the three shall be included:

- i) Lift
- ii) Fire fighting
- iii) Fire alarm system
- iv) Sub Station
- v) DG Set
- vi) HVAC
- vii) External Electrical Installation
- viii) Solar power plant and Solar water heating system.

Balance other four services could be considered even if these had been executed under a separate contract. However, these services executed under a separate contract shall be considered for the purpose of assessing technical competence only without adding its monetary value for determining the eligibility criteria.

OR

Completing balance construction work of one building including structural work minimum upto 8 (Eight) storeys (for calculation of height of storey: basement/s and stilt/s shall be counted as storey and shall be measured for height) including water supply, sanitary installation, Internal Electrical Installations and any three (03) of the following E&M services but one either fire alarm system or firefighting system, out of the three shall be included:-

- i) Lift
- ii) Fire fighting
- iii) Fire alarm system
- iv) Sub Station
- v) DG Set
- vi) HVAC
- vii) External Electrical Installation
- viii) Solar power plant and Solar water heating system.

Balance other four services could be considered even if these had been executed under a separate contract. However, these services executed under a separate contract shall be considered for the purpose of assessing technical competence only without adding its monetary value for determining the eligibility criteria.

**NOTE:**

- (i) The basement, stilt constructed with the building shall be construed as a storey.
- (ii) Mumty and machine room and OHT (including supporting structure above roof) will not be counted as storey for above purpose.
- (iii) For the purpose of similar works, works executed in India only shall be considered.
- (iv) Qualified similar works may be physically inspected by the CPWD Engineers to ascertain

the completion, performance on quality of works for finalizing the Technical bid.

- (v) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple interest rate of 7% per annum, calculated from the date of completion to previous day of last date of submission of tenders.
  - (vi) In case, the eligible work has been executed by a Joint Venture through one or more individual firm(s), then cost of completed work shall be distributed among the individual firm(s) in proportion to their share in Joint Venture and that will be considered as work experience for individual firm(s) for prequalification in bidding.
- 7.2 The bidder should have had average **Annual Financial Turn Over (gross) of 30% of ECPT** on construction works during the immediate last three consecutive financial years ending **31<sup>st</sup> March 2024** in balance sheets duly audited by certified Chartered accountant. Year in which no turnover is shown would also be considered for working out the average. The value of annual turnover figures shall be brought to current value by enhancing the actual turnover figure at simple rate of 7% per annum. (**Scanned copy of certificate from CA to be uploaded by Non C.P.W.D. contractors only**).
- 7.3 The bidder should not have incurred any **loss (profit after tax should be positive)** in more than two years during available last five consecutive balance sheets (Standalone Financial Statement) ending **31<sup>st</sup> March 2024**, duly certified and audited by chartered accountant. (**Scanned copy of certificate from CA with UDIN to be uploaded by Non C.P.W.D contractors only**). (the balance sheet in case of Pvt. / Public Ltd. Company means its standalone financial statement and consolidated financial statement both).
- 7.4 The bidder should have a **Banker's Certificate** from a Commercial Bank of **40% of ECPT** certified by his bankers or **Net worth Certificate** of minimum **Rs. 10% of ECPT**. issued by certified Chartered Accountant with UDIN number. (**Scanned copy of original to be uploaded**). (**Applicable for Non C.P.W.D. contractors only**)
- 7.5 The bidder should have sufficient number of Technical and Administrative employees for the proper execution of the contract. The bidder shall have to submit a list of the employees stating clearly how these would be involved in this work within 15 days of award of work.
- 7.6 The bidding capacity of the contractor should be equal to or more than the estimated cost of the work put to tender. The bidding capacity shall be worked out by the following formula: (**Applicable for both C.P.W.D. and Non C.P.W.D. contractors**)

$$\text{Bidding Capacity} = \{[AxNx1.5]-B\}$$

A = Maximum turnover in construction works executed in any one year during the last seven years taking into account the completed as well as works in progress. The value of completed works shall be brought to current costing level by enhancing at a simple rate of 7% per annum.

N = Number of years prescribed for completion of work for which bids has been invited.

B = Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited.

**The bidder should submit bidding capacity as per Form 'C-3'.**

#### 8.0 Evaluation criteria

8.1 The details submitted by the bidders will be evaluated in the following manner:

8.1.1 The initial criteria prescribed in para 7.0 above in respect of experience of eligible similar works completed, loss, solvency and financial turn over etc. will first be scrutinized and the bidder's eligibility for the work be determined.

8.1.2 The bidders qualifying the initial criteria as set out in para 7.0 above will be evaluated for following criteria by scoring method on the basis of details furnished by them.

(a) Financial strength ( <b>Form 'A' &amp; 'B' or 'B1'</b> )	<b>Maximum 20 marks</b>
(b) Experience in eligible similar nature of work during last seven years ( <b>Form 'C' &amp; Form 'C1'</b> )	<b>Maximum 20 marks</b>
(c) Performance on works ( <b>Form 'D'</b> ) - Time over run	<b>Maximum 20 marks</b>
(d) Performance on works ( <b>Form 'D-1'</b> ) - Quality	<b>Maximum 40 marks</b>
<b>Total</b>	<b>100 Marks</b>

To become eligible for short listing the bidder must secure at least fifty (50) percent marks in each (Section a, b, c & d) and sixty (60%) percent marks in aggregate.

The department, however, reserves the right to restrict the list of such qualified contractors to any number deemed suitable by it.

- Note:**
1. The average value of performance of works for time over run and quality shall be taken on the basis of performance report and eligible similar works.
  2. Performance of works for ongoing works shall be taken by selecting not more than any two ongoing works from the list given.
  3. **Form D-1 need not be filled by the bidder. Marks will be assigned by the designated official committee for quality of works at site based on the inspection of chosen works after opening of technical bid.**

#### Evaluation of performance:

Evaluation of the performance of contractors for eligibility shall be done by the NIT approving authority or a committee constituted by him on the basis of documents submitted. All the eligible similar works executed and submitted by the bidders in support of eligibility and any one of the ongoing works, may be got inspected by a committee which may consist of client or any other authority as decided by NIT approving authority. The marks for the quality shall be given based on this inspection, if inspection is carried out and performance of works as assessed by committee, as per the criteria **defined in form D-1**.

#### Scoring method of evaluation: -

The scoring for evaluation mentioned in these columns shall be done as given in **Perfoma – I**. This should be made part of the tender documents.

#### 9.0 Financial Information:

- 9.1 Bidder should furnish the following financial information:
- 9.1.1 Annual financial statement for the last Five years in **Form ‘A’** and
- 9.1.2 Certificate of Net-worth in **Form ‘B1’** or Banker’s Certificate in **Form ‘B’**
- 10.0 **Experiences in Works Highlighting Experience in Similar Works:**
- 10.1. Bidder should furnish the following:
- 10.1.1 List of all works of similar nature successfully completed during last Seven years in **Form ‘C’**
- 10.1.2 Performance reports (corresponding to work mentioned in **(Form-C)** in **Form-D**). If needed, the bidder may attach a separate certificate in this regard from performance report issuing authority.
- 10.1.3 Any other document as per NIT.
- 10.A Experience of Technology proposed to be used in the work, Bidder should furnish the detail of one work successfully completed during the last seven years using the structural system technology proposed in the letter of transmittal (**Form C-2**) along with experience certificate in **Form D-2**. Or submit the details of the associate firm along with the **MoU** as per the format as required as per para no. 7.1 (ii).
- 11.0 **Organization Information:**
- 11.1 Bidder is required to submit the information in respect of his / her /their organization in Form- ‘E’.
- 11.1.1 The bidder should have sufficient number of Technical and Administrative employees for proper execution of the contract. The bidder should have to submit a list of these employees stating clearly how these would be involved in this work within 15 days of award of work.
- 12.0 **Construction Plant and Equipment:** The Bidder should furnish the list of construction plant and equipment required to be used in carrying out the work
- 13.0 **Letter of transmittal**  
The bidder should submit the Letter of Transmittal attached with the document **(section-III)**
- 14.0 **Opening of Price bid**  
After evaluation of applications, a list of short-listed agencies will be prepared. There after the financial bids of only the qualified and technically acceptable bidders shall be opened at the notified time, date and place in the presence of the qualified bidders or their representatives. **The bid shall remain valid for 75 days from the date of opening of technical bid.**
- 15.0 **Award Criteria**
- 15.1.1 The employer reserves the right, without being liable for any damages or obligation to inform the bidder to:
- (a) Amend the scope of work and value of contract
- (b) Reject any or all the applications without assigning any reason.

- 15.1.2 Any effort on the part of the bidder or his agent to exercise influence or to pressurize the employer would result in rejection of his bid. Canvassing of any kind is prohibited.

**16.0 Action against the bidder(s) for submission of false undertaking on structural stability and soundness:**

Action against the bidder(s) for submission of false undertaking on structural stability and soundness in the tender documents.

1. All the bidders are required to submit the undertaking on structural stability and soundness in the tender documents as per **Form-F**.
2. If the Engineer-in-Charge receives any information about structural failure, of any building/infrastructure constructed by the bidder(s) during last 25 (twenty five) years, making unfit for intended use, the EE or any team as decided by NIT approving authority shall inspect the building/infrastructure. The inspection report along with the recommendations shall be submitted to the NIT approving authority and copy to ADG/SDG.
3. NIT approving authority shall take decision regarding cancelation/ termination of bid/contract, forfeiture of EMD/PG/SDs (as applicable) as per undertaking given by the bidder(s), within 7 working days of receiving the report. The EE shall take immediate necessary action as per decision of NIT approving authority.
4. Further CE/SE will send his recommendations to the ADG/SDG regarding debarment of the bidder. The ADG/SDG will provide an opportunity to the bidder to know his version. After considering bidder(s)'s response, the ADG/SDG will take decision within 15 working days in respect of debarring the bidder, forever from tendering in CPWD and send the intimation to the enlisting authority of CPWD/Non-CPWD as applicable.
5. The debarment order shall be issued and uploaded on the CPWD website by the ADG/SDG. The required changes in ERP tendering system in this respect will be done by the officers as per delegation of authority.
6. ADG/SDG shall be the final authority to take decision for debarment, in this case, for all classes of contractor.

**Proforma - 1****Criteria for Evaluation of the performance of bidder for Pre Eligibility**

S . N o	Attributes	Marks	Evaluation					
(a)	<b><u>Financial Strength</u></b>  (i) Average annual Turnover (ii) Banker's Certificate/	<b>Maximum 20 Marks</b> 16 Marks 4 Marks	i. 60% marks for minimum eligibility criteria ii. 100% marks for twice the minimum eligibility criteria or more. iii. In between (i) & (ii) – on pro-rata basis					
(b)	<b>Experience in Similar class of work</b>	20 marks	(i) 60%marks for minimum eligibility criteria (ii) 100% marks for twice the minimum eligibility criteria or more. (iii) In between (i) &(ii) – on pro-rata basis					
(c)	<b>Performance on works [Time Over Run (TOR)]</b>	20 marks						
	Parameter	Calculation for points	Score				<u>Maximum Marks</u>	
	<b>If TOR=</b>		1.0	2.0	3.00	>3.	<b>20</b>	
	(i) Without levy of compensation		20	15	10	10		
	(ii) With levy of compensation		20	5	0	-5		
	(iii) Levy of compensation not decided		20	10	0	0		
	<b>TOR=AT/ST</b> , where AT=Actual Time; ST= Stipulated Time in the Agreement plus (+) justified period of extension of time. <b>Note:</b> Marks for value in between the stages indicated above is to be determined by straight line variation basis							
(d)	<b>Performance of works (Quality) as per Assessment in Form-D1</b> <b>Maximum- 40 Marks</b>							
	Completed works (max. 25 marks)		Ongoing works (max. 15 marks)		Total marks assessed			
<b>Note : The bidder is required to submit Form-D for all the work listed out by the bidder in Form-C.</b>								

**Section-III**  
**FORM T-1**

**LETTER OF TRANSMITTAL**

**From**

**To**

**The Executive Engineer (C),**  
Guwahati Division  
CPWD, Guwahati - 21

**Sub:** **Submission of bid for the work of** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis].”

**Sir,**

Having examined details given in 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 A to L (except Form D1)** 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 requisite certified banker's certificate and authorize the Executive Engineer (C), Guwahati Division, CPWD, Guwahati to approach the Bank issuing the banker's certificate to confirm the correctness thereof. I/We also authorize Executive Engineer (C), Guwahati Division, CPWD, Guwahati to approach individuals, employers, firms and corporation to verify our competence and general reputation.
4. I/we submit the following certificates in support of our suitability, technical knowledge and capability for having successfully completed the following works:

<b>Name of Work</b>	<b>Certificate from</b>

5. I/we submit the certificates in support of having successfully completed the following works by me/us or our associate agency with monolithic concrete construction with aluminium form work as prescribed in the tender.

Proposed Technology used for structure system	Whether the work shall be got executed by associate agency (Yes/No)	If the work is to be executed by associate agency, name of the associate agency	Name of work executed with proposed technology (By the bidder himself or by the Associate Agency)	Amount of the work	Name of the Client from whom Certificate is obtained
Monolithic concrete construction with aluminium form work					

6. I/We hereby attaching copy of type test report conducted in respect of precast concrete construction system technology proposed to be used in the work (applicable if precast concrete construction system technology is proposed by bidder).
7. I/We hereby submit undertaking on structural stability and soundness as per prescribed format **Form-F**.
8. Format of MoU between main contractor and associated contractor for opted technology in **Form-J**.

**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 if enlisted with C.P.W.D. in case any information furnished by me/us found to be incorrect.

Enclosures

Seal of bidder

Date of submission:

Signature(s) of bidder(s)

## DECLARATION

**To**

**The Executive Engineer (C),**  
**Guwahati Division**  
**CPWD, Guwahati – 21**

**Sub : - Submission of Tender for the work of** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”.

**NIT No. :- 25/ NIT / CE / GHY / 2025-26**

Dear Sir,

It is here by declared that CPWD is committed to follow the principle of transparency, equity, and competitiveness in public procurement.

The subject Notice Inviting Tender (NIT) is an invitation to offer made on the condition that the Bidder will sign the Integrity Pact, which is an integral part of tender/bid documents, failing which the tenderer/bidder will stand disqualified from the tendering process and the bid of the bidder would be summarily rejected.

This declaration shall form part and parcel of the Integrity Pact and signing of the same shall be deemed as acceptance and signing of the Integrity Pact on behalf of the CPWD.

**Yours faithfully**

Signature(s) of bidder(s)

Enclosures

Seal of bidder

Date of submission:

**UNDERTAKING FOR INTEGRITY PACT**

**To**

**The Executive Engineer (C),  
Guwahati Division,  
CPWD, Bamunimaidan,  
Guwahati-781021**

**Sub : - Submission of Tender for the work of** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”.

**NIT No. : 25/ NIT / CE / GHY / 2025-26**

**Dear Sir,**

I/We acknowledge that CPWD is committed to follow the principles thereof as enumerated in the Integrity Pact enclosed with the tender/bid document.

I/We agree that the Notice Inviting Tender (NIT) is an invitation to offer made on the condition that I/We will sign the enclosed Integrity Pact, which is an integral part of tender documents, failing which I/We will stand disqualified from the tendering process. I/We acknowledge that THE MAKING OF THE BID SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of this condition of the NIT.

I/We confirm acceptance and compliance with the Integrity Pact in letter and spirit and further agree that execution of the said Integrity Agreement shall be separate and distinct from the main contract, which will come into existence when tender/bid is finally accepted by CPWD. I/We acknowledge and accept the duration of the Integrity Pact, which shall be in the line with Article 1 of the enclosed Integrity Pact.

I/We acknowledge that in the event of my/our failure to sign and accept the Integrity Pact, while submitting the tender/bid, CPWD shall have unqualified, absolute and unfettered right to disqualify the tenderer/bidder and reject the tender/bid in accordance with terms and conditions of the tender/bid.

Yours faithfully

(Duly authorized signatory of the Bidder)

## INTEGRITY PACT

(To be signed by the bidder and same signatory competent/authorized to sign the relevant contract on behalf of CPWD.)

This Integrity Pact is made at ----- on this ----- day of -----2025.

### BETWEEN

President of India represented through Executive Engineer, Guwahati Division, CPWD, Bamunimaidan, Guwahati-781021 (Assam) (Hereinafter referred as the ‘Principal’, which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assignees.)

### AND

---

(Name and Address of the bidder)

(Hereinafter referred to as the “Bidder/Contractor” and which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assignees).

### Preamble

WHEREAS the Principal has floated the Tender (NIT No. \_\_\_\_/NIT/CE/GHY/2025-26) (hereinafter referred to as “Tender/Bid”) and intends to award, under laid down organizational procedure, contract for “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]” hereinafter referred to as the “Contract.”

AND WHEREAS the Principal values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/ transparency in its relation with its Bidder(s) and Contractor(s).

AND WHEREAS to meet the purpose aforesaid both the parties have agreed to enter into this Integrity Agreement (hereinafter referred to as “Integrity Pact”), the terms and conditions of which shall also be read as integral part and parcel of the Tender/Bid documents and Contract between the parties.

In order to achieve these goals, the Principal will appoint Independent External Monitors (IEMs) who will monitor the tender process and the execution of the contract for compliance with the principles mentioned hereunder

NOW, THEREFORE, in consideration of mutual covenants contained in this Pact, the parties hereby agree as follows and this Integrity Pact witnesses as under:

## Articles

### **Article 1: Commitment of the Principal.**

1. The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:
  - (a) No employee of the Principal, personally or through any of his/her family members, will in connection with the Tender, or the execution of the Contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
  - (b) The Principal will, during the Tender process, treat all Bidder(s) with equity and reason. The Principal will, in particular, before and during the Tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential /additional information through which the Bidder(s) could obtain an advantage in relation to the Tender process or the Contract execution.
  - (c) The Principal shall endeavour to exclude from the Tender process any person, whose conduct in the past has been of biased nature.
2. If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the Indian Penal code (IPC) /Prevention of Corruption Act, 1988 (PC Act) or is in violation of the principles herein mentioned or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can also initiate disciplinary actions as per its internal laid down policies and procedures.

### **Article 2: Commitment of the Bidder(s)/Contractor(s),**

1. It is required that each Bidder/Contractor (including their respective officers, employees and agents) adhere to the highest ethical standards, and report to the Government/Department all suspected acts of fraud or corruption or Coercion or Collusion of which it has knowledge or becomes aware, during the tendering process and throughout the negotiation or award of a contract.
2. The Bidder(s) /Contractor(s) commits himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the Tender process and during the Contract execution:
  - (a) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal employees involved in the Tender process or execution of the Contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the Tender process or during the execution of the Contract.
  - (b) The Bidder(s)/Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission

of bids or any other actions to restrict competitiveness or to cartelize in the bidding process.

- (c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act. Further the Bidder(s)/ Contractor(s) will not use improperly, (for the purpose of competition or personal gain), or pass on to others, any information or documents provided by the Principal/Owner as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
  - (d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the names and addresses of agents/representatives in India, if any. Similarly, Bidder(s)/ Contractor(s) of Indian Nationality shall disclose names and addresses of foreign agents/representatives, if any. Either the Indian agent on behalf of the foreign principal or the foreign principal directly could bid in a tender but not both. Further, in cases where an agent participates in a tender on behalf of one manufacturer, he shall not be allowed to quote on behalf of another manufacturer along with the first manufacturer in a subsequent/parallel tender for the same item.
  - (e) The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.
  - (f) Bidder(s)/Contractor(s) who have signed the Integrity Pact shall not approach the courts while representing the matter to IEMs and shall wait for their decision in the matter.
3. The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
  4. The Bidder(s)/Contractor(s) will not, directly or through any other person or firm indulge in fraudulent practice, wilful misrepresentation or omission of facts or submission of fake/forged documents in order to induce public official to act in reliance thereof, with the purpose of obtaining unjust advantage by or causing damage to justified interest of others and/or to influence the procurement process to the detriment of the Government interests.
  5. The Bidder(s)/Contractor(s) will not, directly or through any other person or firm use coercive practices (which shall include the act of obtaining something, compelling an action or influencing a decision through intimidation, threat or the use of force directly or indirectly, where potential or actual injury may befall upon a person, his/her reputation or property) to influence their participation in the tendering process

### **Article 3: Consequences of Breach**

Without prejudice to any rights that may be available to the Principal/Owner under law or the Contract or its established policies and laid down procedures, the Principal/Owner shall have the following rights in case of breach of this Integrity Pact by the Bidder(s)/Contractor(s) and the Bidder/Contractor accepts and undertakes to respect and uphold the Principal /Owner's absolute right:

1. If the Bidder(s)/Contractor(s) either before award or during execution of Contract has committed a transgression through a violation of Article 2 above or in any other form, such as to put his reliability or credibility in question, the Principal/Owner after giving 14 days' notice to the contractor shall have powers to disqualify the Bidder(s)/ Contractor(s) from the Tender process or terminate/determine the Contract, if already executed or exclude the Bidder/Contractor from future contract award processes. The imposition and

duration of the exclusion will be determined by the severity of transgression and determined by the Principal/Owner. Such exclusion may be forever or for a limited period as decided by the Principal/Owner.

2. Forfeiture of EMD/Performance Guarantee/Security Deposit: If the Principal/Owner has disqualified the Bidder(s) from the Tender process prior to the award of the Contract or terminated/determined the Contract or has accrued the right to terminate/determine the Contract according to Article 3(1), the Principal/Owner, apart from exercising any legal rights that may have accrued to the Principal /Owner, may in its considered opinion forfeit the entire amount of Earnest Money Deposit, performance Guarantee and Security Deposit of the Bidder/Contractor.
3. Criminal Liability: If Principal/Owner obtains knowledge of conduct of a Bidder or Contractor, or of an employee or a representative or an associate of Bidder or Contractor which constitutes corruption within the meaning of IPC Act, or if the Principal/Owner has substantive suspicion in this regard, the Principal/Owner will inform the same to law enforcing agencies for further investigation.

#### **Article 4: Previous Transgression**

1. The Bidder declares that no previous transgressions occurred in the last 5 years with any other Company in any country confirming to the anticorruption approach or with Central Government or State Government or any other Central/State Public Sector Enterprises in India that could justify his exclusion from the Tender process.
2. If the Bidder makes incorrect statement on this subject, he can be disqualified from the Tender process or action can be taken for banning of business dealings/holiday listing of the Bidder/Contractor as deemed fit by the Principal/Owner.
3. If the Bidder(s)/Contractor(s) can prove that he has resorted/ recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal/Owner may, at its own discretion, revoke the exclusion prematurely.

#### **Article 5: Equal Treatment of all Bidders/Contractors/Sub-Contractors**

1. The Bidder(s)/Contractor(s) undertake(s) to demand from all sub-contractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the principle laid down in this agreement/Pact by any of its Sub-Contractors /sub-vendors.
2. The Principal /Owner will enter into Pacts on identical terms as this one with all Bidder(s) and Contractor(s).
3. The Principal /Owner will disqualify Bidders, who do not submit, the duly signed Pact between the Principal/Owner and the Bidder, along with the Tender or violate its provisions at any stage of the Tender process, from the Tender process.

#### **Article 6 : Duration of the Pact**

This Integrity Pact begins when both the parties have legally signed it. It expires for the Contractor 12 months after the completion of work under the contract or expiry of defect liability period or last payment made under the contract, whichever is later and for all other bidders, 6 months after the Contract has been awarded.

If any claim is made/lodged during this time, the same shall be binding and continue to be valid despite the lapse of this Integrity Pact as specified above, unless it is discharged/determined by the ADG/SDG, CPWD concerned.

### **Article 7 : Other Provisions**

1. This Integrity Pact is subject to Indian Law, place of performance and jurisdiction is the Headquarters of the Division of the Principal, who has floated the tender.
2. Changes and supplements as well as termination notice need to be made in writing.
3. If the Contractor is a partnership or a consortium, this Integrity Pact must be signed by all the partners or by one or more partner holding power of attorney signed by all partners and consortium members. In case of a Company, the Integrity Pact must be signed by a representative duly authorized by board resolution.
4. Should one or several provisions of this Integrity Pact turn out to be invalid; the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
5. Issues like Warranty/Guarantee etc. shall be outside the purview of IEMs.
6. It is agreed term and condition that any dispute or difference arising between the parties with regard to the terms of this Integrity Pact, any action taken by the Principal in accordance with this Integrity Pact or interpretation thereof shall not be subject to arbitration.
7. In view of the nature of Integrity Pact, the Integrity Pact is irrevocable and shall remain valid even if the main tender/contract is terminated till the currency of the Integrity Pact.
8. If any complaint regarding violation of Integrity Pact is received directly by the Principal in respect of the contract, the same shall be referred to the IEM for comments/recommendations.

### **Article 8 : Independent External Monitor (IEM)**

1. The Principal appoints competent and credible Independent External Monitor for this Pact after approval by Central Vigilance Commission as per the order of DG CPWD for the same. The task of the Monitor is to review Independently and objectively, whether and to what extent the parties comply with the obligations under this agreement
2. The Monitor is not subject to instructions by the representatives of the parties and performs his/her functions neutrally and independently. The Monitor would have access to all contract documents, whenever required. It will be obligatory for him/her to treat the information and documents of the Bidders / Contractors as confidential.
3. The Bidder(s)/Contractor(s) accepts that the IEM has the right to access without restriction to all project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the IEM, upon his/her request end demonstration of a valid interest, unrestricted and unconditional access to their project documentation. The same is applicable to sub-contractors.
4. The IEM is under contractual obligation to treat the information and documents of the Bidder(s)/Contractor(s)/Sub-contractor(s) with confidentiality. The IEM has also signed 'Non-Disclosure of Confidential Information' and 'Absence of Conflict of Interest'. In case if any conflict of Interest arises at a later date, the IEM shall inform the Engineer-in-Charge and recuse himself/herself from that case.
5. As soon as the IEM notices, or believes to notice, a violation of this agreement, he/she will so inform the Management of the Principal and request the Management to discontinue or take

corrective action, or to take other relevant action. The IEM can in this regard submit non-binding recommendations. Beyond this, the IEM has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

6. The IEM will submit a written report to the ADG/SDG concerned within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.
7. If the IEM has reported to the ADG/SDG concerned, a substantiated suspicion of an offence under relevant IPC/PC Act, and the ADG/SDG concerned has, within a reasonable time, not taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the IEM may also transmit this information directly to the Central Vigilance Commissioner.
8. The Principal will provide to the IEM sufficient information about all meetings among the parties related to the project provided such meetings could have impact on contractual relations between the Principal and the contractor. The parties will offer to the IEM the option to participate in such meetings.
9. The word IEM or monitor would include both singular and plural.

#### **Article 9 : Legal and Prior Rights**

All rights and remedies of the parties hereto shall be in addition to all the other legal rights and remedies belonging to such parties under the Contract and/or law and the same shall be deemed to be cumulative and not alternative to such legal rights and remedies aforesaid. For the sake of brevity, both the Parties agree that this integrity Pact will have precedence over the Tender/Contact documents with regard to any of the provisions covered under this Integrity Pact.

IN WITNESS WHEREOF the parties have signed and executed this Integrity Pact at the place and date first above mentioned in the presence of following witnesses:

.....  
For and on behalf of Principal)

.....  
(For and on behalf of Bidder/Contractor)

WITNESSES:

1 .....

(Signature, name & address)

2 .....

(Signature, name & address)

Place:

Dated:

Note: To be signed by the Bidder and the Engineer-in-Charge.

#### **Provision of IEMs**

IEMs (Independent External Monitors) have been appointed to monitor IP (Integrity pact) for works having estimated cost as mentioned in Schedule F. Details (names, address, number etc.) of IEMs are available in the Schedule F.

**FORM 'A'**  
**FINANCIAL INFORMATION**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”

**NIT No:** - 25/ NIT / CE / GHY / 2025-26

**Name of the firm / Bidder :- .....**

- I. Financial Analysis-Details to be furnished duly supported by figures in balance sheet / profit & loss account for the last five financial years duly certified by the Chartered Accountant, as submitted by the applicant to the Income Tax Department (Copies to be attached).

Sr. no.	Particulars	Financial Years ( <b>Figure in Crores</b> )						
		2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
i)	Gross Annual Turn-over on construction works							
ii)	Profit/Loss (After tax) (Standalone finance statement and consolidated financial statement both)							

- II. Financial arrangements for carrying out the proposed work.

Signature of Chartered Accountant with seal

Signature of Bidder(s)  
(With Seal)

UDIN no. -

**Note:**

1. The Bidder should give information strictly in above format.
2. The annual turnover Figures are to be furnished for last seven years for the purpose of working out bidding capacity of the bidder.

**FORM 'B'**  
**FORM OF BANKER'S CERTIFICATE FROM A COMMERCIAL BANK**

**Name of Work:** "Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]"

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

**Name of the firm / Bidder.....**

This is to certify that to the best of our knowledge and information that M/s./Shri ..... having marginally noted address, .....as a customer of our bank are / is respectable and can be treated as good for any engagement up to a limit of Rs .....  
.....

This certificate is issued without any guarantee or responsibility on the bank or any of the officers.

**(Signature)  
For the Bank**

**NOTE:**

- 1) Bankers certificate should be on letter head of the Bank, addressed to Executive Engineer (C), Guwahati Division, CPWD, Guwahati, Bamunimaidan, Guwahati-21 and should not be more than six months old from the date of opening of technical bid.
- 2) In case of partnership firm, certificate should include names of all partners as recorded with the Bank.

**FORM “B-1”****FORM FOR CERTIFICATE OF NETWORTH FROM CHARTERED ACCOUNTANT**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis”

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

**Name of the firm / Bidder.....**

It is to certify that as per the audited Balance Sheet and Profit & Loss Account during the Financial Year....., the Net Worth of M/s .....(Name & Registered Address of Individual/ Firm/ Company), as on .....(the relevant date) is Rs.....after considering all liabilities. It is further certified that the Net Worth of the company has not eroded by more than 30% in the last three years ending on (the relevant date).

Unique Document Identification Number (UDIN) .....

(Signature of Chartered Accountant)

Name of Chartered Accountant :- .....

Membership No. of ICAI        :- .....

Date and Seal                    :- .....

**NOTE:**

- 1) The certificate should not be more than 6 months old.
- 2) In the case of partnership firm, certificate should include names of all partners as recorded with the Chartered Accountant.

## FORM 'C'

**DETAILS OF ELIGIBLE SIMILAR NATURE OF WORKS COMPLETED DURING THE LAST SEVEN YEARS ENDING PREVIOUS DAY OF LAST DAY OF SUBMISSION OF TENDERS**

**Name of Work:** "Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]"

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

**Name of the firm / Bidder.....**

Sl. No.	Name of work / project and location	Owner or sponsoring organization	Cost of work in Crores of rupees	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Litigation/ arbitration cases pending/ in progress with details*	Name and address/ telephone number of officer to whom reference may be made	Whether the work was done on back to back basis Yes/ No
1	2	3	4	5	6	7	8	9	10

\*Indicate gross amount claimed and amount awarded by the Arbitrator.

Certified that the above list of works is complete, and no work has been left out and that the information given is correct to my / our knowledge and belief

**SIGNATURE OF BIDDER(S)**

**Note:**

**Bidder is required to submit Form D in respect of all the works listed out by the bidder in the Form C.**

**'FORM 'C-1'**  
**PROJECTS UNDER EXECUTION / ONGOING WORKS**

**Name of Work:** "Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]"

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

**Name of the firm / Bidder.....**

Sl. No.	Name of work / project and location	Owner or sponsoring organization	Cost of work in crores of rupees	Date of commencement as per contract	Stipulated date of completion	UpToDate percentage progress of work	Slow progress if any and reason thereof	Name and Address / telephone number of officers to whom reference may be made	Remarks
1	2	3	4	5	6	7	8	9	10

Certified that the above list of works is complete, and no work has been left out and that the information given is correct to my / our knowledge and belief.

**SIGNATURE OF BIDDER(S)**

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

## FORM 'C'-2

**DETAIL OF ONE WORK IN SUPPORT OF HAVING SUCCESSFULLY  
COMPLETED WITH THE STRUTURAL SYSTEM TECHNOLOGY PROPOSED TO  
BE USED IN THE WORK**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

**Name of the firm / Bidder :- .....**

S. No.	Name of Work / Project & location	Owner or sponsoring Organization	Cost of Work in crores of Rupees	Date of commencement as per Contract	Stipulated date of completion	Actual date of completion	Type of Structural system Technology used	Litigation / arbitration cases pending / in progress with details*	Name & address / telephone number of officer to whom reference may be made	Remarks
1	2	3	4	5	6	7	8	9	10	11

**SIGNATURE OF BIDDER(S)  
WITH STAMP**

\*indicate gross amount claimed and amount awarded by the Arbitrator.

## FORM 'C'-3

## Calculation of bidding capacity

## Details of existing commitments and ongoing works.

**Name of Work:** "Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]"

**NIT No:** - 25/ NIT / CE / GHY / 2025-26

**Name of the firm / Bidder.....**

S. No	Name of work/ project and location	Owner or sponsoring organization	Contract value in crore of rupees	Date of commencement as per contract	Stipulated date of completion	Upto date percentage progress of work	Remaining work in percentage (100 - column 7)	Existing commitment Column 4 x Column 8/100	Name and address/ telephone number of officers to whom reference may be made	Remarks
1	2	3	4	5	6	7	8	9	10	11
<b>Total (B) =</b>										
Maximum turnover in last seven years							= Rs.....			
Updated value of turnover (A)							= Rs.....			
No. of years (N)							= .....			
Bidding Capacity= {[AxNx1.5]-B}							=			
<b>Certificate:</b>										
I certify that all the awarded and ongoing works have been included in the above list.										
<b>(Signature of Bidder(s))</b>										
<b>Note: Financial Turnover for last 7 years ending March 2024 should be certified with UDIN No. from Chartered Accountant</b>										

**FORM 'D'****PERFORMANCE REPORT OF WORKS REFERRED IN FORM – C**

1.	Name of work / Project & Location	
2.	Agreement No.	
3.	Estimated Cost	
4.	Tendered Cost	
5.	Date of Start	
6.	Date of completion	
	i) Stipulated Date of Completion	
	ii) Actual Date of Completion	
7.	i) Whether case of levy of compensation for delay has been decided or not  ii) If decided, a) Justified period of extension.  b) Amount of compensation levied for delayed completion, if any	YES / NO
8.	Amount of reduced rate items, if any.	
9.	Performance Report	
	1) Quality of Work	Outstanding/ Very Good/ Good/ Poor
	2) Financial Soundness	Outstanding/ Very Good/ Good/ Poor
	3) Technical Proficiency	Outstanding/ Very Good/ Good/ Poor
	4) Resourcefulness	Outstanding/ Very Good/ Good/ Poor
	5) General Behavior	Outstanding/ Very Good/ Good/ Poor
10	Type of Structure technology used ():-	
11	No. of storeys :- (Note:- Mumty, Machine Room shall not be counted as Storeys)	
12	Whether the work executed with Internal /external electrical installations (Yes/No):-	
13	Whether the work executed with Firefighting works (Yes/No):-	
14	Whether the work executed with Fire Alarm works (Yes/No):-	
15	Whether the work executed with Lift (s) work (Yes/No):-	
16	Whether the work executed with Sub Station / DG Set work (Yes/No):-	
17	Whether the work executed with HVAC work (Yes/No):-	
18	Whether the work executed with Solar PV System work (Yes/No):-	
16	Remarks (if any):	

Note:

1. The performance, if satisfactory, shall be Considered as good for evaluation purpose.
2. This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent.

**“FORM “D-1”**

**ASSESSMENT OF QUALITY FOR COMPLETED AS WELL AS ONGOING WORKS**  
**(Form C & C-1)**

Name of works: -

Date of Inspection: -

Date of submission of report: -

<b>A. General Observation &amp; Operational Aspects</b>		<b>Yes/ No</b>
1.	Availability of approval from local bodies in case of Construction of private buildings.	
2.	Availability of approved Structural drawings	
3.	Observation on seepage/ leakage in the Building	
4.	Whether line level maintained	
5.	In case of basement, observation on seepage, if any	
6.	Any Structural defects/ distress observed. If yes give details	
7.	Whether safety measures adopted at site as per CPWD Safety Code and / or government guidelines are adequate or not	
8.	Whether the welfare facilities provided to labour as per Clause 19H of GCC for CPWD works and/ or government guidelines are adequate or not	
9.	Whether AHU getting automatically switched off and fire damps closed in case of fire signal	
10.	Whether thimbles used for termination of wires in DBs, EDBs & Panels?	
<b>B</b>	<b>Quality of Work</b>	<b>Marks Assessed</b>
1	Quality of plaster/ finishing	
2	Quality of RCC/ CC Works	
3	Quality of Flooring	
4	Quality of Wood work	
5	Quality of Steel work/ Aluminium work	
6	Quality of Plumbing and Sanitary Installation	

7	Quality of Workmanship	
8	Quality of Waterproofing	
9	If cladding done, observation on efficiency/ quality of cladding/ Brick work	
10	Quality of internal electrification work	
11	Quality of DBs, EDBs & Panels?	
12	Quality of E & M equipments, panels & feeder pillars	
13	Quality of fire alarm system/ fire- fighting system	
14	Quality of Air Conditioning work	
15	Quality of Sub-station based on complete live diagram, capacitor panel, power factor, insulating mat, cleanliness, cable termination, earthing pits, earthing of transformer/ DG sets	
16	Quality for Lift	
17	Any Other aspect (To be elaborated)	

Average marks (to be awarded out of 100 Marks based on average marks of marks assessed on each attribute mentioned at B above

Note:

- i. All the above parameters may be considered for assessing the overall quality of work executed by the contractor. Each attribute shall be assessed on maximum marks of 10 under B above.
- ii. In case, any attribute is not applicable, the same may not be included in assessment and mentioned are not applicable (N/A).
- iii. The work as assessed above shall be converted on scale of 25/15 marks for completed / ongoing works respectively.
- iv. In case of eligible completed works being more than one the average marks assigned for eligible completed works shall be considered for marking purpose. Only one ongoing work to be assessed.

**FORM 'D-2'**

**CERTIFICATE OF EXPERIENCE IN SUPPORT OF HAVING SUCCESSFULLY COMPLETED  
ONE WORK WITH THE STRUCTURAL SYSTEM TECHNOLOGY PROPOSED  
TO BE USED IN THE WORK**

1. Name of work/project and location
2. Owner or sponsoring organization
3. Cost of work in crore of rupees
4. Cost of structural system technology
5. Date of commencement as per contract
6. Stipulated date of completion
7. Actual date of completion
8. Type of structural system Technology used
9. Litigation/arbitration cases Pending/in progress with details
10. Name and address/telephone number of officer to whom reference may be made
11. Whether the work was done on back to back basis (yes / no)

Certified that M/s ..... has completed the above work with the structural system technology as per details mentioned above.

**To be signed with date and seal of  
the owner / Sponsoring  
organization**

This should be certified by an officer not below the rank of Executive Engineer/Project Manager or equivalent

**FORM 'E'****STRUCTURE AND ORGANISATION**

**Name of Work:** "Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]"

1. Name and address of the bidder
2. Telephone No./Telex No./Fax No.
3. Legal status of the bidder (Scanned and upload copies of original document defining the legal status)
  - (a) An individual
  - (b) A proprietary Firm
  - (c) A firm in Partnership
  - (d) A limited company or Corporation
4. Particulars of registration with various Government bodies (Scan & upload attested photocopy)

<b><u>Organization/Place of Registration</u></b>	<b><u>Registration No.</u></b>
1.	
2.	
3.	

5. Names and titles of Directors and Officers with designation to be concerned with this work.
6. Designation of individuals authorized to act for the organization.
7. Has the bidder, or any constituent partner in case of partnership firm, Limited company / joint venture, ever has been convicted by the court of Law? If so, give details.
8. In which field of Civil Engineering construction, the bidder has specialization and interest?
9. Any other information considered necessary, but not included above.

**SIGNATURE (S) OF BIDDER(S)**

**FORM 'F'**

**UNDERTAKING ON STRUCTURAL STABILITY AND SOUNDNESS OF ALREADY  
COMPLETED BUILDINGS AND INFRASTRUCTURE PROJECTS.**

**Name of Work:** "Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]"

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

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

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

I/we, also undertake that in addition to above, the Engineer-in-Charge shall be free to debar us forever from tendering in CPWD.

The decision of Engineer-in-Charge or any higher authority shall be final and binding.

Signature of notary  
with seal

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

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

**FORM-G****UNDERTAKING FOR ASSOCIATION OF SPECIALISED AGENCY FOR E & M**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

We undertake that we shall submit within 45 days after award of work an undertaking from the OEMs for all specialised E&M works that “OEM shall unconditionally support the lowest bidder/tenderer technically throughout the execution of contract as well as for Maintenance/Comprehensive Maintenance Contract for the useful life of the system, and they shall also provide all the spares required for healthy functioning of the equipment for at least seven years from the date of supply of equipment”.

**Signature of bidder(s) with stamp**

**FORM 'H'****PROFORMA OF AFFIDAVIT FOR NON - BLACK LISTING**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis”

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

I/we undertake and confirm that our firm / partnership firm has not been blacklisted by any state /Central Departments /PSUs /Autonomous bodies during the last 7 years of its operations. Further that, if such information comes to the notice of the department then I / we shall be debarred for bidding in CPWD in future forever. Also, if such information comes to the notice of department at any time, the Engineer-in-charge shall be free to cancel the agreement and to forfeit the entire amount of Earnest Money Deposit/ Performance Guarantee (**Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid**)

NOTE: Affidavit to be furnished on a ‘Non-Judicial’ stamp paper worth Rs.100/-

Signature of Bidder(s)  
or an authorized person of the firm with stamp

Signature of Notary with seal

**FORM "I"****AFFIDAVIT FOR NON-EXECUTION OF WORKS ON BACK TO BACK BASIS**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

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

Note: Affidavit to be furnished on a Non-Judicial stamp paper worth Rs.100/-

.....

Signature of the Bidder(s) with Stamp

Signature of Notary with seal

Date: -

**FORM "J"****MEMORANDUM OF UNDERSTANDING (MOU) FOR ASSOCIATED CONTRACTOR**

M/s. (Name of the firm with full address) ..... (Henceforth called the Main Contractor)

And

M/s. (Name of the firm with full address) ..... (Henceforth, called the Associated Contractor)

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis”

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

This MoU is made at ..... on ..... between the ..... (herewith called the main contractor) and ..... (herewith called the Associated contractor).

Whereas the main contractor has agreed to entrust the STRUCTURAL SYSTEM of prescribed technology only to the associated contractor.

We state that MoU between us will be treated as an agreement and has legality as per Indian Contract Act (amended up to date) and the department (CPWD) can enforce all the terms and conditions of this agreement for execution of the STRUCTURAL SYSTEM of prescribed technology only in respect of above work. Both of us shall be responsible for the execution of STRUCTURAL SYSTEM as per the agreement to the extent this MoU allows. In case of any delay in the payment by the main contractor, the associated contractor can apply to the CPWD to release the payment under Clause 7B and deduct the same from the bills of the main contractor. In case of any dispute, either of us will go for mediation by the CE or SE (as the case may be) and his decision shall be final and binding on both of us.

We have further agreed as under:

1. The Associated Contractor will execute STRUCTURAL SYSTEM of prescribed Technology works as per terms and conditions of this agreement.
2. All the machinery and equipment, tools and tackles required for execution of the STRUCTURAL SYSTEM of prescribed Technology works, as per this MoU, shall be the responsibility of the Associated Contractor.
3. The site staff required for the execution of STRUCTURAL SYSTEM of prescribed Technology work shall be arranged by the Associated Contractor as per terms and conditions of this MoU.
4. All the correspondence regarding execution of the STRUCTURAL SYSTEM of prescribed Technology work shall be done by the department with the main contractor. In case of non-compliance of the provisions of agreement of the work by the associated contractor, the main contractor shall be held responsible and action will be taken against him as per agreement provisions.
5. In case of non-performance, associated contractor will be debarred from participation or association in the CPWD tenders by the CPWD.

(Authorized Signatory)

SIGNATURE OF THE MAIN CONTRACTOR

Date: .....

Place: .....

1. Witness with address

(From main contractor side)

(Authorized Signatory)

SIGNATURE OF ASSOCIATED CONTRACTOR

Date: .....

Place: .....

1. Witness with address

(From associated contractor side)

**FORM "K"**  
**UNDERTAKING REGARDING ERP Training in CPWD Department**  
**(For Non-CPWD Contractors)**

To,

**The Executive Engineer,  
Guwahati Division, CPWD,  
Guwahati - 781035.**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”

Sir,

Having examined the details given in the bid document for the above work, I/we hereby submit that the Undertaking that :

**“If work is awarded to me, I/we shall obtain ERP (Enterprise Resource Planning) training from CPWD Regional Training Institutes, as applicable, within Two months from the date of receipt of award letter and failure to do so, a recovery of Rs.10,000/- per week shall be made from the R/A bill without giving any show cause notice in this regard.”**

Signature of Bidder(s) or an authorized  
Officer of the firm with stamp  
Date of Submission:

**FORM 'L'****PROFORMA OF AFFIDAVIT FOR NON - BLACK LISTING**

**Name of Work:** “Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]”

**NIT No: - 25/ NIT / CE / GHY / 2025-26**

I/we undertake and confirm that our firm / partnership firm has not been blacklisted by any state /Central Departments /PSUs /Autonomous bodies during the last 7 years of its operations. Further that, if such information comes to the notice of the department then I / we shall be debarred for bidding in CPWD in future forever. Also, if such information comes to the notice of department at any time, the Engineer-in-charge shall be free to cancel the agreement and to forfeit the entire amount of Earnest Money Deposit/ Performance Guarantee (**Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid**)

NOTE: Affidavit to be furnished on a ‘Non-Judicial’ stamp paper worth Rs.100/-

Signature of Associated firm(s)  
or an authorized person of the firm with stamp

Signature of Notary with seal

(Annexure-I)RECEIPT OF DEPOSITION OF ORIGINAL EMD

(Receipt No. ..... / date .....

1. **Name of Work :-** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis].
2. **NIT No. :-** \_\_\_\_/NIT/CE/GHY/2025-26.
3. **Estimated Cost :-** **Rs. 364,33,25,464/-**
4. **Amount of Earnest Money Deposit :-** **Rs. 3,74,33,255/-**
5. **Last date & Time of submission of Bid :-** **15 / 12 / 2025** at 3:00 PM

**{EMD shall be drawn in favor of “The Executive Engineer, Guwahati Central Division, CPWD, Guwahati-21”}**

Name of Contractor: ..... #

1. Form of EMD ..... #
2. Amount of Earnest Money Deposit ..... #
3. Date of submission of EMD ..... #

**# To be filled by EMD receiving EE.**

..... Signature, Name and Designation of EMD  
Receiving officer (EE/AAO) along with Officer Stamp

**Note :-**

- (i) The EE/Engineer in Charge/DDH of any divisions/projects of CPWD or any other office designated by CPWD Directorate from time to time, are authorized to receive the EMDs. These authorities should receive the original EMD for their tenders or tenders of any other division/projects.
- (ii) The NIT approving authority/ Tender inviting authority at the time of issue of NIT also fills and upload the prescribed format of receipt of deposition of original EMD along with NIT.
- (iii) The Authority receiving EMD in original form examines the EMD deposited by the bidder and issues receipt of deposition of earnest money to the agency in a given format uploaded by tender inviting authority. The receipt can also be issued by any subordinate gazette authority as authorized by the EE/Engineer in Charge/DDH.
- (iv) The authority receiving original EMD also intimates tender inviting authority about

deposition of EMD by the agency by email/fax/telephonically.

- (v) The original EMD receiving authority releases the EMD to unsuccessful bidders after the expiry of stipulated bid validity period or immediately after acceptance of the successful bidder, whichever is earlier, after verification from the e-tendering portal website (<https://etender.cpwd.gov.in>) that the particular contractor is not L-1 tenderer and work is awarded.
- (vi) The tender inviting authority calls for original EMD of the L1 tenderer from EMD receiving authority immediately.

**ANNEXURE-II**

Guarantee offered by Bank to CPWD in connection with the execution of contracts on  
 Minimum Rs. 100 /- Non judicial stamp paper)

**Form of Bank Guarantee for Earnest Money Deposit / Performance Guarantee / Security Deposit / Mobilization Advance**

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

OR\*\*

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

We, ..... (indicate the name of the bank) ..... (herein after referred to as "the Bank"), hereby undertake to pay to the Government an amount not exceeding Rs. ..... (Rupees ..... only) on demand by the Government within 10 days of the demand.

We, .....(indicate the name of the Bank) ....., do here by undertake to pay the amount due and payable 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. 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).

We, ..... (indicate the name of the Bank) ....., further undertake to pay the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceeding pending On non-judicial stamp paper of minimum Rs. 100 before any Court or Tribunal, our liability under this Bank Guarantee being absolute and unequivocal. The payment so made by us under this Bank Guarantee shall be a valid discharge of our liability for payment there under and the Contractor shall have no claim against us for making such payment.

We, ..... (indicate the name of the Bank) ....., further agree that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligation here under to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor or for any forbearance, act of omission on the part of the Government or any indulgence by the Government to the said Contractor 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.

We, ..... (indicate the name of the Bank) ....., further agree that the Government at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor at the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee the Government may have in relation to the Contractor's liabilities.

This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

We, ..... (indicate the name of the Bank) ....., undertake not to revoke this guarantee except with the consent of the Government in writing.

This Bank 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 the date of expiry or extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Date: \_\_\_\_\_

Witnesses:

1. Signature \_\_\_\_\_ Authorized Signatory

Name and address Name

Designation

Staff code No.

Bank Seal

2. Signature \_\_\_\_\_

Name and address

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

\*\*In paragraph 1, strike out the portion not applicable. Bank Guarantee will be made either for earnest money or for performance guarantee/security deposit/mobilization advance/Refund of mile stone withheld amount, as the case may be

## **PART-III**

## **FINANCIAL BID**

**CPWD-EPC**

**GOVERNMENT OF INDIA**  
**CENTRAL PUBLIC WORKS DEPARTMENT**  
**Percentage Rate EPC Tender (EPC Mode-III)**

**(A) Tender for the work :-**

**“Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis”**

- (i) Eligibility cum technical bid and price bid are to be submitted online up to 15:00 hrs. on **15 / 12 / 2025**
- (ii) Eligibility cum technical bid to be opened in presence of tenderer /their authorized representative who may be present at 15.30 Hours on **15 / 12 / 2025** at office of the **Executive Engineer, Guwahati Division, C.P.W.D., Bamunimaidan, Guwahati-21.**
- (iii) The date of Opening of the price bid shall be intimated to all eligible bidders separately.

**TENDER / BID**

I/We have read and examined the notice inviting tender, schedule, Specifications applicable, Drawings & Designs, General Rules and Directions, **General Conditions of Contract 2024 EPC PROJECTS** with amendments up to the last date of submission of tenders, clauses of contract, Special conditions, Description of Work & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the President of India within the time specified in Schedule ‘F’ viz., Description of work 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 as per Clause 11 of the **General Conditions of Contract 2024 EPC PROJECTS** with amendments up to the last date of submission of tenders and with such materials as are provided for, by, and in respect of and in accordance with such conditions so far as applicable.

I/We agree to keep the tender open for Seventy-Five (75) days from the date of opening of technical bid and not to make any modification in its terms and conditions.

A sum of **Rs. 3,74,33,255.00** is hereby forwarded in cash/receipt treasury challan / deposit at call receipt of a scheduled bank/fixed deposit receipt of scheduled bank/demand draft of a scheduled bank/bank guarantee issued by a scheduled bank as earnest money.

A copy of earnest money in receipt treasury Challan / deposit at call receipt of a scheduled bank/fixed deposit receipt of scheduled bank/demand draft of a scheduled bank/bank guarantee issued by a scheduled bank is scanned and uploaded. If I/We, fail 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 the complete project referred to in the tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12 of the tender 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-tendering process of the work.

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

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

Signature of contractor \*\*

(i) Signature of Witness

Witness: \*\*Postal Address\*\*

(ii) Signature of Witness

Witness: \*\*Postal Address\*\*

Occupation: \*\*

[\*\* to be filled by contractor]

#### ACCEPTANCE

(To be signed by EE, Guwahati Division, CPWD, Guwahati.)

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

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

(a)

For & on behalf of President of India

Dated: .....

**Executive Engineer (C),  
 Guwahati Division  
 CPWD, Guwahati - 21**

**PROFORMA OF SCHEDULES**  
**(CIVIL, ELECTRICAL AND HORTICULTURE)**

<b>SCHEDULE 'A'</b> (Schedule of work)	<b>Page No. 791 - 793</b>
<b>SCHEDULE 'D'</b> Extra schedule for specific requirements/document for the work, if any.	--NIL-
<b>SCHEDULE 'E'</b> Reference to General Conditions of Contract	<b>General Conditions of Contract 2024 EPC Projects Amendments / Modified up to last date of submission of bid</b>
Name of Work	“Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis].”
Estimated cost of work	Rs. 364,33,25,464/-
<b>Earnest money</b>	Rs. 3,74,33,255/-
Performance guarantee	5 % of accepted bid amount (50% of PG amount will be released after completion of the construction work and remaining 50% shall be released after signing supplementary agreements for the services by the OEM with the RBI)
Security deposit	2.5% of accepted bid amount
<b>SCHEDULE 'F'</b>	
<b>GENERAL RULES &amp; DIRECTIONS:</b>	
Officer inviting tender:	<b>Executive Engineer, Guwahati Division, C.P.W.D., Bamunimaidan, Guwahati-21</b>
Applicable Mode of EPC Contract	Mode-III
Type of Building	Permanent
List of approved construction technologies	Monolithic Concrete constructions system using Aluminium form work

<b>Definitions:</b>	
Engineer-in-Charge for Civil items of work	Executive Engineer (C), Guwahati Division, CPWD, Guwahati. (Major Component: Civil) or his successor thereof.
Engineer-in-Charge for Electrical items of work	Executive Engineer (E), Guwahati Electrical Division, CPWD, Guwahati (Minor Component: - E&M Work) or his Successor thereof.
Engineer-in-Charge for Horticulture items of work	The Deputy Director (Horticulture), CPWD, Guwahati (Minor Component: - Horticulture work) or his successor thereof.
Accepting Authority	The Chief Engineer, Guwahati or his successor thereof /Any other authority as notified by the CPWD Directorate.
Percentage on cost of materials and labour to cover all overheads and profits:	15%
Standard Schedule of Rates  (i) Civil work (ii) Electrical work (iii) Horticulture work	<ol style="list-style-type: none"> <li>1. Plinth Area Rate 2025 with amendments up to last date of submission of bid.</li> <li>2. Delhi Schedule of Rates 2023 Volume-I &amp; II (Civil works with amendments up to last date of submission of bid.</li> <li>3. DSR 2025 (E&amp;M) with amendments up to last date of submission of bid.</li> <li>4. DSR (Wet Riser and Sprinkler System) 2019 with amendments up to last date of submission of bid.</li> <li>5. DSR E&amp;M 2025.</li> <li>6. Horticulture Schedule of Rate 2025 with amendments up to last date of submission of bid.</li> <li>7. Any other schedule of rates issued by CPWD and amended upto date till the last date of submission of tender.</li> </ol>
Department	<b>Central Public Works Department.</b>
Standard CPWD Contract Form	<b>General Conditions of Contract 2024 EPC Projects</b> with amendments up to last date of submission of bid.
<b>All the above documents are available on CPWD web site <a href="http://www.cpwd.gov.in">www.cpwd.gov.in</a></b>	

<b>Clause 1</b>	
(i) Time allowed for submission of Performance Guarantee, Program chart (Time & Progress) and applicable labor licenses, registration with EPFO, ESIC and BOCW Welfare Board or proof of applying thereof from the date of issue of letter of acceptance.	12 days
(ii) Maximum allowable extension with late fee at 0.1% per day of performance guarantee amount beyond the period provided in (i) above	03 days

**Clause 2**

Authority for fixing compensation under clause 2	Chief Engineer, Guwahati, CPWD, Guwahati or any other authority as notified by the CPWD Directorate from time to time or His Successor thereof
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**Clause 5 (Authority to Decide)**

Authority to convey the decision of shifting of milestone and extension of time. (Engineer-in-Charge or Engineer-in-Charge of Major Component in case of Composite Contracts, as the case may be)	Executive Engineer (C), Guwahati Division, CPWD, Guwahati. (Major Component: Civil) or His successor thereof.
Authority to decide rescheduling of milestone and extension of time. (SE/SE&PD/ CE/ CE&ED).	Chief Engineer, Guwahati, CPWD, Guwahati or any other authority as notified by the CPWD Directorate from time to time. or His Successor thereof
Shifting of date of start in case of delay in handing over of site. (SE/SE&PD/CE/ CE&ED)	Chief Engineer, Guwahati, CPWD, Guwahati or any other authority as notified by the CPWD Directorate from time to time. or His Successor thereof

Time allowed for execution of work	(i) <b>36 months</b> for execution of civil, E&M and horticulture works, complete including bulk services & site development works and obtaining all approvals & occupancy certificates from Local Bodies.  (ii) Supplementary agreement to be drawn between OEM / Specialized agency and RBI for maintenance of E&M services after completion of work.
Number of days from the date of issue of letter of acceptance for reckoning date of start	10 (Ten) days from the date of issue of Award Letter or date of handing over of site whichever is later.
Defect Liability Period	36 Months after the date of actual completion of work as recorded by the Engineer-in-Charge

### 5.1 Table of Milestone(s) (Civil)

For Civil Component (In the event of not achieving the necessary progress as assessed from the running payments of Civil Component, following percentage shall be withheld for failure of each milestone subject to max. 5% of the Tendered Amount for Civil work)

Sl. No.	Description of Milestone	Time allowed in days (From Stipulated date of start)	Amount to be withheld in case of Non achievement of milestone
1.1	<ul style="list-style-type: none"> <li>a) Demolition of existing 50% of buildings in the scope of work and disposal of malba/C&amp;D waste etc. to clear the site as required.</li> <li>b) Completion of Labour Hutsments, Field Laboratory &amp; Mobilisation of Manpower.</li> <li>c) Submission of Design mix / RMC proposal for approval.</li> <li>d) Commissioning of Batching plant for concrete production.</li> <li>e) Temporary Barricading of the site.</li> <li>f) Association of Specialized agencies.</li> </ul>	3 months	0.20%

1.2	a) Demolition of existing 80% of buildings in the scope of work and disposal of malba/C&D waste etc. to clear the site as required.  b) Submission of all Good For Construction Drawings using BIM Model of Architectural, Structural, Horticulture, MEP & finishing works, for obtaining NOC from Engineer in Charge (Including Revisions if Any). Finalization of shell plans for shuttering.  c) Uploading all Drawings & BIM Models in ERP Collaboration Tool.  d) Completion of piling work of 40% of total piles.	5 months	0.30%
1.3	a) Completion of piling work of 80% of total piles of residential quarters.  b) Completion of Pile Cap / Pile raft work of 60% of total area of residential quarters.  c) Completion of stilt slab of 25% of officers zone (Grade A, B & C and D quarters) or stilt slab of 25% of Class III & IV quarters.  Or 15% of Total civil component in Financial Terms	8 months	0.30%
1.4	a) Completion of 100% podium and stilt slab of officers zone (Grade A, B & C and D quarters)  b) Completion of 100% of Podium and stilt slab of Class III & IV quarters  c) Preparation od Sample flat for all type of quarters except RD Banglow  Or 25% of Total civil component in Financial Terms	12 months	0.40%
1.5	a) Completion of RCC work upto 3 <sup>rd</sup> Floor roof slab in officers zone (Grade A, B & C and D quarters).  b) Completion of RCC work upto 3 <sup>rd</sup> Floor roof slab in Class III & IV quarters.  c) Completion of Structure of Club House.  Or 35% of Total civil component in Financial Terms	15 months	0.70%

1.6	<ul style="list-style-type: none"> <li>a) Completion of all structure work of Grade A &amp; D quarters and partition wall including plaster and flooring upto 3<sup>rd</sup> floor.</li> <li>b) Completion of RCC work upto 7<sup>th</sup> Floor roof slab in officers zone (Grade B &amp; C quarters) and partition wall including plaster and flooring upto 3<sup>rd</sup> floor.</li> <li>c) Completion of RCC work upto 7<sup>th</sup> Floor roof slab in Class III &amp; IV quarters partition wall including plaster and flooring upto 3<sup>rd</sup> floor.</li> <li>d) Completion of Structure of RD Bungalow.  Or 50% of Total civil component in Financial Terms</li> </ul>	19 months	0.60%
1.7	<ul style="list-style-type: none"> <li>a) Completion of Partition wall of Grade A &amp; D quarters including plaster, flooring, internal water supply lines and sanitary installation.</li> <li>b) Completion of structure work upto mumty level and partition walls including plaster and flooring upto 7<sup>th</sup> floor of Grade B &amp; C quarters.</li> <li>c) Completion of structure work upto mumty level and partition walls including plaster and flooring upto 7<sup>th</sup> floor of Class III &amp; IV quarters.</li> <li>d) Completion of structure of all other ancillary buildings.  Or 75% of Total civil component in Financial Terms</li> </ul>	23 months	0.75%

1.8	a) Completion of All Finishing Works including wood works, door & window work & interior work including Testing & Commissioning for Grade A & Grade D.  b) Completion of Partition wall of Grade B & C quarters including plaster, flooring, internal water supply lines and sanitary installation.  c) Completion of Partition wall of Class III & Class IV quarters including plaster, flooring, internal water supply lines and sanitary installation.  d) Completion of Partition wall including plaster, flooring, internal water supply lines and sanitary installation of all axillary buildings  e) Completion of 50 % of all roadwork, drainage, water supply, UG sump  Or 85% of Total civil component in Financial Terms	27 months	0.75%
1.9	a) Completion of All Finishing Works including wood works, door & window work & interior work including Testing & Commissioning for Grade B & C.  b) Completion of All Finishing Works including wood works, door & window work & interior work including Testing & Commissioning for Class III & Class IV.  c) Completion of All Finishing Works including wood works, door & window work & interior work including Testing & Commissioning for all ancillary buildings.  d) Completion of all roadwork, drainage, water supply, UG sump  Or 95% of Total civil component in Financial Terms	32 months	0.50%
1.10	a) Completion of all construction works for all buildings, including thorough deep cleaning and removal of all protective films.  b) Completion of all civil and development works including testing and commissioning.  c) Obtaining local body clearances, completion certificates, occupation certificates etc. required to declare buildings and campus authorized for occupation including attending	36 months	0.50%

	<p>all Quality Assurance inspection Paras and handing over of the project.</p> <p>Or</p> <p>100% of Total civil component in Financial Terms</p>		
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## 5.2 Table of Milestone(s) (E&M Works)

For E&M Component (In the event of not achieving the necessary progress as assessed from the running payments of E&M Component, following percentage shall be withheld for failure of each milestone subject to max. 5% of the Tendered Amount for E&M work)

### 5.2.1 Table of Milestones: For IEI & external electrical installation

Sl. No.	Description of Milestone	Time allowed in days (From Stipulated date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1.1	a) Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for IEI Work for approval.	3 months	0.1%
1.2	a) Submission of the “Building Information Modelling (BIM) duly integrating and coordinating all services viz plumbing, sanitary, Internal Electrical installations, Fire Fighting, Fire alarm, HVAC, LV services, etc.  b) Submission of shop drawings for internal EI, Fire alarm, CCTV, LAN, EPBAX and Videophone.  c) Submission of method statement by the agency for each activity under this sub-head.	5 months	0.4%
1.3	Completion of conduiting work in stilt and podium for all quarters.	12 months	0.5%
1.4	Completion of conduiting work upto 3 <sup>rd</sup> floor slab for all quarters	15 months	0.5%
1.5	Completion of conduiting work in all buildings	23 months	1%

1.6	Completion of wiring work in all buildings	27 months	0.5%
1.7	Completion of installation/fixing of electrical fans, fittings, DBs, switch- Socket, electrical/floor panels, meter panel in each block etc. as applicable at all the level of all the buildings.	32 months	1.5%
1.8	<ul style="list-style-type: none"> <li>a) Testing &amp; commissioning of all for IEI, fans &amp; external electrical installation as per NIT, applicable local body norms and specifications.</li> <li>b) Submission to CPWD completion plans/As built drawings for the IEI &amp; external electrical installation along with warranty/guarantee certificates, operation manuals etc.</li> <li>c) Obtaining all the requisite clearances &amp; approvals from the local bodies as stipulated in this bid document &amp; as directed by the engineer-in-charge.</li> </ul>	36 months	0.5%

**5.2.2 Table of Milestones: For Sub-station & LT Network (including transformers, HT panel , LT Panel, Cabling etc.)**

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in- Charge (E&M), to be associated for SITC of substation for approval	3 months	0.1%

2)	a) Submission of shop drawings and technical data sheet.  b) Preparation of detailed distribution and substation scheme in coordination with PWD and APDCL and approval from PWD as well as APDCL for the required substation/s and power distribution work.  c) Submission of method statement by the agency for each activity under this sub-head.	5 months	0.4%
3)	Supply of all LT Equipment's, Transformers, LT Panel, Cable and all other equipments pertaining to the substation.	25 months	1%
4)	a) Completion of Installation of all the substation equipments as per the agreement conditions  b) Completion of all LT/Bus duct cabling inside the building & from substation to the individual towers/ building i/c all the necessary civil work  c) Completion of all the HT cabling works required for the energisation of substation.	30 months	2%
5)	Obtaining connection from APDCL i/c clearance from CEA & APDCL etc. testing & commissioning of substation.	33 months	1%
6)	Energisation of substation/s, subsequent handing over the substation to APDCL for operation & maintenance.	36 months	0.5%

### 5.2.3 Table of Milestones: For Diesel Generating sets

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in- Charge (E&M), to be associated for SITC of DG sets for approval.	3 months	0.1%

2)	a) Submission of shop drawings and technical data sheet.  b) Submission of method statement by the agency for each activity under this sub-head.	6 months	0.4%
3)	Completion of Supply of Diesel Generating sets, Cables, synchronisation panels and all other equipments.	27 months	1.5%
4)	Completion of installation of the Diesel Generating sets, Synchronisation panels, Cable laying and all other equipments.	30 months	1.5%
5)	a) Completion of testing & commissioning of all DG sets.  b) Obtaining all the requisite clearances & approvals from the local bodies as stipulated in this bid document & as directed by the engineer-in-charge.	33 months	1%
6)	Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation manuals etc.	36 months	0.5%

#### 5.2.4 Table of Milestones: For Firefighting system

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the fire-fighting works for approval.	3 months	0.1%
2)	a) Submission of shop drawings.  b) Submission of method statement by the agency for each activity under this sub-head.	6 months	0.4%

3)	Completion of piping work for sprinkler in stilt and podium for all the quarters.	14 months	0.5%
4)	Erection of all the vertical risers & piping works on terrace in all the buildings.	26 months	1%
5)	Completion of external piping work.	30 months	1%
6)	Completion of installation of entire fire-fighting installation such as piping works, fire pumps, internal/external hydrants, hose cabinets etc.	33 months	1.5%
7)	a) Testing & commissioning of the entire Firefighting system. b) Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation manuals etc. c) Obtaining Fire NOC & other clearances as stipulated in this bid document & as directed by the engineer-in-charge.	36 months	0.5%

**5.2.5 Table of Milestones: For Fire alarm system, PA system & signages**

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of fire alarm & PA system and its approval.	3 months	0.1%
2)	a) Submission of shop drawings. b) Submission of method statement by the agency for each activity under this sub-head.	6 months	0.4%
3)	Completion of conduiting & wiring work for Fire Alarm & PA system in all the buildings	27 months	1%

5)	Supply of all detectors, fire alarm panels, MCPs, hooters, speakers, amplifiers etc for all the buildings.	30 months	1.5%
4)	Completion of installation of all detectors, fire alarm panels, MCPs, hooters, speakers, amplifiers etc in all the buildings.	33 months	1%
7)	a) Testing & commissioning of the entire Fire alarm system & PA system.  b) Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation manuals etc.  c) Obtaining the Fire NOC & other requisite approvals from the local bodies as stipulated in this bid document & as directed by the engineer-in-charge.	36 months	1%

#### 5.2.6 Table of Milestones: For Centralized Intercom system, EPABX and LAN

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of Centralized Intercom system, EPABX and LAN.	3 months	0.1%
2)	a) Submission of shop drawings  b) Submission of method statement by the agency for each activity under this sub-head.	6 months	0.4%
3)	Completion of conduiting & cabling/ wiring work for Centralized Intercom system, EPABX and LAN. in all buildings	27 months	1%
4)	Supply of Centralized Intercom system, EPABX and LAN. system, phone etc.	30 months	1.5%

5)	Completion of installation work pertaining to Centralized Intercom system, EPABX and LAN. system etc in all the buildings, guard rooms etc.	33 months	1%
7)	a) Testing & commissioning of entire EPABX & LAN installation. b) Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation manuals etc.	36 months	1%

#### 5.2.7 Table of Milestones: For CCTV Surveillance System, Boom Barrier

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of CCTV system, Boom barrier and its approval.	2 months	0.1%
2)	a) Submission of shop drawings. b) Submission of method statement by the agency for each activity under this sub-head.	6 months	0.4%
3)	Completion of conduiting & cabling/ wiring work for CCTV in all buildings	27 months	1%
4)	Supply of camera, NVR, Switch, monitor, Hard disk, Boom barriers, reader etc.	30 months	1.5%
5)	a) Completion of installation work pertaining to CCTV system in all the buildings & for external surveillance. b) Completion of installation of Boom barriers.	33 months	1%

7)	a) Testing & commissioning of entire CCTV installation.  b) Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation manuals etc.	36 months	1%
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**5.2.8 Table of Milestones: For VRF (Air conditioning) works**

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of air conditioning system and its approval.	3 months	0.1%
2)	a) Submission of shop drawings including heat load calculations, design, selection of equipments etc.  b) Submission of method statement by the agency for each activity under this sub-head.	6 months	0.4%
3)	Installation of refrigerant piping, ducting, insulation etc.	24 months	0.5%
4)	1) Supply of VRF/VRV system outdoor/indoor units, TFA, electrical panels, pressurisation fans and other ancillary Components.	27 months	2.0%
5)	Completion of installation of VRF/VRV system, TFA, electrical panel, pressurisation fans etc. as per the conditions give in the bid document.	33 months	1%
6)	a) Testing & commissioning of the entire air conditioning installation along with submission of seasonal test reports etc.  b) Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation	36 months	1%

	manuals etc.		
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**5.2.9 Table of Milestones: For Lifts**

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of lifts and its approval.	4 months	0.1%
2)	Submission of GAD drawing for 10 Nos. lifts	18 months	0.4%
3)	Submission of GAD drawing for another 10 Nos. lifts	23 months	0.4%
4)	Completion of supply of 10 Nos. lifts	24 months	1.5%
5)	Completion of lift installation (10 Nos.)	28 months	0.5%
6)	Supply of remaining 10 Nos. lifts	29 months	1.25%
7)	a) Completion of lift installation in all the Buildings  b) Testing and commissioning of lifts in All the buildings	33 months	0.6%
8)	a) Testing & commissioning of all Lift installations.  b) Submission of warranty/guarantee certificates, operation manuals, AMC etc. for the lift installation  c) Obtaining the lift NOC as stipulated in this bid document & as directed by the engineer-in-charge.	36 months	0.25%

**5.2.10 Table of Milestones: For Uninterruptible Power Supply.**

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of UPS and its approval.	3 months	0.1%
2)	Preparation & submission of load analysis as per the criteria given in the bid document and finalisation of capacity of UPS.	6 months	0.4%
3)	Submission of General Arrangement Drawing and submission of technical data sheet for approval.	9 months	0.5%
4)	Supply of Uninterruptible Power Supply and other ancillary Components at site.	30 months	2%
5)	Completion of installation of the UPS, Battery banks & all other associated ancillary works.	33 months	1%
6)	a) Testing & commissioning of all Uninterruptible Power Supply services and making the campus fit for occupation. b) Submission of warranty/guarantee certificates, operation manuals etc.	36 months	1%

**5.2.11 Table of Milestones: For Grid connected Solar Power Plant and Soler heating system.**

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead

			mentioned in payment schedule for construction works (E&M Works) of bid.)
1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of solar power plant and its approval.	3 months	0.1%
2)	a) Preparation, Submission & issuance of all proof checked shop drawings b) Submission of method statement by the agency for each activity under this sub-head.	6 months	0.4%
3)	a) Completion of structure for mounting PV panels. b) Supply of Grid connected Solar Power Plant equipment and other ancillary Components.	27 months	2.5%
4)	a) Completion of all the installation works pertaining the grid connected solar power plant b) Testing & commissioning of all Grid connected Solar Power Plant and obtaining net metering facility from the APDCL.	33 months	1%
5)	Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation manuals etc.	36 months	1%

**5.2.12 Table of Milestones: For Water pumping system, STP, Water Filtration Plant and Water treatment Plant.**

Sl. No.	Description of Mile stone	Time allowed in days (From date of start)	Amount to be withheld in case of Non achievement of each mile stone (% of individual subhead mentioned in payment schedule for construction works (E&M Works) of bid.)

1)	Submission of documents and credentials of associate agency, to the entire satisfaction of Engineer-in-Charge (E&M), to be associated for the SITC of water pumping system, STP, Water Filtration and Water treatment Plant.	4 months	0.1%
2)	Submission & finalization of pump room layout, Design sheet of water pumping sets, STP, Water Filtration and Water treatment Plant.	7 months	0.4%
3)	Supply of all kind of tanks, Pump-sets and associated accessories i.e. valve, panels etc.	27 months	2%
4)	Completion of all associated Piping & wiring, cabling for sensors & all the essential electrical works required for the working of the pumping system, STP, Water Filtration and Water treatment Plant.	30 months	1%
5)	Completion of all the installation works pertaining to the water pumping system, STP, Water Filtration Plant and Water treatment Plant.	33 months	1%
6)	a) Testing & commissioning the entire water pumping system, Water Filtration and Water treatment Plant. STP and obtaining NOC for Operation of STP.  b) Submission of completion plans/As built drawings for the E&M services, warranty/guarantee certificates, operation manuals etc.	36 months	0.5%

### 5.3 Milestone(s) table for Horticulture

For Horticulture Component (In the event of not achieving the necessary progress as assessed from the running payments of Horticulture Component, following percentage will be withheld for failure of each milestone subject to max. 5% of the Tendered Amount of work)

Sl. No.	Description of Milestone	Time allowed in days (From Stipulated date of start)	Amount to be withheld in case of Non-achievement of milestone
1.1.	Supply of Plants, Filing of soil complete as required	30 months	3%
1.2	Completion of above work	36 months	2%

**Note:-**

### Officer's Quarters Zone :

#### 1. STILT & PODIUM FOR PARKING

2. GRADE A QUARTERS	2 Towers (S+P+7), (S+P+6) (60 NOS.)
2. GRADE B&C QUARTERS	2 Towers (S+P+9) (60 NOS.)
3. GRADE D QUARTERS	1 Tower (S+P+5) (12 NOS.)
4. GRADE -F (RD) Quarters	1 Tower (G+1) QUARTER

### Staff's Quarters Zone :

1. STILT & PODIUM FOR PARKING	
2. CLASS III QUARTERS	2 Towers (2S+P+9) (80 NOS.)
3. CLASS IV QUARTERS	2 Towers (2S+P+9) (80 NOS.)

### Ancillary structures:

1. WATCHMAN CABIN 1&2
2. CRECHE
3. CLUB HOUSE FOR OFFICIALS
4. SWIMMING POOL
5. CLUBHOUSE FOR CLASS III & IV RESIDENTS
6. CARETAKER BLOCK FOR STAFF
7. CARETAKER BLOCK FOR OFFICERS
8. WATER TANK & PUMP ROOM
9. SUBSTATION

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 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 milestones.
3. Monthly recovery for delay in submission of the monthly progress report within specified period in terms of delay days @ Rs 10000/- per day.

### Performa of Schedules

Schedule of handing over of site:	Site is available
Schedule of issue of Design	All architectural and Structural drawings are included in the NIT.
Clause :- 6	Yes, Applicable
Clause 7	

<p>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</p>	<p><b>I. Civil Rs 900 lakh</b>  <b>II. Electrical Rs. 300 lakh</b>  <b>III. Horticulture Rs. 10 lakh</b></p> <p>However, the Engineer-in-Charge at his discretion may release monthly payment even at a lesser amount subjected to availability of funds from client and LoC. But Contractor should not claim it as a matter of right and no interest payment as per clause 7 is permitted unless the work executed is beyond Gross value of work done as stipulated above and the bill is received in the division office, complete in all respects with all required attachments &amp; Annexures /Statements.</p>	
<p><b>Whether Clause 7A shall be applicable</b></p>	<p>Yes, 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 as submitted by the Bidder to the Engineer-in Charge.</p>	
<p><b>Clause 8</b></p>		
<p>Detail of building/infrastructure project to be completed early for use :</p>		
<p>Sl. No.</p>	<p>Name of building/infrastructure project to be completed</p>	<p>Remarks</p>
	<p>As per program prepared by bidder</p>	
<p>Competent Authorities to inspect and issue part / final completion certificate</p>	<p>The Chief Engineer, Guwahati, CPWD, Guwahati, or his successor thereof /Any other authority as notified by the CPWD Directorate.</p>	
<p><b>Clause 8 A</b>  Authority to decide compensation on account if contractor fails to submit completion plans.</p>	<p>The Chief Engineer, Guwahati, CPWD, Guwahati, or his successor thereof /Any other authority as notified by the CPWD Directorate.</p>	
<p>Recovery rate for not submission of completion plans by the contractor</p>	<p>0.1% of tendered value of all Components subject to ceiling of <b>Rs. 100,00,000/- (Rupees One Hundred Lakh).</b></p>	
<p><b>Clause 10B (i)</b></p>	<p>Yes - Applicable</p>	
<p><b>Clause 10B (ii)</b></p>	<p>Yes - Applicable</p>	
<p><b>Clause 10B (iii)</b></p>	<p>Yes - Applicable</p>	
<p><b>Clause 10CC</b></p>	<p>Yes - Applicable</p>	
<p>Sl. No.</p>	<p>Relevant component of material/labour for price escalation</p>	<p>Percentage of total value of work</p>

1	Component of cement	15%
2	Component of labour	25%
3	Civil component of other civil construction materials including POL (diesel) and Bitumen	27%
4	Electrical and Mechanical (E&M) component of construction materials.	13%
5	Reinforcement steel bars/TMT bars/structural steels (Including strands and cables)	20%
	<b>Total</b>	<b>100%</b>
<b>Clause 11</b>		
Specifications to be followed for execution of work		<p><b>CIVIL WORKS :-</b></p> <ol style="list-style-type: none"> <li>1. CPWD Specifications 2019, Volume- I and II and DPAR-2023 as amended up to last date of submission of bid.</li> <li>2. IGBC green homes V3.0 /CPWD Green Rating Manual 2021 as amended up to last date of submission of bid.</li> <li>3. CPWD Handbook on Safety, Health and Environment as amended up to last date of submission of bid.</li> <li>4. CPWD Manual on Accessible Built Environment 2019 as amended up to last date of submission of bid.</li> </ol> <p><b>Horticulture Works - Specifications (Horticulture &amp; Landscaping) - 2020</b> as amended up to last date of submission of bid.</p>

	<p><b>Electrical work :-</b></p> <ol style="list-style-type: none"> <li>1. CPWD General Specification for electrical works Part I Internal 2023 as amended up to last date of submission of bid.</li> <li>2. CPWD General Specification for electrical works Part II External 2023 as amended up to last date of submission of bid.</li> <li>3. CPWD General Specification for electrical works Part IV Sub-Station 2013 as amended up to last date of submission of bid.</li> <li>4. CPWD General Specification for electrical works Part III Lift and Escalators 2003 as amended up to last date of submission of bid.</li> <li>5. CPWD General Specification for electrical works Part V Wet Riser &amp; Sprinkler system – 2020 as amended up to last date of submission of bid</li> <li>6. CPWD General Specification for electrical works Part VI Fire Detection and Alarm System – 2018 as amended up to last date of submission of bid</li> <li>7. CPWD General Specification for electrical works Part VII DG Sets - 2013 as amended up to last date of submission of bid</li> <li>8. CPWD General Specification for electrical works Part VIII Gas Based Fire Extinguishing System - 2013 as amended up to last date of submission of bid.</li> <li>9. General Specification for Heating Ventilation &amp; Air- Conditioning-2017 and amended upto last date of submission of bid.</li> <li>10. Indian Electricity Act 2003 amended up to last date of submission of bid.</li> <li>11. National Electrical Code. 2017 amended up to last date of submission of bid.</li> <li>12. Indian Electricity Rule 2005 amended up to last date of submission of bid.</li> <li>13. National Building Code 2016 as amended up to last date of submission of bid.</li> <li>14. GREEN AND GHAR RATING and <u>Barrier Free and Accessibility norms.</u></li> </ol>
<b>Note</b>	<ol style="list-style-type: none"> <li>1. All above specifications shall be applicable with corrections slips amended / modified up to last date of submission of bid.</li> <li>2. In case of discrepancy in mentioned items /</li> </ol>

	<p>description among any of the following two or more documents, the following order of preference shall be followed. If any item required for completing the work in any of the following documents but not in the order of preference below, shall be applicable and nothing extra shall be paid on this account. However, quantities mentioned in “Schedule of Quantities” shall have precedence among all the following documents for payment purpose.</p> <ul style="list-style-type: none"> <li>(i) Description under Scope of work in the NIT.</li> <li>(ii) Architectural Drawings and Schedule of finishes in the NIT.</li> <li>(iii) Schedule of Quantities.</li> <li>(iv) Technical Specifications, Additional Conditions &amp; Special Conditions of NIT.</li> <li>(v) CPWD Specifications for Civil, Electrical &amp; Mechanical and Horticulture with up-to-date corrections as on last date of submission of Bid.</li> <li>(vi) Contract clauses of General conditions of contract for Central P.W.D. works 2024 – EPC Projects.</li> <li>(vii) Indian Standard Specifications of B.I.S.</li> <li>(viii) National Building Code 2016</li> <li>(ix) Manufacturer's specifications.</li> <li>(x) International Standard &amp; Specifications.</li> <li>(xi) Sound Engineering practices.</li> <li>(xii) Decision of the Engineer-in-charge</li> </ul>
As per specifications in this bid document, ECBC 2017, NBC 2016 and relevant BIS codes modified and corrected up to last date of submission of the bid shall be referred.	
Building information Model (BIM) is applicable:	<p>YES, Applicable.</p> <p>The 3D Architectural Models of the project will be prepared on any BIM applications with minimum LOD 350 and IFC format of the same shall be made available for interoperability of building information to all stakeholders of the project.</p> <p>The 3D Architectural BIM model information(s) shall be used for structural, MEP services and</p>

		<p>horticulture design. The comprehensive BIM model with minimum LOD350 of project shall have all the architectural, structural, horticulture and MEP services elements.</p> <p>All the BIM Models shall be uploaded on CPWD ERP collaboration portal by the contractor and shared with the Engineer-In-Charge on CPWD ERP collaboration portal.</p> <p>All architectural and MEP drawings (2D) shall be generated from BIM model. All the structural shall be in conformity with BIM model.</p> <p>Project or work shall be executed using 2D drawings generated from BIM model.</p>				
<b>Clause 12</b> Deviation limit beyond which clauses 12.2 and 12.3 shall apply for all types of works :		As per GCC 2024 EPC Projects.				
<b>Clause 16</b> Competent authority for deciding reduced rates.		The Chief Engineer, Guwahati, CPWD, Guwahati, or his successor thereof /Any other authority as notified by the CPWD Directorate.				
<b>Clause 19 C</b> Penalty for Rs. 5,000/- each default		The Engineer-in-Charge. or His successor thereof				
<b>Clause 19 D</b> Penalty for Rs. 5,000/- each default		The Engineer-in-Charge. or His successor thereof				
<b>Clause 19 G</b> Rs. 5,000/- per day for each default (subjected to a maximum of 5% of the estimated cost put to tender)		The Engineer-in-Charge. or His successor thereof				
<b>Clause 19 K</b> Penalty for each default Rs 5000/- per tradesman per day.		The Engineer-in-Charge. or His successor thereof				
<b>Clause 25 (Settlement of Disputes by Conciliation and Arbitration)</b>						
i) Conciliator		ADG, Guwahati				
ii) Arbitrator Appointing Authority		Chief Engineer, Guwahati, CPWD, Guwahati				
iii) Place of Arbitration		Guwahati only				
<b>Clause 32</b>						
<b>Requirement of technical representative(s) and recovery rate</b>						
S. No	Minimum Qualification of Technical Representative	Designation of Technical Staff	Minimum experience (Years)	Number (Civil + E&M)	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause36(i)	Period of Deployment
					Figures	Words
1	Graduate Engineer (Civil Engineering)	Project Manager	20 (and having experience of one similar nature of work)	1 No.	Rs. 60,000/- per month	Rs. sixty thousand per month.
						Full duration from start of work to

							final bill payment
2	Graduate Engineer (Civil / Electrical Engineering)	Deputy Project Manager (Civil and Electrical)	12 (and having experience of one similar nature of work)	2+1 Nos.	Rs. 40,000/- per month per person	Rs. forty thousand per month per person	From start of work to completion of respective component of Work
3	Graduate Engineer or Diploma Engineer (Civil / Electrical / Mechanical Engineering)	Project/Site Engineer	5 or 10 respectively	4+2 Nos.	Rs. 25,000/- per month per person	Rs. twenty five thousand per month per person	- do-
4	Graduate Engineer(Civil/ Electrical Engineering)	Quality Engineer (Civil & Electrical)	8	1+1 Nos.	Rs. 25,000/- per month per person	Rs. twenty five thousand per month per person	- do-
5	Diploma Engineer (Civil Engineering)	Surveyor	8	1	Rs. 15,000/- per month per person	Rs. fifteen thousand per month per person	- do-
6	Graduate Engineer(Civil/ Electrical Engineering))	Project Planning/Billing Engineer	6	1+1 Nos.	Rs. 20,000/- per month per person	Rs. twenty thousand per month per person	Full duration from start of work to final bill payment
7	Graduate Engineer or Diploma Engineer (Civil / Electrical / Mechanical Engineering	BIM professional	5	1 No.	Rs. 2,00,000/- per month per person.	Rs. Two lac per month per person	From start of work to completion of respective component of Work

Note:

- Assistant Engineers retired from Government services, who 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 such deployment subject to the condition that such diploma holders should not exceed 50% of requirement of degree engineers.
- The above given strength shall be required to be deployed as and when necessity arises at site or so directed by Engineer-in-charge.
- The Tenderer shall submit a certificate of employment of the technical representative (s) (in the form of

copy of Form -16 or CPF deduction issued to the Engineers employed by him) along with every account bill/final bill and shall produce evidence of regular physical availability of such engineers on the above project at any times if so required by the Engineer-in-charge.

4. The Recovery on account of non-deployment of technical staff shall be made by the Engineer in Charge of the respective Discipline / Component.

### Clause 38

(i)	(a)	Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of “Delhi Schedule of Rates 2023” with correction slips issued upto last date of submission bid	
(ii)		Variations permissible on theoretical quantities:	
	(a)	Cement for works with estimated cost put to tender more than Rs.25 lakh.	3% plus / Minus
	(b)	Bitumen all works	2.5% plus only and 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

### Provision of Independent External Monitors

- (i) Integrity Pact would be applicable for the work having estimated cost put to tender Rs.300 crore and above.
- (ii) Particulars of IEMs appointed by CVC are given below :

S. No.	Name of IEM	Address
1.	Sh. Vinayaka Rao Turaga IOFS (Retired)	Turaga House, Anne Baburao Colony, Penamaluru, Vijaywada, Andhra Pradesh – 521139 email: <a href="mailto:tvrao56@gmail.com">tvrao56@gmail.com</a> Mobile: 9007723414
2.	Dr. Ravindra Kumar Srivastava IAS (Retired)	A6 Anand Niketan, New Delhi - 110021 email: <a href="mailto:srivastava.rks@gmail.com">srivastava.rks@gmail.com</a> Mobile: 9999985440
3.	Sh. Vijay Kumar Singh Principal Chief Conservator of Forest HAG (Retired)	House no. 12 stellar Okas Golf View, Sector-H, Sushant Golf City, Lucknow Pin- 226030 email: <a href="mailto:ksingh_vijay@yahoo.com">ksingh_vijay@yahoo.com</a> Mobile: 9717581113

**Executive Engineer(C),  
Guwahati Division  
CPWD, Guwahati**

**Name of Work :** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]

## **PART-B (Civil Work)**

### **Chapter-A : Scope & Specifications of Deconstruction (Demolition) work**

## Scope of Works

RBI Colony is situated near Mother Teresa Road along with Ambikagiri road at Hatigarh Charaili, Guwahati, Assam. This area falls under the jurisdiction of Guwahati Municipal Corporation (GMC). The location plan is as under :



1. The scope of work includes demolition of existing structures, Construction of multi-storeyed residential RCC buildings with monolithic technology using aluminium shuttering, pump room, substation, STP and other ancillary structure i/c all civil, electrical works and Horticulture services and handing over the assets after making them habitable in all aspects. The work is to be executed on EPC (Engineering, Procurement & Construction) (Mode-III) basis. The cost of labour, material, tools & plants and machinery required for execution of the whole project as per attached layout plans and drawings is within the scope of this work. The buildings shall be planned to obtain Platinum rating as per IGBC (Indian Green Building Council) amended upto last date of submission of bids.
2. The brief details of the project are mentioned below:
  - i) Demolition of all the existing structures at the site as per directions of Engineer-in-Charge.
  - ii) Construction of Multi-storeyed (Grade -F (Regional Director) (G+1) quarter, Grade D quarters (S+P+5) (12 nos.), Grade B & C quarters (S+P+9) (60 nos.), Grade A quarters (S+P+6 & S+P+7) (60 nos.), Class III quarters (2S+P+9) (80 nos.) & Class IV quarters (2S+P+9) (80 nos.)) with stilt, Podiums along with all related external development, plinth protection work all around the building and other allied works to complete the entire project.
  - iii) The scope of work also includes construction of Club house - 2 for class III & IV residents, Club house - 1 for officers, caretaker block for staff, caretaker block for officers, water tank & pump room, substation, STP, Swimming pool, boundary walls along with all related external development work, park and other allied works.

- iv) Mapping and shifting of all the existing underground services and above the ground in consultation with the concerned departments and Engineer-in-Charge at his own cost. All statutory expenses, if any, shall be reimbursed by the department after production of original receipts of payment made by the agency.
  - v) Development of area, landscaping, boundary wall, internal roads, pathways, street lighting, Parks, Cycle track, Sports facilities, Social facilities and other amenities i/c other ancillary structure etc. as per this tender document as required for safe living to meeting the functional and statutory requirements as applicable.
  - vi) Supplying, Installation, Testing and Commissioning of internal electrical installations and luminaires, Fire Fighting, Fire Alarm System, PA System, Lifts, DG sets, UPS, Intercom & CCTV system, street lightening with LED, water supply pumps, Hydropneumatic systems, water filtration plant, Solar PV power generation system, solar water heating system, boom barrier, VRV / VRF system, organic waste composter, emergency light illumination signages, Lightning conductor.
  - vii) Horticulture/ landscape enabling work (i/c soil filling & plantation as per requirement i/c all internal & external service connections of civil, E&M works etc. as per GFC drawings by incorporating stipulated specifications and integrating all internal and external services etc., including all incidental works and handing over in accordance with approved layout plan and architectural / structural drawings. The layout plan and architectural / structural/ MEP drawings are provided in the tender document.
  - viii) The Schedule of finishes as attached in Part-B of this NIT is part of the scope of work.
3. In case item and specifications of items are not explicitly mentioned in the bid documents same shall be executed as per the CPWD Specifications, NBC-2016, BIS Codes, Manufacturers Specifications, International Standard & Specifications if relevant Indian specifications are not available or according to sound engineering practices so as to make the building and services fully functional. No claim what so ever shall be entertained on this account.
  4. The contractor shall comply all requirements to obtain “PLATINIUM” IGBC green rating system as per IGBC green homes V3.0. All activities on part of construction agency are to be complied by the construction agency and the cost incurred for all above activities for obtaining IGBC green homes rating is included in the rate quoted by the contractor and nothing extra on this account is payable.
  5. The working drawings i.e. Architectural, Civil, Structural, Services, E&M and landscape Drawings have been prepared by consultant appointed by CPWD. The execution of work shall be done by the contractor based on the approved working drawings which are part of tender document. Consultancy/vetting charges, if any, for execution of design and drawings/shop drawing under the scope of contractor, as detailed in bid document, shall be borne by contractor.
  6. The defects and deficiencies found during the defect liability period of three years period shall be made good by the Agency at his own cost as per clause 17 of General Condition of Contract 2024 EPC project and modified upto last date of submission of the bid.
  7. The contractor shall have obligation to rectify all defects in the structural elements or any other part of building/structure/road etc. due to construction/design deficiency at his own cost for 10 (ten) years from the date of completion as recorded in the completion certificate by the Engineer-
- Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)*

in-Charge. Such defects shall be made good by the contractor at his own cost after getting instructions/ notice from the Engineer-in-Charge within the time period specified in such instructions/notice and as per the methodology duly approved by the Engineer-in-Charge.

8. The detailed Design Basis Report (DBR), Technical Specifications, Drawings and conditions for all services like Civil, Electrical& Mechanical, IT, Plumbing, Fire, STP, External Development, Landscape, Street lighting, Lift, Pressurization etc. are elaborated in this tender document.
9. It shall be deemed that the Agency has satisfied himself with the nature and location of the work, general and local conditions and particularly those pertaining to transport including restriction of movement of traffic/vehicles etc., handling, availability and storage of materials, availability of labour, weather conditions at site and general ground/sub soil conditions. Agency is expected to quote their rates accordingly and nothing extra shall be payable for any reason/s whatsoever it may be later on.
10. Detailed design of all civil, electrical & mechanical and horticulture services required to make the building functional shall be provided to the agency for execution. However, agency shall submit shop drawing duly coordinated with GFC drawing before execution and as per the direction of Engineer-in-charge. The structural execution should be compliant to all latest modifications, corrigendum, addendum of the relevant BIS Codes in general i.e. IS 1893:2016, 13920:2016, IS 800-2007 and other relevant BIS Codes with upto-date revisions.
11. On Completion of Work, EPC Contractor shall get required post-construction permissions from the local body, Fire department and other statutory authorities whose permission is required after completion of the construction including completion/occupancy certificate required to complete the building in all respects to make it habitable and ready for occupation and submit a copy of such approvals/certificates to the Engineer-in-charge. The statutory fees required shall be borne by the Department but all other expenses towards obtaining the post-construction permission shall rest with EPC contractor.
12. The Agency is required to connect all the external services like Water Supply, Sewerage, Drainage, Electric Supply, LAN/WAN, Telephone Lines, Gas pipe line etc. to the main lines of the authorised service providers of local bodies or any other agency and this shall be considered as integral part of scope of work and such cost shall be included in the price quoted by the agency.
13. The agency shall be responsible for the safety and watch & ward of fittings and fixtures provided and installed by it in all buildings against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the department or the period of comprehensive maintenance is over whichever is later. No extra payment shall be made on this account.

The details of buildings, approximate plinth area and particulars are indicated in table below.

## BUILT- UP AREA STATEMENT

Sl. No.	Blocks	1st Stilt Floor/ Ground Floor			2nd Stilt Floor/ Landscape Podium (Officers' Housing)			Landscape Podium/1st Floor (only for Staff Housing)	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Total built - up Area as per no of blocks				
		Common Areas	Office Areas	Parking + Services	Common Areas	Office Areas	Parking + Services															
		<b>Staff Housing</b>																				
1	Class III (2S+P+9)	1289.6	163.93	5911.54	665.07		4278	1531.01	1531.01	1531.01	1531.01	1531.01	1531.01	1531.01	1531.01	1531.01	1531.01					
2	Class IV(2S+P+9)							1267.49	1267.49	1267.49	1267.49	1267.49	1267.49	1267.49	1267.49	1267.49	1267.49					
	Total Stilt area	7365.09			4942.65													12307.74				
		<b>TOTAL BUILT UP of CLASS III and CLASS IV TOWERS</b>																40292.74				
3	Club House + Creche							Double height	Rest													
								447.16	365.51	297.69	27.11							1137.47				
4	Watchman Cabin 1	33.02																33.02				
8	Watchman cabin 2	29.37																29.37				
9	Pump Room	154.44																154.44				
10	LT Panel & Meter	130.07																130.07				
	<b>TOTAL BUILT UP of STAFF HOUSING</b>																	41777.11				

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

Officers' Housing																		
1	Grade A ( 2 Blocks) - S+P+7/6	1206.2 181.99 9121.6 8	763.136 763.136 662 662 546.7	763.136	763.136	763.136	763.136	763.136	763.136	763.136	763.136	0	0	0	0	6105.088		
2				763.136	763.136	763.136	763.136	763.136	763.136	763.136	763.136	0	0	0	0	5341.952		
3	Grade B & C ( 2 Blocks)- S+P+9			662	662	662	662	662	662	662	662	662	662	662	0	6620		
4				662	662	662	662	662	662	662	662	662	662	662	0	6620		
5	Grade D ( 1 Block)- S+P+5			546.7	540.25	540.25	540.25	540.25	540.25	540.25	0	0	0	0	0	3247.95		
	Total Stilt Area	10509.86																10509.86
6	R D Bungalow + Servant +		264.69 + 72.45						133.03								470.17	
	<b>TOTAL BUILT UP OF Grade A ( 2 Blocks), Grade B &amp; C ( 2 Blocks) &amp; Grade D ( 1 Block)</b>																<b>38915.02</b>	
7	Club House + Creche + Pool Changing Room	Swim ming pool + Pump Room	Double height area	rest														
		212.22 +20.87	570.88	499.67					332.05								1402.6	
	<b>TOTAL BUILT UP OF OFFICERS HOUSING</b>																<b>40317.62</b>	
	<b>TOTAL BUILT UP (including swimming pool area and pump Room)</b>																<b>82327.82</b>	

Note: Plinth area calculated as per Annexure V of Plinth Area Rates 2025.

Correction...Nil Deletion...Nil Insertion...Nil Overwriting...Nil AE (C) AE(E) EE(C)

## CHAPTER-A

### SCOPE & SPECIFICATIONS OF DEMOLITION WORK

## Brief Scope of Work

1. The location plan where **Dismantling & Demolition of existing RBI's Residential Quarters at Zoo-Narengi Road Colony, Guwahati (Assam)** is as below.

### EXISTING SITE SITUATION

#### BUILDINGS TO BE DEMOLISHED:

- 1. COMMUNITY HALL GRADE IV
- 2. BLOCK - ZF
- 3. BLOCK - ZG
- 4. BLOCK - ZH
- 5. BLOCK - ZI
- 6. BLOCK - ZJ
- 7. BLOCK - ZA
- 8. BLOCK - ZB
- 9. BLOCK - ZC
- 10. BLOCK - ZD
- 11. BLOCK - ZE
- 12. CO-OPERATIVE & DISPENSARY
- 13. BLOCK - A
- 14. BLOCK - B
- 15. BLOCK - C
- 16. COMMUNITY CENTER GRADE III
- 17. BLOCK - E
- 18. BLOCK - D
- 19. BLOCK - F
- 20. BLOCK - G
- 21. BLOCK - H
- 22. BLOCK - I
- 23. BLOCK - J
- 24. BLOCK - K
- 25. BLOCK - L
- 26. BLOCK - M
- 27. BLOCK - N
- 28. BLOCK - O
- 29. BLOCK - P
- 30. BLOCK - Q
- 31. BLOCK - R
- 32. BLOCK - S
- 33. BLOCK - T
- 34. BLOCK - U
- 35. BLOCK - V
- 36. BLOCK - W
- 37. BLOCK - X
- 38. BLOCK - Y
- 39. NURSERY SCHOOL



2. The present bid is comprises **Dismantling & Demolition** of existing RBI's Residential Quarters at Zoo-Narengi Road Colony, Guwahati (Assam). The details of the existing structure are as below:

Sr. No.	Location of Buildings	No. of Buildings	No. of Storey	No. of Quarters
1	Zoo-Narengi Road, Guwahati 21	35	(Ground+3) floor	280
		01	Nursery School (Ground floor)	01
		01	Community Centre	01
		01	Compound wall	01
		01	Dispensary & Co-operative Society Bldg.	01
		01	RCC over head tank (capacity 1.5 lakhs litres with staging above 20 m.)	01
		01	Underground sump 2.75 lakhs	01
		01	Multipurpose Hall / Community Hall (Ground + 2)	01
		01	Panel room and pump house	01
		01	Other misc. structures such as security cabin, Covered Parking sheds - 03 Nos., place of worship	-

3. **Description of buildings:** - The Residential buildings having Ground+3 storied RCC framed structure buildings and other ancillary structures such as Nursery school, community centre, compound wall, dispensary and cooperative society building, RCC overhead tank, underground sump, multipurpose hall/ community centre, Panel room and pump house and other misc. structures such as security cabin, covered parking sheds and place of worship etc., were constructed during the year 1981-86.
4. The agency shall follow all the norms prescribed as per National Green Tribunal. Use of Anti-Smog Guns and sprinkling of water while demolition if required by way of any local body/statutory regulation shall be done by agency at their cost. The demolition shall be done only after erecting temporary barricading around the working area as per the norms of local body and nothing extra shall be paid under this account.
5. The buildings/installations shall be handed over on “**as is where is basis**” to the successful builder from the date of acceptance of the bid. At present, buildings are completely vacant, which shall be handed over to the agency immediately after the award of the work. The quarters which have been handed over to the agency by CPWD shall be demolished by the agency including all superstructure and substructure within stipulated time frame as per bid. The demolition shall be done after erecting barricading/wind barrier of required height all around the block/s. Nothing extra shall be paid for this.
6. It shall be the responsibility of the successful bidder to maintain the security / watch and ward of the buildings to be dismantled after taking over of the buildings and the Engineer-in-Charge shall not be responsible for any loss of any materials from the site. Utmost care should be taken during demolition of building to avoid any incident.
7. The buildings shall be demolished completely. All dismantled materials (C & D waste) shall be removed from the site and the site shall be leveled, up to existing road level clear and tidy. The site shall be levelled and dressed neatly before handing over to the department.
8. The Agency shall be responsible for any damage done in the demolition and indemnify the Government against any claim on account thereof including third party and workmen's Compensation claims. If any damage is done to any adjoining property, the Engineer-in-Charge shall be entitled to have the same put right at the risk and expense of the successful bidder or treat the default as a ground for terminating the contract. Site shall be handed over to the Agency on “**as is where is basis**”. All existing blocks for the purpose of demolition shall be handed over with fixtures in the existing structures/ premises except the property of service providers such as services passing through the site such as property of GMC, waste supply, power supply
9. , Gas supply etc.
10. The Agency shall acquire no interest in the land comprised in the said property except a permission to enter thereon for the demolition only aforesaid & for demolition of structure as per terms and conditions of this bid document and shall not be entitled to reside or allow anyone to reside or remain on the property except watchmen during the contract period/ extended contract period.
11. The work shall be executed without creating disturbance to the movement of the people on the adjoining roads. Care shall be taken to prevent dust spreading beyond the building to be demolished. The work shall be executed without making heavy noise.
12. No explosives shall be used for dismantling of the buildings.
13. The Agency shall abide by the restrictions, rules, regulations and timings imposed by the department/ local body on the working and on movement of labour, materials etc.
14. The Agency shall take instructions from the Engineer-In-Charge for stacking of materials. Excavated earth / building rubbish shall be stacked in accordance with the plan approved by Engineer-in-charge.

15. The agency shall appoint sufficient qualified Safety-personnel for taking care of implementation of safety norms during the demolition work. Any untoward incident happening during demolition shall be the responsibility of the Agency.
16. No unauthorized person should be allowed to enter workspace without following the prescribed safety norms. All the dangerous moving parts of the portable / fixed machineries being used shall be adequately guarded. Inserting of bare wires for tapping the power from electrical sockets is completely prohibited. All unsafe conditions, unsafe acts identified by agency, reported by site supervisors and / or safety personnel to be corrected immediately.
17. All Indian Standard Specification / or guide lines of any competent authority shall be followed by the Agency.
18. The debris / building rubbish waste and the Construction & Demolition waste commonly known as C & D waste generated from the demolition work, shall be taken out to be disposed off the campus in a legal and environment-friendly way to the “declared dumping/Land fill sites”, after approval of Engineer-in-charge. The documentary proof with respect to disposal of all C&D waste generated out of demolition work shall be submitted to Engineer-in-charge on weekly basis. The waste shall be disposed of as per local body regulations in any approved dumping ground approved by local body.
19. The material like bricks, wooden doors, trusses, steel reinforcement rods and debris etc. from demolition including the electrical installations and fittings shall become the property of agency. All Serviceable as well as unserviceable materials shall become the property of the contractor and he shall clear the site free from all materials.
20. All Local Byelaws, CPWD guidelines, NGT guidelines, MoEF guidelines etc. shall be strictly adhered to while executing the works. Contractor shall be responsible to obtain all required permits / approvals from local body or any other authority for demolition work prior to starting the work. Nothing extra shall be paid in this regard. The agency shall comply all the guidelines/orders issued by local/State/Central authorities in respect with COVID-19/any other unexpected pandemic as and when required. All protocols related to Covid- 19/any other unexpected as per the guidelines of Government of India shall be followed and nothing extra shall be paid for this.
21. All safety precautions shall be taken during the execution of demolition of the buildings. The CPWD safety code and BIS codes of practice shall be followed strictly. All IGBC platinum norms shall be implemented to prevent Noise, Air and dust pollution at site by sprinkling water or/and by use of Anti-Smog gun at required intervals or/and washing the tyre of the trucks etc. Necessary barricading around the work site with Metal sheeting/ Green fabric net up to a required height as per local body norms shall be provided.
22. Necessary approvals from Local Traffic Police for transportation of building debris, C&D waste from the site to the approved C&D waste plant/local body approved dumping grounds should be obtained by the contractor at his own cost.
23. No temporary electrical connection shall be provided by the Engineer-in- Charge/CPWD. The contractor shall make his own arrangement of temporary electrical connection from the Local Power Distribution Company, fuel/generator for running of tools, plants and machinery required for demolition work. Nothing extra shall be paid for this.
24. The existing boundary wall of the plot along with railing, gates etc. shall also be demolished & is included in the scope of this demolition work.

25. The contractor shall conduct videography of site and also obtain high resolution photographs of existing structures/features before start of demolition work and after completion of work. The videos and photographs shall be submitted to engineer-in- charge in CD/pen drive before start of demolition work and after completion of work.
26. The agency has to demolished all the existing Structure shown in the location plan nothing extra will be paid on this account.
27. Rates quoted by the agency is inclusive of all above conditions/activities (1 to 25) and nothing extra shall be paid on any account.
28. The existing Storm water drain along with boundary wall of the plot shall also be demolished. It is also included in the scope of this demolition work. The suitable alternative arrangements shall be made to divert the sewerage coming in this drain during demolition and construction of new pipe drain in place of existing drain.

## GENERAL CONDITIONS

1. The rates quoted by the contractor shall be inclusive of demolition of quarters and other ancillary structure, compound wall existing presently at site. In case of any discrepancy in rates or amount in figure and words the procedure specified in the contract document of CPWD shall be followed.
2. Except for the items, for which particular specifications are given or where it is specifically mentioned otherwise in the description of the items in the schedule of quantities, the work shall generally be carried out in accordance with the "**CPWD Specifications 2019 Vol. I & II with up to date correction slips (up to date of receipt of bid) and instructions of Engineer-In-Charge**". Wherever CPWD Specifications are silent, the latest IS Codes / Specifications shall be followed. The work in general shall be executed as per additional conditions, special conditions, provisions of this tender document.
3. The rates for all item 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.
4. The contractor(s) shall quote all-inclusive rates against the item in the schedule of quantities and nothing extra shall be payable for any of the conditions and specifications mentioned in the bid documents unless specifically specified otherwise.
5. The rate for all item, in which the use of cement is involved is inclusive of charges for curing and water requirements.
6. 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 guidelines only)
7. The contractor shall indemnify the Govt. against any claims or obligations arising out of any damage to adjacent property, structure or to building work done by him.
8. **Licenses:-**
  - (i) The contractor shall pay to the municipal, police or other authorities all the fees etc. that may be required by law, obtain requisite licenses for temporary constructions, enclosures and pay all fees taxes and charges which shall be leviable on account of his obligations in executions of the contract. No extra claim will be entertained on this account.

### 9. Royalty Clause

#### 9.1 Deduction of Royalty

Royalty and other ancillary charges on all minor minerals (such as sand, stone, earth, clay, boulders, aggregates, etc.) used in execution of the works shall be recovered from the Contractor's Running Account Bills and Final Bill at the rates prescribed in the Third Schedule of the Assam Minor Mineral Concession Rules, 2013, as amended by the Assam Minor Mineral Concession (Amendment) Rules, 2021 vide (Gazette notification No. PEM.130/2021/40 dated 07.10.2021) and as may be further revised by the Government from time to time.

#### 9.2 Basis of Recovery

Recovery of royalty shall be made in proportion to the prescribed percentage of the total project cost, excluding taxes such as GST, Income Tax, etc., as notified in the said Rules.

#### 9.3 Mode of Deposit

The amounts so recovered on account of royalty and ancillary charges shall be deposited by the Department into the appropriate Government Head of Account or Bank Account as notified by the Government of Assam.

#### 9.4 Responsibility of Contractor

- (a) It shall be the responsibility of the Contractor to ensure that all minor minerals used in the works are sourced from authorized quarries/mines with valid permits.
- (b) Where the Contractor procures minor minerals through suppliers, it shall be his duty to ensure that due royalty and ancillary charges have been paid by such suppliers. In case of non-payment, the Department shall recover the same from the Contractor's bills.
- (c) No final payment shall be released until satisfactory proof of compliance with royalty payment obligations has been furnished or recovery thereof has been made from the Contractor's bills.

#### 9.5 Applicability

This clause shall be applied to this tender due to the commencement of the Assam Minor Mineral Concession (Amendment) Rules, 2021.

- 10. The contractor shall be responsible for the safety of all Govt. T&Ps, fittings and fixtures including sanitary and water supply fittings and fixtures against pilferage and breakage during the period of running of the contract.
- 11. The order of preference in case of any discrepancy as indicated under "Conditions of Contract" given in the **GCC EPC Projects-2024**.
- 12. Preference will be given following:
  - (i) Description under Scope of work in the NIT.
  - (ii) Architectural Drawings and Schedule of finishes in the NIT.
  - (iii) Schedule of Quantities.
  - (iv) Technical Specifications, Additional Conditions & Special Conditions of NIT.
  - (v) CPWD Specifications for Civil, Electrical & Mechanical and Horticulture with up-to-date corrections as on last date of submission of Bid.
  - (vi) Contract clauses of General conditions of contract for Central P.W.D. works 2024 – EPC Projects.
  - (vii) Indian Standard Specifications of B.I.S.
  - (viii) National Building Code 2016
  - (ix) Manufacturer's specifications.
  - (x) International Standard & Specifications.
  - (xi) Sound Engineering practices.
  - (xii) Decision of the Engineer-in-charge

Any 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 up to last date of receipt of bids. The contractor shall keep at his own cost all such publications of relevant Indian Standards applicable to the work at site.

13. The contractor shall be bound to follow the instruction and restrictions imposed by the Administration/Police authorities on the working and/or movement of labour, materials etc. and nothing extra shall be payable on this account or due to less/restricted working hours or suspension of work or any detours in movement of vehicles due to stated instructions and restrictions.
14. Any damage caused by the contractor to the existing building/installations/roads/ boundary walls shall be made good by him (the contractor) at his own cost.
15. Site is located in a busy residential area, where movement and routes may be restricted. No claim whatsoever shall be entertained for any loss on this account. Some restrictions may be imposed by the security staff/ Guwahati police on the working and for movement of labour, materials etc.
  - (i) The movement of trucks and vehicles shall be regulated in accordance with rules and regulations as approved by competent authority.
  - (ii) The contractor shall be bound to follow all such restrictions / instructions and nothing extra shall be payable on this account.
  - (iii) No claim whatsoever will be entertained by the department on account of any, restrictions (including temporary suspension of work) imposed by the security agencies in execution of work.
16. CPWD is not bound to provide space for labour huts however considering exigency same may be provided. If space is not provided no claim in this regard will be admissible. Bidders shall quote their rates accordingly nothing extra shall be paid on this account
17. The contractor shall see the approaches to the site. In case, any approach from main road is required by the contractor, the same shall be provided, improved and maintained by the contractor at his own cost. No payment shall be made on this account.
18. Building shall be at the risk/in the custody of the contractor after the deposition of Performance Guarantee by the contractor.
19. No labour below the age of 18 years shall be employed on the work of demolition.
20. The contractor shall pay his labour not less than minimum wages as prescribed by the Govt. time to time.

## SPECIAL CONDITIONS FOR DEMOLITION

1. All dismantling /demolition works shall carried out as per **C.P.W.D specifications 2019 Vol I & II** with correction slips to previous day of submission of bid and "**Construction and Demolition Waste Management Rules 2016**" with up to date revisions.
2. The agency shall pursue with the local body and obtain NOC (No Objection Certificate) from local body GMC/GMDA prior to carrying out the demolition work if required. The same NOC shall be submitted to Engineer-in-charge by the agency prior to execution of the work. Nothing extra shall be paid to the agency on this account.
3. The Contractor shall deploy adequate manpower and machinery for the work as per direction of Engineer-in-Charge, so as complete the work with in stipulated time. The work shall be executed under supervision of safety engineer to be employed by Contractor for this work.
4. If the agency does not start the work within the stipulated period as specified then the PG shall be forfeited and further action as per agreement will be taken.
5. The Contractor shall ensure that no accident/mis-happening occur during the work. In case any accident occurs/may take place or any claim/claims is lodged during the work by any injured/agrieved person(s) before any courts or authority, the same shall be the sole liability and responsibility of the Contractor to pay compensation or face the criminal prosecution, if any.
6. The agency shall display proper informative/cautionary signage boards at site for the safety of the workers and public. Necessary barricades and view cutter (green cloth) as approved by Engineer in Charge shall be provided around the structure by the agency at his own cost to avoid mishaps of any kind.
7. The Building shall be demolished completely and all serviceable and unserviceable material including building rubbish etc. shall be removed from the site and make the site level, clear and tidy at the expense of the tenderer/bidder (including the provision of the necessary tool & plant, scaffolding etc.) within stipulated period/extended period if any from the date of the acceptance of the tender/bid and in all respects to the satisfaction of the Engineer-in-Charge, who shall be allowed access to the work, failing which Government shall be entitled to do it at the risk and expense of the agency or to treat the agency's default as ground for terminating the contract.
8. The PG amount shall be refunded to the contractor without any interest after successful completion of work.
9. The contract shall be considered as complete subject to following conditions:
  - a. Clearing the premises on which work shall be executed including all serviceable and unserviceable materials, malba/ rubbish, T&P, barricades, scaffolding, other materials and cleaning the site.
  - b. Disposal of all unserviceable material to municipal dumping ground.
10. The work shall be carried out as per the terms and condition of the contract. Work shall be monitored by the Engineer-in-charge and his authorized representatives at site. The contractor shall acquire no interest in the land comprised in the said property except a license to enter thereon for the purpose only of the demolition aforesaid, and in particular shall not be entitled to reside or allow anyone to reside or remain on the property except guards that too for the period of contract only.
11. The boundary wall, grill above of the building compound is not to be dismantled initially. It is to be protected from any damage during the dismantling of the building.
12. Agency shall take all necessary precautions to avoid fire hazard at site and in case of any incident/accident at site agency shall be solely responsible and shall make good all such losses

at his own cost. Nothing extra shall be paid to the agency on account of this.

13. Agency shall arrange water and electricity to execute the work at their own cost.
14. Agency shall dismantle /demolish the structure & remove all serviceable /Unserviceable materials, articles and malba from site at his own cost.
15. Agency shall adopt all the safety measures for the workmen, staff & users/occupants/Visitors in building during the work.
16. Agency shall take all precautions so as not to damage any services like water lines, sewers /drains, roads, paths, any part of building electric cable /poles etc. during the work. Any such damage made advertently or inadvertently by the agency shall be made good by the agency at their own cost.
17. Agency shall provide helmets, gumboots, safety belts, goggles, gloves for the safety of workmen & staff at his own cost.
18. Agency shall not create any inconvenience to the users/occupants during the work.
19. Agency shall not damage any existing tree at the site of work, if any issue arises in this matter during the course of work, it shall be solely the responsibility of the agency and any damages shall be dealt by the agency at his own cost.
20. The rates shall however include all jungle/bushes clearance, dressing/levelling the ground after execution of work as per direction of Engineer-in-charge.
21. Dismantling/demolishing & removal of Dismantled materials/ articles (serviceable/ unserviceable/ malba/rubbish) shall be carried out side by side simultaneously on daily basis.
22. The Plan attached and area is given with the tender/bid are only for the guidance and the work will be based on as is where is basis.
23. If the contractor fails to maintain the required progress to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the Government on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the authority specified in schedule 'F' (whose decision in writing shall be final and binding) may decide the amount of compensation for delay in work as per contract conditions.

#### **24. Scope of Handling of C&D Waste:**

- 24.1 The debris / building rubbish waste and the like (Construction & Demolition waste commonly known as C & D waste) generated from the demolition work, should be segregated.
- 24.2 C&D waste shall be taken out to be disposed from the campus in a legal and environment-friendly way to the "local body approved dumping/Land fill sites", after approval of Engineer-in-Charge. The documentary proof with respect to disposal of all C&D waste generated out of demolition work shall be submitted to Engineer-in-Charge on weekly basis. The waste shall be disposed of as per Local Body approved dumping ground or any other approved site by competent authority can be used for the purpose. Other building rubbish, etc. can be disposed of at suitable location as per prevailing guidelines of competent authority/ local body. The guidelines issued by local authority shall be abided by the Agency.
- 24.3 The material like bricks, wooden doors, trusses, steel reinforcement rods and debris etc. from demolition including the electrical installations and fittings shall become the property of agency.

#### **25. Conditions of Hon'ble National Green Tribunal:**

- 25.1 The agency shall not store/ dump demolition material or debris on the metaled roads within

the campus as well as the peripheral roads around the campus.

- 25.2 The agency shall get prior approval from Engineer-in-Charge for the area where the demolition material or debris can be stored beyond the metaled roads. This area shall not cause any obstruction to the free flow of traffic /inconvenience to the pedestrians/public in general. It should be ensured by the agency that no accidents occur because of such permissible storage.
- 25.3 The agency shall take appropriate protection measures like raising wind breakers of appropriate height on all sides of the plot/area to ensure that no demolition material dust fly outside the plot area, if required.
- 25.4 The agency shall ensure that all the trucks or vehicles of any kind which are used for construction purposes or carrying demolition work are fully covered. The agency shall take every necessary precaution that the vehicles are properly cleaned and dust free to ensure that en-route their destination, the dust, sand or any other particles are not released in air or contaminate the air.
- 25.5 The agency shall provide mask to every worker on the construction site who are involved in loading, unloading and carriage of construction material and construction debris to prevent inhalation of dust particles.

## **26 Anti-Smog Guns:**

- 26.1 If directed by department, the agency shall provide manually operated trolley mounted anti-smog guns in sufficient number of suitable throws for  $360^0$  rotations and  $0^0-60^0$  raising with water filter support and movable wheels & 2 off road pneumatic wheels.
- 26.2 The agency shall compulsorily use wet jet in grinding and stone cutting.
- 26.3 The agency shall comply with all the preventive and protective environmental steps as stated in the MoEF guidelines, 2019.
- 26.4 The agency shall ensure that all DG set comply emission norms notified by MoEF.
- 26.5 The agency shall use vehicles having pollution under control certificate. The emissions can be reduced by a large extent by reducing the speed of a vehicle to 20 Kmph. Speed bumps shall be used to ensure speed reduction. In case where reductions speed cannot effectively reduce fugitive dust, the agency shall divert traffic to nearby paved areas.
- 26.6 The agency shall ensure that the demolished material is covered by tarpaulin. The agency shall take all other precaution to ensure that no dust particles are permitted to pollute air quality because of such storage.
- 26.7 Any violation of orders of MoEF including guidelines of State Government, SPCB or any officer of any department shall lead to stoppage of work for which Agency shall be responsible and no hindrance shall be accounted in this regard.

## **27. Prevention of Nuisance and Pollution:**

- 27.1 The Agency shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupiers of adjacent properties and to the public in general and to prevent any pollution and damages to such properties, service lines and any pollution. Agency shall make good at his own cost and to the satisfaction of the Engineer-in-Charge, any damage to roads, paths, drainage works or public or private property whatsoever caused by the execution of the work or by traffic brought thereon by the Agency. All waste or

superfluous materials shall be cleaned away by the Agency without any reservations entirely to the satisfaction of the Engineer-in-Charge at no extra cost.

- 27.2 The site shall be kept clean of all debris, up to existing road level rubbish and dirt & all surplus waste material all the time. All machines, equipment and laborers for this purpose will be arranged by Agency and nothing extra shall be payable on this account.
- 27.3 If at any stage, the demolition activity is stopped due to the enforcement of the statutory orders by the Government. or due to change in Government policies or due to change in the local body norms /approvals/ NOC or pandemic conditions, etc. then the agency shall be granted extension of time after considering the various factors involved but nothing extra shall be paid to the agency for the duration during which the work was stopped due to these reasons.
- 27.4 Any penalty imposed by APCB (Assam Pollution Control Board)/Civil bodies/local authorities/violation of NGT guideline in respect of pollution i.e. air, water, sound, dust, etc. and for noncompliance of their guidelines issued by them from time to time shall be borne by the contractor. Nothing extra shall be paid on this account.

## **28. CONSTRUCTION VEHICLES TYRE WASHING FACILITIES**

All the vehicles leaving the site shall be loaded in such a manner that the excavated materials, mud or debris will not be deposited on roads. All such loads shall be covered or protected to prevent dust being emitted. The wheels of all vehicles shall be washed properly before leaving the site to avoid the deposition of mud and debris on the roads. The contractor shall provide a wash pit and a wheel washing facility with high pressure water jets for this purpose. Also, the contractor shall make necessary arrangements for sweeping and removal of mud from roads if it is deposited even after washing of wheels of vehicles leaving site. A penalty of Rs 2000/- per day for violation of such measures shall be levied. Nothing extra shall be paid for providing and maintaining this facility.

## **29. Site Management Plan**

The contractor / subcontractor shall prepare and submit a Site Management Plan (SMP) within 60 days of start, for approval by the Engineer -in-charge. This SMP shall indicate the locations of godown, stockpiles, barricading, waste storage, offices, vehicular movement routes etc. In short this SMP would comprehensively represent how the site activities shall be managed conforming to IGBC guidelines. Contractor will be penalized @ Rs. 1,00,000/- (Rupees One Lakh only) per day of delay on non-submission of SMP beyond due date to be recovered from next RA bill. Any other site management measures suggested by the Engineer-in-charge shall be followed on site.

## **ADDITIONAL CONDITIONS FOR DISMANTLING AND DEMOLITION**

1. The contractor(s) shall take all necessary approval from the local body GMC/GMRDA, BSNL etc. police and other authorities that may be required by law and obtain all requisite permission for demolition work and pay all fee, taxes, security, bank guarantee, caution money etc. and charges which may be leviable on account of these operations in executing the contract. Nothing shall be paid on this account by the department. He shall make good any damage to the adjoining property whether public or private and shall supply and maintain lights either for illumination or for cautioning the public at night. Contractor(s) will submit safety plan for cordoning of the area.
2. The Contractor(s) shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night, speed limit boards, 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 or awarded. No hindrances shall be caused to traffic during the execution of the work. In case of any accident of labours /contractor(s) staff 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 born by the contractor and department shall have no role on this account. Nothing extra shall be paid on these accounts.
3. 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 other demolition activities to be carried out. 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.
4. The department shall not bear responsibility for lack of knowledge of site condition and also the consequences thereof. The information and site data shown in the drawings and mentioned herein and also elsewhere in the tender documents are being furnished for general information and guidance only. The Engineer-in-charge in no case shall be held responsible for the accuracy thereof or any interpretation / or conclusions drawn there from by the contractor.
5. 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. Stocked unserviceable debris thus generated during the process of demolition of buildings shall be cleared simultaneously according to the pace of demolition, so that clear working space at site can be available.
6. No compensation shall be made for any damage caused by rain, flood or any other natural calamity, whatsoever during the execution of the work. The contractor shall be fully responsible for any damage to the Govt. property and work he shall make good the same at his risk and cost.
7. The work may be carried out in more than one shift or during night, no claim on this account shall be entertained. The contractor has to take permission from the police /local authorities

- etc. if required for work during night hours, no claim / hindrance on this account shall be considered if work is not allowed during nighttime.
8. Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar services 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, it shall be diverted or removed by the agency with the approval of Engineer in charge nothing shall be paid on this account. 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.
  9. The Contractor shall be responsible for the watch and ward / guard of the buildings safety, dismantled materials/articles by him against pilferage and breakage and nothing extra shall be paid on this accounts.
  10. Work is to be carried out in a restricted area. It shall be deemed that the contractor has satisfied himself as to the nature and location of the work, general and local conditions and particularly those pertaining to transport, including the restrictions on plying trucks etc. The department may provide all assistance by way of reasonable recommendations, in obtaining permits for plying trucks etc. from the concerned traffic authorities but bears no responsibility for the same. It shall be assumed that the contractor has also satisfied himself about, handling, availability and storage of materials, availability of labour, weather conditions at site and general ground level and the contractor has estimated and calculated his cost accordingly.
  11. The tenderer shall study carefully the specifications, schedule of quantities and conditions of the tender documents to fully appreciate the scope of work before quoting his rates.
  12. The dismantling and demolishing of building shall be carried out in the manner complying in all respects with the requirements of relevant bye-laws of the local body under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-Charge and nothing extra shall be paid on this account.
  13. The contractor shall ensure the stability of the excavation so that the surrounding ground and all adjoining structures and plants will be safe against settlement, subsidence, and damage and that there is no risk of injury to personnel.
  14. The contractor shall be responsible for arranging at his own cost all necessary tools and plants required for proper execution of work.
  15. Get required local body approval for dismantling and removing to debris at approved dumping ground no extra payment on this accord will be paid.
  16. The building to be dismantled are existing in the site campus, hence Agency will make all necessary arrangements such as temporary barricading with suitable means to avoid entry of public and spreading dust in the Campus.
  17. It shall be ensured by the contractor that no electric live wire is left exposed or unattended to avoid any accident in this regard. No payment shall be made on this account.
  18. **The contractor shall submit the dismantling methodology before the start of work.**

## CHAPTER-B

### SCOPE OF WORK, PLANNING & DESIGNING

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## SECTION-I

### GENERAL SCOPE OF WORK

The scope of work has been elaborated here broadly but this shall be read with details given elsewhere in this document and drawings attached herewith.

#### **1.1 Project Management-Building Information Modelling (BIM)**

- i) 3D BIM LOD 350 model for entire building complex shall be developed by the Agency before taking up execution as per latest amendments, circulars of CPWD upto the last date of submission of bid. It will be developed from advanced detailed drawings on Revit / Architectural CAD software. Co-ordinated construction drawings shall be issued from BIM model for architectural, structural, all multiple services such as HVAC, Fire safety works, Electrical, Plumbing, Sanitary and External services etc. in the building before start of execution of work at site. Contractor should prepare BIM model to combine all services of the building to see if there are any clashes and to remove all those clashes.
- ii) The EPC contractor shall engage a specialized BIM Consultant duly approved by the Engineer in charge for the development of BIM Model to successfully facilitate the generation of as planned design drawings, construction documents, coordination, scheduling, phasing of the work and handover processes.
- iii) The overall design work (Structural, Architectural, mechanical, Electrical, Plumbing and other supporting infrastructure facilities) of RBI, Guwahati work shall be done by the specialized agency. The specialized agency is expected to take up the BIM model in line with completed design work to a LOD 350 level to be utilized for construction and operation & maintenance Phases.
- iv) The BIM process shall be a complementary but integral part of the project delivery and shall be used for:
  - a. Clash resolution, adjustment of developed design ensuring constructability.
  - b. Facilitate revision & detailing in design, re-coordination, shop drawing & fabrication drawings production.
  - c. Tracking of quantities per area for procurement, cost control and progress monitoring purposes
  - d. Enabling all stakeholders to view and track the project throughout construction and close out and prepare the basis for later Facility Maintenance stage.
- v) All the Elements shall be modelled as specific assemblies accurate in terms of quantity, size, shape, location and orientation.

- vi) The EPC contractor shall prepare and update 3D BIM models of the project on a fortnightly period basis for full construction period for developing latest model based BOQ of construction materials for Quantity Survey, Material and Manpower management and Project Management Support.
- vii) The EPC contractor shall provide continued support during project implementation period of through sharing of interactive walk through, 3D cut section, display of interplay of various MEP services to facilitate and ease the construction work at site and assist in project progress, monitoring & control etc.
- viii) The EPC Contractor shall prepare & submit, on completion of construction work, 'As built' 3DBIM model, to Engineer in charge of CPWD for Operation & Maintenance, repair & modification purposes.
- ix) Actual model to be prepared including 3-D drawings before execution.

- 1.1.1 Agency shall get topographic survey done for their use in planning and designing of the campus at their own cost. The agency shall collect data/information, which may be needed for completing the job.
- 1.1.2 The design and drawings if any prepared by the agency shall be the property of Engineer-in-Charge and agency cannot issue and use the same to any other person / organization or use for any other project.
- 1.1.3 Engineer-in-Charge will not be responsible for any lapses and /or losses, if so occur, due to absence of any data /knowledge. The information and site data given in the drawings or mentioned in this tender document are furnished for general information and guidance only and Engineer-in-Charge does not take responsibility for their accuracy. It is advised that the Agency get itself satisfied for all possible contingencies, situations, bottlenecks and acts of co-ordination, which may be required between the different agencies and due to site conditions.

It shall be deemed that agency has satisfied itself as to the nature and location of work, general and local condition and particularly, those pertaining to transport, handling, availability and storage of materials, availability of labour/workforce, weather conditions at site, general grounds/ sub-soil conditions and all other conditions required to execute and complete the work. The agency shall have to quote its offer/rates accordingly and no claim in this regard will be allowed.

## **1.2 Plumbing & Sanitary**

- 1.2.1 The Execution of Plumbing and Sanitary work for buildings /spaces as per scope of the work read with Technical Specifications and Drawings.

- 1.2.2 The Sleeves, cut out, Drainage arrangement, embedment, concealed piping, hot & cold- water arrangement, overhead tanks, water recycling system etc. and connecting the service to the main line of GMC are expressly included (but not limited to) in the scope of work.
- 1.2.3 Agency shall obtain water connection from service provider i.e. GMC. The agency shall execute all necessary piping etc. to bring the water supply to the collecting tank to be constructed by the agency as and within the scope of work. However, the payment made by the agency to GMC for the water connection shall be reimbursed on production of the actual receipts.
- 1.2.4 The Agency shall facilitate Purba Bharati Gas Private Limited (PBGPL)/IGL to provide gas pipelines etc. in all dwelling units and provide necessary coordination and help for the purpose.
- 1.2.5 The Sewage Treatment Plant shall be provided underground which will be used to collect, hold, recycle & redistribute water. The waste will be collected from sewerage network. The distribution will be done to horticulture & to dual plumbing network in toilets for flushing, irrigation, etc. and to the proposed construction sites.
- 1.2.6 The toilets in all floors of all blocks are to be completely fitted & finished with all plumbing & sanitary fixtures and fitting, completely ready for use.

### **1.3 External Water Supply & Sewerage, Storm Water Drainage System.**

- 1.3.1 Integration of detailed shop drawings shall be done with Civil / Structural details prepared by Agency for each building in BIM model.
- 1.3.2 The execution of work for above scope of the work read with Technical Specifications and Drawings and connecting the services from first manhole to the main line of the Agency like GMC including approval from the GMC as required.
- 1.3.3 Design, installation, testing, commissioning and handing over of the above services with all services in running condition is included in the scope of work of the main executing agency.

### **1.4 Site Development & Landscape**

The scope of work of the Agency shall include:

- 1.4.1 Construction of Internal Roads, berms, Pathways, Kerbs, Cycle track, open parking space etc. including connecting with the external road network as per Drawing and Technical Specification.
- 1.4.2 Hard and Soft Landscape in open land area including all horticulture operations, earth filling, grassing, tree plantation etc. as per Drawing and Technical Specifications. Hard landscape shall be done to achieve a high-quality urban environment with permanent maintenance friendly features using granites in variety of anti-skid finishes.

- 1.4.3 Work to include built in planters & seating, large tree planters in stone, bush / ground covers in planters.
- 1.4.4 Street furniture to include litterbins, water fountains, bollards, fire tender path markers etc. will be developed, approved & installed. Fire tender path to be maintained & marked around all Blocks as per Fire norms.
- 1.4.5 Ramp entrances & exits to have Solid polycarbonate canopies as per detailed design so as to shelter the entrances.

### **1.5 Water connection**

- 1.5.1 The scope of work consists of detailing and calculating water demand for RBI colony, Guwahati.
- 1.5.2 Agency shall obtain water connection from service provider i.e. GJB (Guwahati Jal Board). The agency shall execute all necessary piping etc. to bring the water supply to the collecting tank to be constructed by the agency as a scope of work.
- 1.5.3 However, the statutory payment made by the agency to GMC shall be re-imbursed on production of actual receipts.

### **1.6 Diversion/Shifting of Services**

- 1.6.1 All works pertaining to services including rerouting/diversion (temporary & permanent for maintaining services to nearby areas throughout project of services, routine testing, installation etc., embracing in one or more than one process shall be subject to examination and approval to each stage thereof by the competent authority of the concerned Department. Temporary rerouting/diversion/shifting of any service required for the execution for the work shall be done by the Firm in coordination with the respective Department and Nothing extra shall be paid for such work. However, for permanent shifting of services by service provider, payment shall be made by CPWD, but the agency shall obtain required estimate from concerned service provider for such shifting.
- 1.6.2 The agency will not have any claim in case of any delay in removal/transplantation of trees or shifting, raising, removing of telegraph, telephone or electric lines (overhead or underground), water and sewer lines and other structures etc., if any, which may come in the way of the work. However, suitable extension of time will be granted to cover such delays.

### **1.7 Water Supply and Electricity**

- 1.7.1 Arrangement of water for drinking purpose and for construction work (preferably recycled water from nearby STP) is also to be made by the Agency at his own cost and nothing will be paid on this account. The Agency shall get the water tested with regard to its suitability and

conforming to the relevant IS Code. The Agency has to install a RO plant at site to treat the water, to make it suitable for construction purpose at his own cost. Proper logbook for the operation and maintenance of the RO plant shall be prepared. The agency shall arrange water test kits for checking quality of water on regular basis. The Agency shall obtain written approval from the Engineer-in-Charge before he proceeds by using the same for execution of work. Water demand during construction should be reduced by use of curing agents but the cost of curing agent shall be borne by contractor (Hydrocarbon curing agents based only) and other best practices referred as per directions of Engineer-in-Charge. Water testing kits shall be kept at site for regular testing of water in addition to mandatory equipments at site laboratory. Testing of water on monthly basis from the approved laboratory has to be done and test reports to be provided to the department.

- 1.7.2 The Agency shall make his own arrangement for obtaining electric connections and make necessary payment directly to the department concerned. Engineer-in-Charge will however make all reasonable recommendations to the authority concerned in this regard, if required.

#### **1.8 Excavation and Disposal of Excavated Earth:**

- 1.8.1 The agency shall deposit royalty, any other duty / taxes, fees and obtain necessary permit for excavation from concerned local/statutory authority, if any, required. The quoted rates shall be inclusive of the payments to be made for royalty, if any.
- 1.8.2 The agency shall also retain the top layer of 200mm (or as per the direction of Engineer-in-Charge) of earth for its utilization as per IGBC Norms.
- 1.8.3 The agency shall ensure to retain the excavated earth to the extent of required for back filling at the site of work or otherwise, he will have to arrange the good earth required for the back filling at the site of work, at his own cost and no extra payment on this account is payable to agency.
- 1.8.4 The excavated surplus earth shall be used by the agency in the work. However, if any extra quantity of earth is required for back fillings and for horticulture works shall be arranged by the agency. The agency shall carry this excavated earth at the various locations arranged by him at his own cost. All incidental charges shall be included in the cost of earth work and nothing shall be paid extra on this account.
- 1.8.5 The agency shall dispose of surplus earth as per the rules and laws applicable in Guwahati/Assam. Fine, penalty, if any, imposed for violation of rules and laws shall be payable by agency. No extra payment, whatsoever, on this account shall be payable to the agency.

#### **1.9 CPWD Site Office**

- 1.9.1 The Agency shall construct site office (semi-permanent structure) for CPWD officers and staff as per the location shown in the drawing attached with this document, which should be equipped with all necessary equipment required for functioning the office. The area of this

site office should not be less than 150 Sqm with the provision of pantry, conference room, toilets and other requisite facilities. A proposal of site office shall be submitted by the agency within 15 days after award of work for the approval of Engineer-in charge. This office shall be constructed and made functional within 60 days after approval of the proposal and accepted by Engineer-in-Charge failing which the compensation at the rate of Rs. 1,00,000/- per day shall be recovered from the agency. The agency shall provide the required number of CCTV cameras of approved specifications in the site office as well as on the site including its live coverage for monitoring and real time update of the work as per the directions of the Engineer- in- Charge. The charges for operation and maintenance of CCTV cameras shall be borne by the agency and nothing extra shall be paid on this account.

- 1.9.2 The office should have Engineered marble/full body tiles flooring in common areas and Vitrified (full body homogeneous) tiles in rooms with uPVC windows with wire gauge shutters and laminated flush door shutters. The toilet fixtures and specifications to be adopted as mentioned in this document should be same as that for Type-IV Units.
- 1.9.3 The Agency shall provide necessary Air Conditioners, lighting and fixtures i/c fans, RO, Refrigerators, Microwave, Photocopy machine (make Sharp or equivalent for A3&A4 coloured and black & white both side print facility) etc. of reputed make as per the approval of the Engineer-in-Charge. The running, repair and maintenance of all the civil, electrical/electronic fittings provided in the site office shall be done by the agency till the completion of the project and nothing extra shall be paid on this account failing which the necessary job shall be got done by the Engineer-in-Charge at the cost of the agency.
- 1.9.4 The Agency shall arrange to maintain the site office which includes watch and ward, day to day upkeep of the building and surroundings, periodic whitewashing/ colour washing of the building including utilities, payment of electrical/water supply bills etc. at his own cost and nothing extra shall be paid on this account failing which the necessary job shall be done by the Engineer-in-Charge at the cost of the agency.
- 1.9.5 The cost of construction, cost of all furniture, fittings/fixtures /electrical fittings etc. and cost of maintenance and the related service charges of the site office building, payment of electricity bills/ water charges etc. (till completion of project) is deemed to be included in the quoted rates of work and nothing extra shall be payable. This site office accommodation shall be maintained properly till completion of work and no claim what so ever shall be entertained on the ground whether the delay in completion of work has been attributable to the Department or to the agency.

- 1.9.6 The agency shall provide the following furniture of reputed make such as Godrej, Wipro or equivalent (new) for use of CPWD staff at site office as per approval of the Engineer-in-Charge.

S.No.	Articles	Quantity
1.	Executive table (wooden) with side table and leatherite & wooden top and computer table, finish PU polish or laminate	03 Nos.
2.	Executive Revolving chair with high back	03 Nos.
3.	Executive Revolving chair	09 Nos.
4.	Office Tables	05 Nos.
5.	Office Chairs	15 Nos.
6.	Steel Almirah (big)	08 Nos.
7.	Conference table (for 20 seats)	01 Nos.
8.	Conference chairs	20 Nos.
9.	Digital display arrangement & sound system with at least 77" display	1 set
10.	Visitors Chairs	20 Nos.
11.	Sofa set (05 seater with central table and corner table)	02 set

## 1.10 Communication and commuting

- 1.10.1 The agency shall make arrangement for One (1 nos.) vehicles (One nos 1600 CC engine with 200mm ground clearance or equivalent, Model of vehicles shall not be older than 2024), from start to completion of entire work, for the field staff of the CPWD to facilitate work inspection, quality control, coordination with multiple agencies and better liaising with other offices within one month after the award of the work failing which the necessary job shall be got done by the Engineer-in-charge at the cost of the agency. This facility will be provided till the actual date of completion of work plus 6 months for finalization of the account. The average mileage of each vehicle shall be approximately 2,500 Km/month. The vehicles shall be made available for 12 hours per day on daily basis including holidays as per the directions of Engineer-in-Charge. All expenses of these vehicles including running and maintenance, fuel charges, driver's salary, insurance, etc. shall be borne by the agency at his own cost and nothing shall be payable on this account. In the eventuality of failing of providing such vehicle by the Contractor, an amount of Rs. 100000/- per month per vehicle will be recovered from the Contractor's bill.

- 1.10.2 The Agency shall provide latest 06 nos. latest i7 13<sup>th</sup> generation or latest Desktops of reputed

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and approved make such as HP or DELL or equivalent with highest configuration and latest version of software like MS windows & Office, AutoCAD with stabilizer/UPS and printers (A3 & A4) of reputed make such as HP or equivalent having 4G/5G enabled internet connection for the supervisory staff of department (CPWD) in consultation with the Engineer-in-Charge within one month time after the award of work. The cost of running and maintenance for these electronic items shall also be borne by the agency at his own cost.

1.10.3 The Contractor shall make arrangement of at least 01 (One) high-definition mirror less Cameras of make Sony, Canon, Nikon or equivalent capable of recording 4K video for the documentation of the project during construction.

1.10.4 The Site office, Inspection Vehicles, Desktops, digital camera, furniture etc. shall be provided from start of the work till 6 months after completion of work (Excluding Maintenance), thereafter the same shall become property of the contractor. All running cost & charges for AMC of equipment, Electricity, water supply, RO/drinking water, High Speed Broadband Internet, etc. shall be borne by the agency.

## **1.11 Sample Flats**

1.11.1 The contractor will construct a mockup sample flat (without staircase, lift lobby etc.) at ground level separately for approval of engineer-in-charge within Six months after the date of start of work failing which the compensation at the rate of Rs. 5,000/- per day shall be recovered from the agency. The sample flat mockup should have all the components of the actual flat except concealed pipes / conduits etc. The sample flat shall be constructed as a temporary structure. The wiring necessary to energize the light fittings / fans shall be provided. The sample flat can be dismantled when one flat is ready for demonstration in the main towers. The fittings/ equipment/ doors/ windows/ cupboard etc. of sample flat may be used in actual flat, if in good condition as decided by Engineer-in-charge. Cost of sample flat including its subsequent demolition is included in the scope of work and nothing extra shall be paid on this account to the agency.

1.11.2 The size and model no. of all fittings and fixtures to be used in the sample flat shall be got approved from the Engineer-in-Charge in consultation with the NIT and its '**list of preferred makes**' and the decision of the Engineer-in-Charge in this regard shall be final and binding on the Agency. These approved fittings and fixtures shall only be used in the residential buildings.

1.11.3 After completion of structure work upto 1<sup>st</sup> floor of any block, the agency shall prepare sample flat in the block and thereafter, the pre-fabricated structure shall become property of the agency and it shall be removed from the site by the agency as per direction of Engineer-in-charge.

## **1.12 Security of the Site**

1.12.1 The Agency shall be wholly responsible for security of site and works. The Agency shall be

responsible for keeping unauthorised persons and encroachments off the Site; and Authorized persons shall be limited to the Employees of the Agency, Sub Agency or persons as authorized by the Engineer-in-Charge.

- 1.12.2 **Lighting:** The agency shall provide sufficient lighting at project site considering the safety and security of project. The Agency shall provide suitable numbers and suitable type of fittings to have sufficient illumination level with glare-free lighting for safety of workmen while performing their assigned job. Wiring for such installation shall be adequately protected to avoid any risk of electric shock. The agency shall ensure that luminaries should always be so placed that no person is required to work in their own shadow and that the local light for one person is not a source of glare for the others. Strongly made clamps should be available for attaching luminaries to poles and other convenient supports.
- 1.12.3 Luminaries shall be robust, resistant to corrosion and rain proof especially at the point of the cable entry. Lamp holders not fitted with a lamp should be capped off and no open end shall be left. The agency shall take every effort to illuminate the work site as per the direction of Engineer-in-Charge.
- 1.12.4 All steel structure like, tower cranes, steel yards, steel porta cabin structures, etc. shall be duly protected from lightening by providing lightening arrester.

### **1.13 Traffic Management:**

- 1.13.1 The basic objective of the following guidelines is to lay down procedures to be adopted by agency to ensure the safe and efficient movement of traffic and also to ensure the safety of workmen at construction sites.
- 1.13.2 All construction workers should be provided with high visibility jackets with reflective tapes. The conspicuous of workmen at all times shall be increased so as to protect them from speeding vehicular traffic.
- 1.13.3 The Agency shall provide safety helmet, safety shoe and high visibility clothing for all employee including workmen, traffic marshal and other employees who are engaged for any work under this contract as per the following requirement:

All employees of the Agency including workmen.	Traffic marshals
i) Hard hat with company Logo	i) Hard hat with company Logo
ii) Safety boots	ii) Safety boots
iii) Hi-visibility waistcoat covering upper body and meeting the following requirements as per BS EN 471:1994:	iii) Hi-visibility jacket upper body and meeting the following requirements as per BS EN 471:1994:
iv) Background in fluorescent orange red in colour	(a) Background in fluorescent orange red in colour

v) Two vertical green strips of 5cm wide on front side covering the torso at least 5cm.	(b) Jackets with full-length sleeves with two bands of retro reflective material, which shall be placed at the same height on the garment or those of the torso. The upper band shall encircle the upper part of the sleeves between the elbow and the shoulder: the bottom of the lower band shall not be less than 5 cm from the bottom of the sleeve.
vi) Two vertical green strips of 5cm wide on front side covering the torso at least 5cm	(c) Two vertical green strips of 5cm wide on front side covering the torso at least 500 cm
vii) Two diagonal strips of 5 cm wide on back in an 'X' pattern covering at least 5cm	(d) Two diagonal strips of 5cm wide on front side covering the torso at least 500cm
viii) Horizontal strips not less than 5cm wide running round the bottom of the vertical strip in front and 'X' pattern at back.	(e) Horizontal straight not less than 5cm wide running around the bottom of the vertical strip in front and 'X' pattern at back.
ix) The bottom strip shall be at a distance of 5cm from the bottom of the vest.	(f) The bottom strip shall be at a distance of 5cm from the bottom of the vest.
x) Strips must be retro reflective and fluorescent	(g) Strips must be retro reflective and fluorescent
Waistcoat shall have a side adjustable fit and a side and front tear away feature on vests made of nylon.	

1.13.4 Wherever operations undertaken are likely to interface with public traffic, specific traffic management plans shall be drawn up and implemented by the agency in consultation with the prior approval of local police authorities, and /or the concerned metropolitan/civil authorities as the case may be.

1.13.5 Such traffic management plans shall include provision for traffic diversion and selection of alternative routes. If necessary, the agency shall carry out road widening before commencement of works to accommodate the extra load. The agency shall be responsible for getting the "Traffic Management Plan" approved from Traffic Police before taking up any construction activity on the road.

1.13.6 The guiding principles to be adopted for safety in construction zone are to warn the road user clearly and sufficiently in advance, provide safe and clearly marked lanes for guiding road users and marked buffer and work zones. The agency shall provide adequate measures that control driver behavior through construction zones.

1.13.7 The primary traffic control devices used in work zones shall include signs, delineators, barricades, cones, pylons, pavement markings and flashing lights, deployment of sufficient number of marshals on diversion roads.

1.13.8 Regulatory signs impose legal restriction on all traffic and they are to be used only after consulting the local police and traffic authorities.

- i. Warning signs in the traffic control zone shall be utilised to warn the drivers of specific hazards that may be encountered.
- ii. The agency shall place detour signage at strategic locations and install warning signs. In order to minimize disruption of access to residences and business, the agency shall maintain at least one entrance to a property where multiple entrances exist.
- iii. A warning sign shall be installed on all secondary roads which merges with the primary road where the construction work is in progress at sufficient distance before it merges with the primary road so as to alert the road users regarding the “Construction Work in Progress”.
- iv. Materials hanging over/ protruded from the chassis / body of any vehicle especially during material handling shall be indicated by red indicator (red light/flag) to indicate the caution to the road users.
- v. The required number of traffic guards /marshals as decided by Guwahati Traffic Police / Engineer-in-Charge shall be provided during construction period so as to ensure safe movement of traffic without any extra cost to CPWD. In case of default, the traffic guards/ marshals shall be provided by CPWD and cost thereof shall be recovered from the Agency in addition to recovery for violation of tender provisions. No claim whatsoever shall be entertained on this account.

#### **1.14 Various Ancillary Provisions at Site**

- 1.14.1 Traffic cones of 500mm, 750mm and 1000mm height and 300mm to 500mm in diameter or in square shape at base and are often made of plastic or rubber and normally having retro-reflectories red and white band shall be used wherever required.
- 1.14.2 Drums about 800mm to 1000mm high and 300mm in diameter can be used either as channelizing or warning devices. These are highly visible, give the appearance of being formidable objects and therefore command the respect of drivers.
- 1.14.3 The barricading shall be maintained during the execution of the entire work till completion and shall not be removed at any stage without prior approval of the Engineer-in-Charge. All barricades shall be conspicuously visible in the dark/night- time by the road users so that no vehicle hits the barricade. Conspicuousness shall be ensured by affixing retro reflective stripes of required size and shape at appropriate angle at the bottom and middle portion of the

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barricade at suitable gap. In addition, red light or red-light blinkers should be placed at the required locations on the barricading as per directions of the Engineer-in-Charge.

- 1.14.4 The barricading after the completion of the work shall be dismantled including its foundation by the agency and the material received shall be the property of the agency.
- 1.14.5 Traffic signals during construction at site for day and night, reflective signs, direction boards, marking, glow lamps, marking, caution tape, traffic signage as per requirement, flags, Traffic Marshals etc. as directed by the Engineer-in-Charge. However, traffic police signals shall not be the responsibility of the Agency.
- 1.14.6 The cleaning of barricading every fifteen days or as directed by the Engineer-in-Charge with water and detergent so as to ensure that there is no dirt or splashes on the barricading. The dust accumulated along the barricades on the carriageway shall be removed every week failing which suitable recovery shall be proposed against the agency and the decision of the Engineer-in Charge in this regard shall be final and binding.
- 1.14.7 Installation of temporary warning signs/lamps on all barricades during the hours of darkness and kept it always lit there during these hours.
- 1.14.8 Shifting and re-fixing in position as per the direction of Engineer-in-Charge and all incidentals to execute the job as many times as directed by Engineer-in-Charge.
- 1.14.9 Re-painting of the barricading after regular interval as directed by Engineer-in-Charge and proper maintenance of the barricading till completion of the work by repairing/replacing the damaged barricade. They shall be maintained in one line and level.
- 1.14.10 Barricading of appropriate height is required to be erected by the Agency at his own cost for segregating the area of work locally and deep excavation for restricting the movement of man and machinery and nothing extra shall be paid to the agency on this account.
- 1.14.11 Fixing of Lit and Non-lit boards on the barricades of various sizes and design as per the direction of Engineer-in-Charge and kept the boards lit at all times during hours of darkness.
- 1.14.12 The Agency shall ensure the cleanliness of roads and footpaths by deploying proper manpower for the same. The Agency shall have to ensure proper brooming, water sprinkling, washing of roads and footpaths at all the time, throughout the entire stretch till the currency of the contract including disposal of sweeping without any extra cost.

## **1.15 Existing Services, Storage and Labour Camps within Site**

### **1.15.1 Existing Services-**

Existing drains, pipes, cables, overhead wires, sewer lines, water lines and similar services encountered in the course of the execution of the work shall be protected and maintained against the damage by the Agency. The Agency shall identify all underground and overhead services and take necessary measures to protect the services before starting any excavation / activity. All temporary supports and other measures required to protect and

maintain the services during construction period as per direction of Engineer-in-Charge, shall be deemed to be included in the quoted rate/ amount of the Agency and nothing extra shall be paid on this account. For shifting of any temporary or permanent services, the agency shall arrange to shift the services including liaisoning work with the concerned Govt. Agencies as and when required. Any construction cost of shifting of the above services shall be paid by the Engineer-in- charge directly to the concerned Govt. Agency. In certain cases, it can also be paid by the agency to the concerned Govt. Department for which such cost shall be reimbursed to the agency by the Engineer-in-Charge.

#### **1.15.2 Land for Storage/Labour Camps/RMC**

Agency shall manage all activities within the land portion shown in the drawing . CPWD is not obliged to make any other land available for Batch Mix Plant, Store, Preserving Topsoil, labour camps etc.

#### **1.16 Incidental Works.**

For execution of any items of work where incidental works such as bailing out water, shoring etc. are actually required but not specifically stated in the scope of item and tender document, it is to be understood that the contract amount quoted by the agency shall cover such charges also and nothing extra on account of such incidental charges shall be payable.

#### **1.17 Security of the Work.**

- 1.17.1 The Agency shall bear full risk and take full responsibility for the watch and ward of work site, care of the works and materials, goods and equipment for incorporation therein from the commencement date until the completion certificate is issued including the maintenance period.
- 1.17.2 The agency shall take full responsibility for the Adequacy, Stability, Safety, Quality and Security of the Works, Plant, Goods, Agency's Equipment, Temporary Works, operations on Site and methods of manufacture, installation, construction and transportation.
- 1.17.3 Provide and maintain all lights, guards, fences and warning signs and watchmen when and where necessary or required by the Engineer-in-Charge or by laws for the protection of the Works and for the safety and convenience of the public and all persons on or in the vicinity of the site.
- 1.17.4 Agency is required to take note of all the necessary provisions in Employer's Safety, Health and Environment Manual (SHE Manual) and the Agency's price shall be inclusive of all the necessary costs to meet the prescribed safety standards. In the case, the Agency fails in the above; the Employer reserves the right to provide the necessary arrangements and recover the costs from the Agency.

#### **1.18 Housekeeping during the execution of the work**

- 1.18.1 Housekeeping is the act of keeping the working environment cleared of all unnecessary waste, thereby providing a first line of defence against accidents and injuries. General housekeeping

shall always be carried out by the Agency and ensured at work site, construction depot, fabrication yard, workshop, batching plant, labour camp, stores, offices and toilets/urinals etc. The Agency shall be responsible to provide segregated containers for disposal of debris at required places and regular cleaning of the same.

- 1.18.2 All stairways, passageways and gangways shall be maintained without any blockages or obstructions. All emergency exits, passage, ways, fire exits, break-glass alarm points, fire-fighting equipment, first aid stations, and other emergency stations shall be kept clean, unobstructed and in good working order.
- 1.18.3 All surplus earth and debris shall be removed/ disposed-off from the working areas immediately. Trucks carrying sand, earth and any pulverized materials etc. shall be covered while moving in order to avoid dust or odour impact. The tyres of the trucks leaving the site shall be cleaned with water, wherever the possibility of spillage on carriageways meant for regular road traffic exists.
- 1.18.4 No parking of trucks/trolleys, cranes and trailers etc. shall be allowed on roads, which may obstruct the traffic movement.
- 1.18.5 Roads shall be kept clear and materials like: pipes, steel, sand boulders, concrete, chips and brick etc., shall not be allowed on the roads to obstruct free movement of road traffic.
- 1.18.6 Water logging or bentonite spillage on roads shall not be allowed.
- 1.18.7 Proper and safe stacking of material are of paramount importance at fabrication stores and such locations where material would be unloaded for future use. The storage area shall be well laid out with easy access and material stored / stacked in an orderly and safe manner.
- 1.18.8 Flammable chemicals compressed gas cylinders etc. shall be safely stored. Unused/surplus cables, steel items and steel scrap lying scattered at different places within the working areas shall be removed to marked locations(s). All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from the site. Lumber with protruding nails shall be either bent/ removed and properly stacked.
- 1.18.9 The compliance of above provisions are deemed to be included in the quoted amount of the Agency and no claim / payment whatsoever shall be entertained on this account.

## **1.19 Safety**

- 1.19.1 Appropriate number/s of Safety Officer/ Manager are required to be always at site.
- 1.19.2 Qualifications of Safety Coordinator/ Manager should not be less than those prescribed in local regulation in building and other construction workers (regulation of employment & conditions of service) Central Rules,1998.
- 1.19.3 Agency shall arrange for initial Site orientation / induction of all Workmen / Supervising personnel on ‘Safety practices’ before starting work at site. This shall include a briefing about project, safety policy, site safety rules and site facilities.

- 1.19.4 Agency shall conduct a daily toolbox talk for all workers previous to starting to work.
- 1.19.5 These tool box talks should include topics related to ongoing work activities and precautions to be taken on daily activities.
- 1.19.6 Agency shall ensure participation of his site in-charge and the safety coordinator in the safety meetings arranged at intervals decided by the Engineer-in-Charge.
- 1.19.7 Agency shall also submit a Health & Safety report on monthly basis or as directed by Engineer-in-Charge.
- 1.19.8 **Agency's Safety Engineer / Safety Officers shall:**
- (i). Assist the Agency's Construction Manager and coordinate with Safety Supervisor for the implementation of the SHE programmes within corresponding work groups.
  - (ii). Get familiarized with all Government, and Owner's safety and health regulations, including reports and work permit procedures.
  - (iii). Inspect the construction area on a regular basis in order to verify appropriate corrective actions and prepare reports to their construction manager.
  - (iv). Review the SAP (Safety Action Plan) prepared by line supervisor.
  - (v). Co-ordinate with supervisors and foremen periodical safety meetings and lead daily safety meetings.
  - (vi). Conduct safety training classes for all workers.
  - (vii). Participate in Toolbox Talks.
  - (viii). Suggest safety promotional activities.

**1.19.9 Information to Be Provided by Agency**

- (i). Health, Safety and Environment policy
- (ii). A detailed Health, Safety and Environment plan.
- (iii). Names of the Safety personnel.
- (iv). Work method statements for critical operations such as lifting etc.
- (v). Test Certificates for lifting gear, lifting equipment and accessories.
- (vi). Information related to hazardous materials used and corresponding MSDS (Materials Safety Data Sheets).
- (vii). Daily labour returns
- (viii). Copies of all Statutory Records.
- (ix). Copies of the Agency Safety's reports
- (x). Supervisor's reports of his findings onsite inspections.

**1.19.10 Initial site orientation / induction**

The number of orientation sessions presented each week will vary to the greatest extent possible in order to accommodate the Agency's needs to bring labour on site.

- 1.19.11 The following topics shall be included during such presentations, which will change

during the course of the project to meet changing site requirements:

- (i). Introduction to the site and project, with a brief overview of the project under constructions.
- (ii). Owner's SHE policy and safety philosophy.
- (iii). Personal Protective Equipment (hard hats, safety glasses, safety steel-toed boots)
- (iv). Housekeeping
- (v). Working in and around excavations
- (vi). Working at height (ladders, scaffolds, free edges and openings)
- (vii). The Safety Action Plan (SPA)
- (viii). First aid facilities, Accident reporting system
- (ix). Emergency procedure
- (x). Smoking restrictions, prohibition of alcohol and drugs.
- (xi). The Agency will conduct a site visit for his new employees in groups of less than 25 so that they get acquainted with essential services, their workplace, and general site layout.
- (xii). Gate pass will be issued only after completion of the site orientation / induction.

#### 1.19.12 Personal Protective Equipment's (PPEs)

The Agency shall provide required PPEs to workmen to protect against safety and/or health hazards. Primarily PPEs are required for the following protection:

- (i). Head Protection (Safety helmets)
- (ii). Foot Protection (Safety footwear, Gumboot, etc.)
- (iii). Body Protection (High visibility clothing (waistcoat/jacket, Apron, etc.)
- (iv). Personal fall protection (Full body harness, Rope-grab fall arrester, etc.)
- (v). Eye protection (Goggles, Welders glasses, etc.)
- (vi). Hand protection (Gloves, finger coats, etc.)
- (vii). Respiratory Protection (Nose mask, SCBAs, etc.)
- (viii). Hearing protection (Ear plugs, Ear muffs, etc.)

#### 1.19.13 The PPEs and safety appliances provided by the Agency shall be of the standard as prescribed by Bureau of Indian Standards (BIS). If materials conforming to BIS standards are not available, the Agency shall procure PPE and safety appliances, as approved by the Engineer-in-Charge.

Safety Helmet Colour Code	Person to use
White	CPWD Engineers
Grey	All designers, Architect, Consultants etc.
Violet	Main Agencies (Engineers/Supervisors)
Blue	All Sub-Agencies (Engineers/Supervisors)
Red	Electricians (both Agency and sub-Agency)
Green	Safety Professionals (Both Agency and Sub Agencies)

Orange	Security Guards/Traffic Marshals
Yellow	All workmen
White (with "Visitor" sticker)	Visitors

**every Helmet should have the LOGO affixed/painted).**

- 1.19.14 All construction workers should be provided with high visibility jackets with reflective tapes confirming to the requirement specified under BS EN 471: 1994. The conspicuous of workmen at all times shall be increased so as to protect them from speeding vehicular traffic.
- 1.19.15 In addition to the above, any other PPE required for any specific jobs like, welding and cutting, working at height, tunnelling etc. shall also be provided to all workmen and also ensure that all workmen use the PPEs properly while on the job. The Agency shall not pay any cash amount in lieu to PPE to the workers/sub-Agencies and expect them to buy and use during work.
- 1.19.16 The Agency shall at all-time maintain a minimum of 10% spare PPEs and safety appliances and properly record and show to the Engineer-in-Charge during the inspections. It is always the duty of the Agency to provide required PPEs for all visitors & CPWD staff as and when required. Towards this, the required quantity of PPEs shall be kept always at the security post.
- 1.19.17 Notwithstanding the above, the Agency shall at their expense arrange for the safety provisions as per all relevant Indian Standard Safety Codes & local byelaws. The Agency shall provide all facilities in connection therewith and shall also issue the identity card to his labourer.

## **1.20 Work at Heights:**

- 1.20.1 During construction of buildings/towers safety net (horizontal and vertical) shall be used by Agency to check/control falling of any object. The Agency/vendor shall also take the other safety measures used during construction, for e.g. Personal Protective Equipment's (PPEs), safety during working at heights etc.
- 1.20.2 The Agency shall provide proper scaffolding and working platforms with handrails to work at higher elevations and Tools and loose material should not be left on the scaffolding from where they are likely to fall. Persons should use safety belts while working near open edge where it is not possible to provide handrails.
- 1.20.3 Things should not be thrown from heights and should be brought down or taken up with the help of ropes. While work is being carried on at higher elevations, warning notices should be posted below or barricade the area so as to draw the attention of persons and prevent them from coming under the falling objects.
- 1.20.4 Defective scaffoldings, damaged ladders, insufficient working platforms etc. shall not be permitted. Wherever necessary, light weight mobile tower scaffolds or hydraulic platforms should be used.

- 1.20.5 Proper access should be available to the work spot. Nobody should jump over open area between equipment, pipes and rails etc. from where they may slip. Walking over beams, narrow pipes etc. should be prohibited.
- 1.20.6 The area from where the materials are pulled up with ropes etc. should have hand railings and the person should keep firm footing. They should not lean over the hand rails and should use safety belts to protect themselves from fall due to body imbalance.
- 1.20.7 The Agency shall install **inspection lift of minimum 10 Pax** capacity at suitable locations for each tower or as decided by the Engineer-in-Charge. The installation of the inspection lift shall commence from the Fourth floor level and it shall be extended upto the terrace level. The de-installation of the same shall be done after taking permission from the Engineer-in-Charge. The Agency shall supply, install, operate and maintain the system and the quoted rates shall be deemed to be all inclusive for the complete item and nothing extra shall be paid to the Agency on this account.

## **1.21 Sanitation and hygiene measures**

In order to provide adequate sanitary conditions for all personnel at site, the following provisions as a part of the temporary facilities to be provided by the Agency:

- 1.21.1 Provision for an adequate supply of potable water.
- 1.21.2 Provision for toilets and hand wash basins
- 1.21.3 Garbage disposal and regular collection
- 1.21.4 Proper drainage and sewer disposal
- 1.21.5 Other special hygienic operations viz. Fumigation, pest controls etc.
- 1.21.6 Worker's Rest Space:
- 1.21.7 Smoking hut
- 1.21.8 Sunshade and/or site canteen
- 1.21.9 Smoking on site is not allowed, « No smoking » signs shall be displayed at prominent location including stores/ storage places.

## **1.22 Third party quality control**

In order to achieve a high standard of quality, it shall be required to go for Third Party Quality Control. For this purpose, a separate agency shall be appointed by the CPWD and also an independent quality auditor appointed by RBI who will carry out independent inspection of construction work, testing of materials and checking and ensuring overall quality procedures. The agency shall be required to fully cooperate with TPQA (Third Party Quality Assurance) team and independent quality auditor and facilitate them in taking samples, transportation and examination of various activities including documentation at no extra time and cost to the owner. In case of any adverse findings by the TPQA team and independent quality auditor, the agency shall do the needful rectifications at no extra time and cost to the owner. The Engineer-in-Charge shall be at liberty for getting quality assurance work done through agencies like IIT Guwahati, any NIT or Govt. Engineering College, EIL, RITES etc. (any one

agency as approved by Chief Engineer). The successful bidder shall include the provisions mentioned in this chapter while framing the proposed methodology for tests. The suitable office space along with furniture should be provided by the agency and nothing extra will be paid on this account.

### **1.23 Unforeseeable Difficulties**

Except as otherwise specifically stated elsewhere in the Contract:

- 1.23.1 The Agency shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Works.
- 1.23.2 By signing the Contract, the Agency accepts total responsibility for having foreseen all difficulties and costs of successfully completing the Works; and
- 1.23.3 The Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs.
- 1.23.4 CPWD shall not provide any material either on chargeable or on free issue basis to the Agency for execution of the project.

### **1.24 INSURANCE**

#### **1.24.1 Requirements:**

Before commencing the execution of the work, it shall be obligatory for the contractor to obtain at his own cost, insurance cover under the following requirements:

- (i) Contractor's all risk and third-party cover.
- (ii) Liability under the workman's compensation act 1923, Minimum wages act 1923, Minimum wages act 1948 and contract labour (Regulation and abolition) Act 1970.
- (iii) Accidents to Staff, Engineers, Supervisors of the main Agency, sub-contractor / specialized agencies and CPWD who are not governed by Workman's compensation act.
- (iv) Damage to material, machinery and works due to fire, theft, flood, earthquakes etc.

#### **1.24.2 Policy in the joint names of Agency and CPWD:**

Before commencing the execution of work, the Agency shall, without in any way limiting his obligations and liabilities, insure at his own cost and expense against any damage or loss or injury, which may be caused to any person or property, at site of work. The Agency shall obtain and submit to the Engineer-in-Charge proper Contractor All Risk Insurance Policy for an amount 1.25 times the contract amount for this work, with Engineer-in-Charge as the first beneficiary. The insurance shall be obtained in joint names of Engineer-in-Charge and the Contractor (who shall be second beneficiary). The policy shall be kept in force till completion of defect liability period.

The policy referred above shall be obtained in the joint names of the Agency and Engineer-in-Charge and shall inter-alia provide coverage against the following, arising out of or in

connection with execution of work, their maintenance and performance of contract.

- (i) Loss of life or injury involving public, employee of the contractor or that of CPWD, labour etc.
- (ii) Loss or damages to the finished works / in progress works.
- (iii) Loss or damage to the works or property belonging to public, Government bodies, local authorities, utility organizations, contractors, employers or others.

#### 1.24.3 **Currency of policy**

- i. The policies shall remain in force throughout the period of execution of the work and till the expiry of the defects liability period. If the contractor fails to effect or keep in force or provide adequate cover in the insurance policies mentioned above or any other insurance he is required to effect under the contract, then the employer may effect and keep in force any such insurance or further insurance and the cost and the expenses incurred by the department in this regard shall be deductible from the payment due to the contractor or from the contractors security deposit.
- ii. The terms and conditions of the Insurance policies shall be got approved from Engineer-in-charge. Policies and certificates for insurance shall be delivered by the contractor to Engineer-in-Charge or his authorized representative before the start date. All such insurances shall provide for compensation to be payable, and the amount required to rectify the loss or damage incurred.
- iii. Alterations to the terms of insurance shall not be made without the prior approval of the Engineer-in-Charge.
- iv. The Agency shall, from time to time, provide documentary evidence as regards payment of premium for all the Insurance Policies for keeping them valid till the completion of the work

#### 1.25 **Make in India Policy**

The main Agency as well as associate contractor or sub-agencies of each discipline shall comply with Government of India Public Procurement (Preference to Make in India), Order-2017 amended up to last date of submission of bid.

## SECTION-II

### **Standard Operating Procedures (SOPs) and Guidelines for Construction Sites for COVID Outbreak/Any other unexpected pandemic.**

In response to COVID outbreak/any other unexpected pandemic the following Standard Operating Procedures (SOPs) and guidelines to ensure safety of construction site workers shall be followed. In addition to trained Supervisor(s), a Site Safety Representative (SSR) will be deployed at every site, to ensure the safety guideline is followed. Necessary trainings will be given in advance to Supervisors and SSRs, so that they can train the workers further.

#### **A. General Guidelines- Applicable to All**

1. The workers coming from outside will be required to self-declare their health profile as per “**Form -1**” and shall be quarantined for a period of at least 15 days. Mandatory.
2. Thermal Scanning of everyone entering and exiting a construction site will be done for fever with thermal scanners. If anyone leaves and re-enters the site during the shift, re-screening of the individual will be done prior to re-entry into the work site.
3. Personal Protective Equipment (PPE) and other material requirement shall be documented as per “**Form-2**”.
4. Provision for hand wash & sanitizer (touch free recommended) will be made at all entry and exit points and common areas (including at distant locations like higher floors). Everyone will be required to wash & sanitize his/her hands before entering the site and using PPEs. Same procedure to be followed after removing PPEs and exiting the premise. Sufficient quantities of all the items should be available at the site.
5. All Protocol including Emergency Response will be laid out. Periodic tailgate sessions will be arranged to review site protocols in view of highly dynamic scenario ensuring social distancing norms. During these sessions, everyone including workers will be informed about the safety guidelines and important updates. Necessary arrangements for announcements shall be made at site.
6. Mandatory use of PPEs (face mask, hand gloves and other as applicable) by everyone entering the premise. Re-usable PPEs should be thoroughly cleaned and should not be shared with others.
7. Entire construction site including site office, labour camp, canteens, pathways, toilets, and entry / exit gates will be disinfected on daily basis. Housekeeping team should be provided with necessary PPEs.
8. There will be total ban on non-essential visitors at sites (including from Head office staff, consultants etc.).

9. There will be strict ban on Gutka, Tambaku, Paan etc. on site and spitting shall be strictly prohibited.
10. Food should be consumed at designated areas only ensuring social distancing.
11. Common sitting arrangements should be removed.
12. Post lunch, waste should be disposed by individual in designated bins and area should remain clean.
13. Areas with a probability of bigger gathering, for e.g. cleaning area, toilets etc. should be identified and all arrangements should be made to ensure social distancing.
14. A doctor will be present periodically (at least once a week) at site on allotted time for any medical assistance.
15. Appropriate signages at construction site spelling out safety practices in the language which is understood by all, shall be provided.
16. Hospital/clinics in the nearby area, which are authorized to treat COVID patients, should be identified and list should be available at site all the time.
17. For any confusion, clarification and update, everyone should approach designated authority or rely on authentic source.
18. Rumours shall be discouraged and offenders be warned.
19. An isolation room of appropriate capacity shall be created at site.

#### **B. Guidelines for workers**

1. On day one, before resuming the work on site post lockdown period, mandatory medical check-up will be arranged for all workers. The workers coming from outside will be quarantined for a period as prescribed by Govt. Authorities, Medical & Health Authorities applicable at the period of construction. Only medically fit workers will be deployed at site and medical assistance will be arranged for unfit workers. Medical checkups camp should be arranged every month.
2. The labours staying at site will not be allowed to go outside. All the essential items will be made available to labours at site only. If necessary, the workers can go out wearing PPEs, after informing supervisor. Similarly, no outside labour will be allowed at site without following proper procedure and instructions.
3. Start time on site will be staggered to avoid congestion at the entry gates. Number of workers working at a particular time / place will be reduced by making arrangements for different shifts / areas. Accordingly, additional staff such as security guards, supervisors etc. will be deployed.
4. For workers staying outside, special transportation facility will be arranged by the agency without any dependency on the public transport system.

5. During attendance, training and other sessions, social distancing guidelines will be followed along with provision of no-touch attendance.
  
6. Workers should not shake hands when greeting others and while working on the site.
7. Workers shall avoid contact with sick people and avoid going to site if they are feeling sick, have fever, cough or shortness of breath. In such case, supervisor should be informed immediately.
8. Workers with such symptoms should not come to site and should be placed in isolation and medical assistance will be provided on immediate basis. The Agency should make all the arrangements of food and any other requirement on priority basis and the worker shall not be allowed to leave the isolated space designated for such person.
9. Mandatorily wear face masks while working on site. While not wearing masks, worker shall cover his mouth and nose with tissues.
10. Cough/sneeze should be done in the crook of one's arm and elbow.
11. Avoid large gatherings or meetings of 10 people or more. Stay at least 6 feet away from others on job sites and in gatherings, meetings, and training sessions.
12. Not more than 2/4 persons (depending on size) will be allowed to travel in lifts or hoists. Use of staircase for climbing should be encouraged.
13. Workers should clean hands frequently by washing them with soap and water for at least 20 seconds. When hand washing isn't possible, alcohol-based hand sanitizer with greater than 60% ethanol or 70% isopropanol should be used.
14. Workers should not share their belongings like food, water bottles, utensils, mobile phones etc. with others.
15. The utensils should be washed properly post use at designated place.
16. Post work, workers should change their clothes before leaving the site and clothing should not be shook out.
17. Avoid touching eyes, nose, or mouth with unwashed hands.

#### **C. Guidelines for Material, Tools, Machinery, Vehicles etc.**

1. Wipe down interiors and door handle of machines or construction vehicles, the handles of equipment and tools that are shared, with disinfectant prior to using.
2. Non-touch waste bin with disposable garbage bag should be installed for waste collection at all common access areas.
3. Proper disposal of garbage should be ensured.
4. At all point of time, easy access to parking should be ensured since public transit is limited.
5. All construction material arriving at site should be left idle for 3 days before use to

ensure safe usage.

6. All vehicles and machinery entering the premise should be disinfected by spray mandatorily.

**D. Emergency protocol in case of detection of symptoms of COVID to be observed by Project Manager of Contractor**

1. Immediate shift worker to isolation room & inform the Engineer-in-charge or his Nodal officer.
2. Call for a doctor.
3. Keep worker under observation for a few days in isolation room. In case of doubt, act as per advice of local doctor.
4. Covid testing shall be arranged as per instructions of doctor and if so advised by Doctor move worker to Hospital.

<b>Sl. No.</b>	<b>Designation</b>	<b>Responsibility</b>
1.	CPWD Nodal officer as designated by Engineer-in-charge.	To coordinate efforts on behalf of Engineer in Charge and ensure compliance of these SOPs. He shall send a daily confirmation of compliance of SOPs.
2.	Project Manager of contractor	Overall responsibility of ensuring compliance of procedure and precautions in SOP. To submit daily compliance report to CPWD Nodal officer To designate a senior person as COVID Marshal and form a team under him
3.	COVID Marshal (Nodal Officer)	To exclusively look after the implementation of all the precautions and procedure at work site and labour camps. To intimate daily requirement of PPEs, sanitizers, disinfectants etc in their respective sections. Regular attendance of workers to ensure that no one leaves the site without the permission from local authorities. Ensuring Timely payment to workers/ staff.

## “Form-1”

### **COVID (Coronavirus) Exposure Questionnaire for New workmen**

Name	Native (State, District/City, Village)
Age	
Gender	

Please answer the following questions with as much detail as possible:

1. Location/Travel Declaration

a. Please provide your locations/travel patterns over the past 14 days in Table below:

COUNTRY	CITY/ VILLAGE	DATE ARRIVED/SINCE WHEN YOU HAVE BEEN IN THE LOCATION	DATE DEPARTED

2. Any cases of COVID in your locations where you have been for last 14 days?

**YES**                                   **NO**

3. Are you, or have you been in close contact with anyone who has been quarantined or who has been diagnosed with novel coronavirus (SARS-CoV-2/COVID)? If yes, please provide details.

**YES**                                   **NO**

4. Have you ever been quarantined due to a possible exposure to novel coronavirus (SARS-CoV-2/COVID)? If yes, please provide dates and locations.

**YES**                                   **NO**

5. Have you experienced any of the following symptoms within the last 14 days?

- Any fever
- Cough
- Shortness of breath
- Malaise (flu-like tiredness)
- Rhinorrhea (mucus discharge from the nose)
- Sore throat
- Gastro-intestinal symptoms such as nausea, vomiting and/or diarrhoea, If yes, to any of these, please indicate which and provide full information.

6. Are you currently in good health?

**YES**

**NO**

**Declaration:**

I confirm that the answers I have given are, to the best of my knowledge, true, and that I have not withheld any material information that may influence the assessment or acceptance of this application.

I agree that this form will constitute part of my application for insurance(s) and that failure to disclose any material fact known to me may invalidate my insurance(s).

Signature

Date

Time

Witness

**“Form-2”****PPE and Other material requirement:**

<b>SL. No.</b>	<b>List of Items (Personal Sanitization)</b>	<b>At Stores</b>	<b>At Office</b>	<b>At Workmen Camp</b>
1	Hand Sanitizer (min.60% Alcohol)	1 bottle (500ml) at all entrance and to be refilled on regular basis	1 Bottle (500ml) at all entrance and to be refilled on regular basis	2 bottles (500ml) at all entrances and to be refilled on regular basis
2	Alcohol based Shop Solution	To be made Available on demand	To be made available on demand	2 bottles (500mL) at the front side of each campus visible & easy to access along with water availability for washing. Need to be refilled on regular basis
3	Soap (100gm)		1 No in each toilet and wash basins	1 No. to be distributed to each contractor workman once in a week.

<b>Sl. No.</b>	<b>List of Personal Protective Equipment (PPEs)</b>	<b>Scope</b>
1	Nose Mask & Paper Tissues	For all workmen (daily one for at least one month)
2	Face mask/Face shield/Goggles	For workmen involved in disinfection/ sanitization activity (new one to be issued for each day activity) and COVID Marshal.
3	Gloves (Nitrite)	For workmen involved in disinfection/ sanitization activity (new one to be issued for each day activity)
4	Coverall/Gowns (Nitrite)	For COVID Marshals and workmen involved in disinfection/sanitization activity (new one to be issued for each day activity)

## SECTION-III

### SPECIAL CONDITIONS

1. Before commencement of any item of work, the Agency 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 dimensions 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 Agency 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.
2. The execution of work shall be carried out in accordance with specifications, drawings, schedule of civil items and General conditions / additional conditions detailed herein in this bid document to be read along with relevant CPWD specifications 2019 Vol-I and Vol-II (amended upto the last date of submission of bids) and manufacturer's specifications wherever necessary. For the items which are not covered under CPWD Specifications, the Particular Specifications / B.I.S. Specifications shall have to be followed. The decision of Engineer-in-Charge shall be final and binding in this regard.
3. Wherever any reference is made to any Indian Standard, it shall be taken as reference to the latest edition with all amendments / revision issued thereto upto the last date of submission of bids.
4. The Agency is required to deploy resources as per availability of site. However, no claim will be entertained for idle labour, idle machinery, idle eligible / non-eligible staff, idle T&P etc.
5. The Agency shall procure the required materials in advance so that there is sufficient time for testing of the materials and clearance of the same before use in the work. The Agency 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.
6. The terms machine batched, machine mixed and machine vibrated concrete used elsewhere in Agreement shall mean the concrete produced in concrete batching and mixing plant and if necessary, transported by transit concrete mixers, placed in position by the concrete pumps, tower crane and vibrated by surface vibrator /needle vibrator / plate vibrator, as the case may be to achieve the required strength and durability.
7. The work shall be carried out in accordance with the Architectural drawings and Structural drawings approved by the Engineer-in-Charge.

8. Before commencement of any item of work, the agency shall correlate all the relevant architectural and structural drawings and specifications etc. well in advance and satisfy himself that the information available is complete and unambiguous. The agency alone shall be responsible for any loss or damage occurring by the commencement of work based on any erroneous and or incomplete information and no claim whatsoever shall be entertained on this account.
9. The work of services will be executed simultaneously. The agency shall minimize the scope of making recesses, holes, opening etc. as the same shall be planned and necessary grooves / niches shall be provided.
10. The agency shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other agency(s) or by the Engineer-in- Charge and shall as far as possible arrange his work and shall place and dispose of the materials being used or removed, so as not to interfere with the operations of other agency 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.
11. If the work is carried out in more than one shift or during night, no claim on this account shall be entertained. The agency must take permission from the police authorities etc., if required for work during night hours and no claim / hindrance on this account shall be considered if work is not allowed during night time.
12. The agency shall be responsible for the safety, watch & ward, fittings and fixtures provided by him of all buildings against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the department or the period of comprehensive maintenance is over whichever is later. No extra payment shall be made on this account.
13. Samples of building materials, fittings and other articles required for execution of work shall be got approved from the Engineer-in-Charge before use in the work well in advance. The quality of samples brought by the agency shall be judged by standards laid down in the relevant section of agreement/CPWD or BIS specifications as applicable. All materials and articles brought by the Agency to the site for use shall conform to the samples approved by the Engineer-in-Charge which shall be preserved till the completion of the work.
14. BIS marked materials except otherwise specified shall be subjected to quality tests at the discretion of the Engineer-in-Charge besides testing of other materials as per the specifications described for the item/material. Wherever BIS marked materials are brought to the site of work, the agency 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 agency for incorporation in the work satisfies the provisions of specifications / BIS codes relevant to the material and / or the work done.

15. Regarding testing of civil & electrical materials, the testing of materials shall be conducted in Govt. Laboratory / Govt. Engineering Colleges / IITs /NITs or from the laboratory approved by Engineer-in-Charge. The charges of testing of all materials as per the required frequency in approved laboratory shall be borne by the agency and nothing shall be payable to the Agency. Testing frequency shall be as per updated CPWD Specifications/ BIS/ NBC norms/ as directed by engineer in charge as applicable and water test shall be monthly basis from start of concrete work at site for main project structures.

## 16. **Quality Assurance and Record Keeping.**

- 16.1 The agency shall procure the required materials well in advance so that there is sufficient time for testing of the materials and clearance of the same before use in the work. The agency 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.
- 16.2 Agency shall submit minimum "**Quality Assurance Plan**" based on CPWD Quality assurance Manual for Building Works 2022 updated upto the last date of submission of bids within 45 days after award of work for the approval of Engineer-in Charge which shall be consisting of:
  - 16.2.1 Number of required tests and frequency of testing. While deciding these criteria, CPWD specifications 2019 vol I and II with updated correction slips & provisions of BIS code and standard practices may be referred. Volume of work, practical difficulties and site conditions etc. may also be kept in view. The lot size, number of tests and frequencies of testing can be altered or modified by the Engineer-in-Charge from the prescribed limits.
  - 16.2.2 It should clearly indicate the machinery and other tools & plants required to be deployed at site by the agency. Entire machinery and T&P may not be required at the start of work; therefore, a proper time schedule by which each machinery and T&P is to be brought at site should also be indicated.
  - 16.2.3 The agency shall prepare and submit Method **Statement** for all important activity as decided by Engineer-in-charge to the Department for approval before actual start of the work. The '**Method statement**' is a statement by which the construction procedures for any activity of construction are formulated and stated in chronological order. The 'Method statement' should have a description of the item with elaborate procedures in steps to implement the same for execution, the specifications of the materials involved, their testing and acceptance criteria, equipment to be used, precautions to be taken, steps of measurement etc.

- 17. Receipt of Material, testing of the same & Maintenance of Register of Tests.**
- 17.1 All the registers for the tests carried out at construction site or outside laboratories shall be maintained by the agency, which shall be inspected by Engineer-in-Charge or his/her authorized representative at any point of time. These test registers shall be issued by the Engineer-in-Charge to the Agency.
- 17.2 The Agency shall allow access to Third Party Quality Assurance Agency (TPQA) engaged by Engineer-in-Charge to have a control on quality and methodology of execution. At least 10% of samples of materials including Cement Concrete Cubes shall be taken jointly by Agency and TPQA / Engineer-in-Charge or his authorized representative.
- All expenditure to be incurred for testing of all the samples e.g. packaging, sealing, transportation, loading, unloading etc. including testing charges shall be borne by the contractor at his own cost and nothing extra shall be payable on this account.**
- 17.3 All the tests in field lab setup at construction site shall be carried out by the quality control team to be engaged by the Agency which can be witnessed by Engineer-in-Charge or his/her authorized representative at any time. A daily report of Tests to be conducted on a day shall be submitted to Engineer-in-Charge or his/her authorized representative.
- 17.4 All the entries in the registers will be made by the designated Engineering Staff of the Agency.
- 17.5 Agency shall be responsible for safe custody of all the test registers.
- 17.6 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.
- 17.7 All materials received at site shall be entered in online MAS (material at site) Register and copy of supply order, MTC (Manufacturer's test certificate) & self-attested e-Bill- invoices of the material received shall be maintained in order for the inspection of Engineer-in-Charge or his authorized representatives as and when required.
- The Agency shall raise an RFI (Request for Inspection) for material in site register on the portal which shall be reflected as an action item in AE's notification who is responsible for checking the item on the field. Once physical check is completed, the AE should update as approved/Reject/In process and subsequently the entry will be considered for report.**
- 17.8 The Cement and Steel Registers including material at site register shall be maintained by a qualified staff of Agency which may be inspected by Engineer-in-Charge or his/her authorized representative at any time. All the test registers, Material at Site Registers, Cement Register, Paint Register and any other register maintaining the daily usage of material at site shall be issued to the Agency by the Engineer-in-Charge. The daily

report of receipt of material shall be sent to Engineer-in-Charge or his/her authorized representative.

- 17.9 As and when any important item (as decided by Engineer-in-charge) is taken up for execution, the Agency shall submit the specifications and develop the checklist and Pour card. This sample checklist should be got approved from the Engineer-in-Charge well in advance and should be used at site. This check list should be shown to the Engineer-in-Charge or his/her authorized representative during inspection. This procedure is to be followed for all hidden items, CC (cement concrete) /RCC work, Steel-reinforcement, shuttering, cast-in-situ flooring, doors & windows, plumbing, including water supply pipelines, roof treatment, water proofing works, earth filling etc.
  
18. The agency 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 agency on this account
  
19. The work shall be carried out, all in accordance with true intent and meaning of the specifications and the drawings taken together, regardless of whether the same may or may not be particularly shown on the drawings and / or described in the specifications, provided that the same can be reasonably inferred as per sound engineering practice. There may be several incidental works, which are not mentioned in the scope of work but will be necessary to complete the item in all respect. All these incidental works / costs which are not mentioned in specifications / drawings / tender document but are necessary to complete the item shall be deemed to have been included in the rates quoted by the contractor. No adjustment of rates shall be made for any variation in quantum of incidental works due to variation / change in actual working drawings. Also, no adjustment of rates shall be made due to any change in incidental works or any other deviation in such element of work (which is incidental to the items of work and are necessary to complete such items in all respects) on account of the directions of Engineer-in-Charge. Nothing shall be payable on the account of incidental works.
  
20. If any further details / elaboration or any miscellaneous clarifications etc. to the attached drawings required to the contractor for execution of work, the same may be asked by the contractor at least one month prior to its requirement so that consultant of the work may provide within a month to him. No hindrance shall be given on this account. Requirement of more Elaboration / detailing / Miscellaneous Drawings as required by contractor and provided by the consultant / department shall not mean change of Scope of Work etc. and the price of this shall be deemed to have been covered in the tendered amount.
  
21. In the event of any variation / discrepancy in the drawings, specifications and tender

documents etc. the decision of the Engineer-in-Charge shall be final, binding and conclusive on the contractor and in the case the contractor have any doubt and the same should be got clarified immediately from the Engineer-in-Charge and no claim of the contractor shall be entertained thereafter. Moreover, the agency is not allowed to take benefit out of any clerical / grammatical mistake in the standard clauses / Specifications etc. being used in the agreement.

22. Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar services encountered in the course of the execution of work shall be protected against the damage by the contractor, in case any damages to such existing services take place the same shall be rectified by the contractor at his own expense to the satisfaction of the 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.
23. The rates quoted by the contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference benchmark(s), taking spot levels, construction of all safety and protection devices, barriers, preparatory works, working during monsoon, Festival seasons, working at all depths, height, lead, lift and location and any other incidental works required to complete this work.
24. For works below ground level, the contractor shall keep that area free from water. If dewatering or bailing out of water is required, the same shall be responsibility of contractor. The price of this shall be deemed to have been covered in the tendered amount.
25. Any legal or financial implications resulting out of disposal of earth shall be carried out by the contractor at his own cost. The price of this shall be deemed to have been covered in the tendered amount.
26. The contractor shall keep himself fully informed of all acts and laws of the Central & State Governments, all orders, decrees of statutory bodies, tribunals having any jurisdiction or authority, which in any manner may affect those engaged or employed and anything related to carrying out the work. All the rules & regulations and bye-laws laid down by local body and any other statutory bodies shall be adhered by the contractor, during the execution of work. The contractor shall also adhere to all traffic restrictions notified by the local authorities for which unless or otherwise mention nothing extra will be payable on this account.
27. The cost of water for construction and labour (for municipal water connection as well as tanker water) shall be borne by the contractor. Also, if the contractor obtains water connection for the drinking purposes from the municipal authorities or any other statutory body, the consequent charges shall be borne by the contractor.
28. The contractor shall assume all liability, financial or otherwise in connection with this contract and shall protect and indemnify the department from any and all damages and claims that may arise on any account. The contractor shall indemnify the department against

all claims in respect of patent rights, royalties, design, trademarks or name or other protected rights, damages to adjacent buildings, roads or members of public, in course of execution of work or any other reasons whatsoever, and shall himself defend all actions arising from such claims and shall indemnify the department in all respect from such actions, costs and expenses. The price of this shall be deemed to have been covered in the tendered amount.

29. The contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupants of the adjacent properties and to the public in general. The contractor shall take all care, as not to damage any other adjacent property or other services running adjacent to the plot. If any damage is done, the same shall be made good by the contractor at his own cost and to the entire satisfaction of the Engineer-in-Charge. The contractor shall use such methodology and equipment for execution of the work, so as to cause minimum environmental pollution of any kind during construction, to have minimum construction time and minimum inconvenience to road users and to the occupants of the buildings on the adjacent plot and public in general, etc.
30. He shall make good at his own cost and to the entire satisfaction of the Engineer-in- Charge any damage to roads, paths, cross drainage works or public or private property whatsoever caused, due to the execution of the work or by traffic brought thereon, by the contractor, further, the contractor shall take all precautions to prevent any pollution of streams and waterways. All waste or superfluous materials shall be carted away by the contractor, entirely to the satisfaction of the Engineer-in-charge. Utmost care shall be taken to keep the noise level to the barest minimum so that no disturbance as far as possible is caused to the occupants / users of adjoining buildings. No claim what so ever on account of site constraints mentioned above or any other site constraints not specifically stated here, shall be entertained from the contractor. Therefore, the contractor is advised to visit site and get first-hand information of site constraints. They should quote their rates accordingly.
31. The quoted rates shall also be inclusive of all ancillary and incidental works required for execution of work like labour camp, stores, fabrication yard, offices, watch and ward, temporary structure for plants and machineries, water storage tanks, arrangement for temporary connection for electricity, telephone, water etc. including their consumption charges, protection works, barricading including its removal, providing testing facilities/laboratory at site of work for various field and laboratory tests or any other activity which is necessary for execution of work and as directed by Engineer-in- Charge. Before start of the work, the contractor shall obtain approval of the Engineer- in-Charge, before locating various temporary structures / site office, positioning of machinery, material yard, cement and other storage, steel fabrication yard, site laboratory, water tank, etc.
32. The contractor shall display all permission, licenses, registration certificates, bar charts, other statements etc. under various labour laws and other regulations applicable, at his site

office.

33. In case of variation / conflicting provisions is observed in any condition of bid document forming part of contract, the decision of NIT approving authority shall be final and binding on the contractor.

#### **34. Mode of measurement (For Record Purpose)**

- 34.1 **The Agency shall raise RFI (Request for Inspection) on the CPWD ERP portal which shall be reflected as an action item in AE's notification, who is responsible for checking the item on the field. Once Physical check is completed, AE should update the RFI as Measurement Verified/Test Checked/Rejected & subsequently the RFI may be selected to create e-MB which include abstract of quantity item wise against the selected RFIs.**

(Request for inspection (RFI) is a process for recording of measurements online to create e-MB and forwarding it to the concerned authority for Inspection and Test Checks of quality & measurements recorded against the items uploaded under 'Contract Agreement Data Collection Forms on CPWD ERP')

- 34.2 The stage-wise measurement as per schedule of stage payment shall be recorded and submitted in computerized format by the Agency as per directions given above.
- 34.3 The contractor shall submit item wise measurement for the work executed in line with detailed estimate based on items in DSR-2023 including non-schedules items if or as required by engineer in charge, along with running account bill to facilitate stage wise payment and nothing extra shall be paid.
- 34.4 In addition, the contractor shall submit theoretical consumption statements for the items involving use of cement, steel reinforcement, chemical, paints, ready mix plaster, bitumen, waterproofing chemicals, etc. as directed by the Engineer-in-Charge along with every running account bill for record and reconciliation of material issued, consumed and balance.
- 34.5 These measurements shall then be 100% checked by the authorized representatives of the Engineer-in-Charge. The contractor shall incorporate all such changes or corrections, as may be done during these checks, to his draft computerized measurements and submit the corrected computerized measurement books.
- 34.6 The Computerized Measurement Book shall be allotted a serial number as per the Register of Computerized Measurement Books and processed for payment, if required.

## CHAPTER-C

### ADDITIONAL CONDITIONS & SPECIFICATIONS OF CIVIL WORK

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**SECTION-I**

**ADDITIONAL CONDITIONS FOR CIVIL WORKS**

1. The work in general shall be carried out in accordance with the CPWD Specifications 2019 Vol. I to II (corrected up to the last date of submission/uploading of bid) hereinafter referred as CPWD Specifications and similar items as per CPWD Delhi Schedule of Rates 2023 Vol. I to II (corrected up to the last date of submission/uploading of bid).
2. Agency(s) shall provide permanent benchmarks, flag tops and other reference points for the proper execution of work with reference to the other buildings or as decided by Engineer-in-Charge, and these shall be preserved till the end of the work.
3. On completion of work, the Agency(s) shall submit eight prints of “as built” drawings to the Engineer-in-Charge (Hard & soft copy both) failing which the recovery at the rate of Rs. 10,000/- (Ten Thousand) per day shall be done.
4. All such “Completion / As Built” drawings of all services shall have a unique ERP generated identifier number (called the ERP Drawing/Document Number or EDN) through the Collaboration Tool of CPWD ERP. This EDN shall be in addition to the drawing/document number presently being written on drawings/documents and will be written/stamped/embedded clearly on the drawing / document by the drawing / document approving authority. All such “Completion / As Built” drawings of services shall be uploaded in pdf format only on the Collaboration Tool for issue and transmittal along with unique EDN as issued by ERP unit.

**The “Completion / As Built” drawings of all services shall not be considered valid without EDN and without uploading and transmittal on ERP Collaboration Tool.**

5. Any cost involved in cutting or filling of good earth to maintain the required ground level shall be borne by the Agency and nothing extra shall be paid on this account.
6. The Agency should engage approved and 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 Agency shall submit for the approval of the Engineer-in-Charge, the name of the plumbing Agency proposed to be engaged by him well in advance.
7. The agency shall give performance test of the entire installation(s) as per the CPWD specifications 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 agency for the test.
8. Ordinary Portland Cement (OPC), 43 Grade conforming to IS: 8112 (Part-I) / PPC cement conforming to IS:1489 (part I) shall be used in work.

9. No fly ash mixing at site would be allowed. However, with prior approval of Engineer-in-Charge, fly ash mixing can be allowed at the Batching plants at site with proper handling mechanism and quality of fly ash as per codal requirement,
10. The work of services will be executed simultaneously. The Agency shall minimize the scope of making recesses, holes, opening etc. as the same shall be planned in advance and necessary grooves/niches shall be provided in shuttering of RCC itself.
11. Gypsum plaster shall be executed using pneumatic spray machine of reputed make and specifications with the prior approval of the Engineer-in-Charge.
12. The ready-mix plaster duly containing recron fiber @5 to 10% of thickness 10 to 15 mm will be used on the AAC / pre-cast concrete Block masonry work as per BIS specifications.
13. All types of mortars to be used in the work shall be mixed in the mechanical mixer and hand mixing shall not be permitted.
14. The flush doors shall be factory manufactured (as per the approved makes), with Laminates on flush doors machine pressed in factory only. The design and pattern of laminates shall be as per the approval of Engineer-in-Charge.
15. Space frame, steel gates, railing, uPVC/ Aluminum door-windows-framework, shall be factory made.
16. All internal and external plaster work shall be done by using plaster mortar spraying by spray plastering and mechanized finishing towels. Entire operation from batching to mixing of cement, sand, water, and admixture, if any shall be done by the machine only. After mixing of material the mortal plaster shall be sprayed at wall, ceiling, etc. in required thickness as per CPWD Specifications. The plaster surface shall be finished with plastering machine to get the smooth surface ready for putty/paint work.
17. All putty work including its mixing, rubbing and surface preparation (before and after putty application both) on wall ceiling, etc. shall be done by using automatic putty mixer and putty sander machine.
18. All internal & external painting work shall be done only by mechanized way. Painting work shall be done by specialized agency/ authorized applicator of approved painting agency in mechanized way.
19. Any chase cutting for any services like electrical, plumbing shall be done mechanized.
20. For speed delivery of work the agency may use pre-cast RCC drains, drain cover, service trenches & other miscellaneous areas in place of cast in situ. Pre-cast RCC material shall be of minimum M-40 grade of make, design, etc. as approved by Engineer in Charge.
21. Concrete Screed work, concrete road work shall be done by self-propelled laser screed machine which vibrates concrete during pouring by itself.

22. Controlled Low Strength Material (CLSM) is a backfill material and it may be used in backfilling in foundation, trenches, basement, etc. in place of compacted earth. The material specification, composition and technical parameters of CLMS shall be as per IRC: SP: 63-2018.

**23. Engagement of Associates for Specialized works:**

23.1 The main contractor has to associate agencies for specialized component(s) conforming to eligibility criteria as defined below and has to submit detail of such agency(s) to Engineer-in-Charge of relevant component(s) within prescribed time. Name of the agency(s) to be associated shall be approved by Engineer-in-Charge of relevant component(s). The associated specialized agency should satisfy following experience criteria during the last seven years ending last day of month previous to date of award of the work:

- (a) Three works each costing not less than 40% of tendered cost of respective specialized item/ Quantity for proposed similar specialized work concerned.

Or

- (b) Two works each costing not less than 60% of tendered cost of respective specialized item/ Quantity for proposed similar specialized work concerned.

Or

- (c) One work costing not less than 80% of tendered cost of respective specialized item/ Quantity for proposed similar specialized work concerned.

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

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

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

23.4 The main contractor may have to choose more than one specialized agency for a specific

specialized work, depending on requirement of target progress and to be in conformity with the above specified eligibility criteria for quantum of work proposed.

- 23.5 In case main contractor himself has satisfactorily completed similar work of required magnitude as mentioned above, he may also be allowed to carry out specialized work. However, in such cases, contractor has to certify that such similar work was not executed by him through any other specialized agency.
- 23.6 In case the main contractor intends to change any of the above agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in- Charge of relevant specialized component(s). The new agency/agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
- 23.7 The main contractor has to enter into MoU with agency(s) associated by him. Copy of such MoU shall be submitted to EE/ DDH in charge of each relevant component as well as to EE-in-charge of major component. In case of change of associate contractor, the main agency(s) has to enter into MoU/agreement with the new contractor associated by him.

#### **24. Specialized Items of Work (Civil):**

Various specialized items of works under this agreement in respect of civil construction is as below:

- (a) Water proofing treatment
  - (b) Expansion/seismic joint system
  - (c) Anti-termite chemical treatment
  - (d) Soil Investigation and Survey Work.
  - (e) Special foundations including all types of piles
  - (f) Synthetic play area surface for games.
  - (g) BIM services
- 25. Some of the items of work such as the ones listed below, shall be executed by the contractor through the Manufacturer of the items or through their authorized applicators/installers/experienced professionals only
    - (a) Stone Cladding work
    - (b) Structural glazing Work
    - (c) Plumbing work
    - (d) Aluminium work/uPVC work
    - (e) Stone/ GRC/Aluminium Jali work/ Powder Coated Aluminum strips work
    - (f) Swimming pool
    - (g) Signage
    - (h) Irrigation
    - (i) Mechanised spray plaster

- (j) False Ceiling
- (k) Factory made Kitchen cabinets, Wardrobes and vanities.
- (l) Acoustic treatment
- (m) Fire Resistant Doors
- (n) Stainless steel work/ Modular Stainless-steel railing
- (h) Painting.

26. **Additional Security Deposit:** Additional security @10% of value of work done of specialized items (i.e. water proofing, anti-termite treatment, synthetic area surface etc.) shall be deducted from each running/final bill and released after guarantee period of 10 years. If any defect is noticed during the guarantee period, the contractor shall rectify it within 7 days of receipt of intimation of defects in the work. If the defects pointed out are not attended within the specified period, the same will be got done from another agency at the risk and cost of contractor. This additional security can also be deposited in the form of bank guarantee issued by the scheduled bank. Such bank guarantee bond shall be valid for the guarantee period from date of completion of whole construction work, recorded by the Engineer-in-charge. The Performa for the BG shall be as given in the tender document. For specialized items of works, Agency has to engage specialized agencies/firms who have work experience and submit work experience certificate issued by competent authority for satisfactory completion of similar works as per criteria mentioned above during last seven years. The decision of Engineer-in-Charge in this regard shall be final and binding on the Agency.

The guarantee bond for the period of 10 years for any defect crop up during guarantee period for the following items shall be furnished by the agency on prescribed proforma :

1. uPVC Windows/Doors/Ventilators
2. Fire resistant doors
3. Polycarbonate sheet
4. Waterproofing
5. Anti termite Treatment
6. Expansion joint
7. Sanitary fittings

## SCHEDULE OF FINISHES

### SCHEDULE OF FINISHES – OFFICER’S QUARTER SCHEDULE OF FINISHES – OFFICER’S QUARTER

SCHEDULE OF CIVIL ITEMS AND SPECIFICATIONS			
DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>GENERAL SPECIFICATIONS/ GUIDELINES</b>	<p>1. All the items of Delhi Schedule of Rates are In the Scope of Work against the tender, As may be applicable, according to the discharged by the Engineer-in-Charge by way of GoodForConstruction drawings.</p> <p>2. CPWD Specifications Vol-I and Vol-II 2019 as amended from time to time shall be applicable for all the items to be executed as per good for construction drawings.</p> <p>3. Provisions contained in Harmonized Guidelines &amp; Standards for Universal Accessibility in India 2021 (available on CPWD website) of Ministry of Housing and Urban Affairs, Government of India shall be complied.</p> <p>4. C&amp;D waste products and recycled aggregates to the extent provided in is codes shall be used as per extant provisions of green building measures.</p> <p>5. Type of Cement to be used in the work shall be as per provisions of is: 456 with regard to exposure conditions including Sulphate attack.</p> <p>6. Only RO water shall be used in the work.</p> <p>7. DSR Items are only indicative, items are to be executed for all heights and all levels.</p>		

Provision contain in IGBC Green Building Norms for Platinum Rating

#### 1. EARTH WORK FOUNDATION AND PLINTH :

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.1	For foundation of Main Building, Substation, Security Rooms , RWHT, OWC, Retaining Wall, Services, Road works, Podiums, Club House, Peripheral Storm Drainage, Boundary Wall, STP, UGT & other allied RCC works as per structural design and drawings		<p>1. Scope of work includes all items of DSR'23 as contemplated in the sub head Earth Work of DSR'23 (including bailing and pumping out water, strutting etc.) as may be applicable to the work as per design and drawings and as confirmed by the Engineer-in-Charge and are to be executed as per CPWD Specifications.</p> <p>2. Surplus excavated Earth shall be disposed of by the contractor after remittance of due Royalty to concerned authority, as applicable, by the contractor.</p> <p>3. Filling available Earth or Earth brought from outside shall be done as per requirement to level the ground as per approved drawings.</p> <p>4. Post construction anti-termite treatment as per the necessity of ground shall be carried out as per relevant Indian Standard Codes/CPWD Specifications.</p> <p>5. Structural / Non-structural grade slab as per the necessity at</p>	

		<p>site/design requirement and as per the functional requirement of supported flooring shall be designed &amp; provided accordingly.</p> <ol style="list-style-type: none"> <li>6. Damp Proof course shall be provided where ever required as per CPWD Specification.</li> <li>7. Drainage and plinth protection along the perimeter of the buildings shall be provided as per CPWD Specifications or as per specific functional requirement</li> <li>8. Water Proofing as particular per specifications.</li> </ol>
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.1	ANTI TERMITE TREATMENT			Post Constriction Anti-Termite treatment as per the necessity of ground shall be carried out as per relevant Indian Standard Codes / CPWD Specifications with upto date correction slips, DSR'23 Item Nos. 2.34, 2.35.2 & 2.35.3

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.2	FILLING EARTH AVAILABLE			Filling available earth or earth brought from outside shall be done as per requirement to level the ground as per approved drawings. Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, surplus excavated / unsuitable earth shall be taken out of the campus or shall be used in campus itself as per direction of the Engineer-in-Charge. Additional good earth fit for filling, if required, for the work shall be procured from outside of the campus at his own cost.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.2	FILLING EARTH AVAILABLE			Filling available earth or earth brought from outside shall be done as per requirement to level the ground as per approved drawings. Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, surplus excavated / unsuitable earth shall be taken out of the campus or shall be used in campus itself as per direction of the Engineer-in-Charge. Additional good earth fit for filling, if required, for the work shall be procured from outside of the campus at his own cost.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.3	PLINTH FILLING			Plinth filling shall be done with sand of grading zone IV as per CPWD Specifications with upto date correction slips. Plinth filling shall be with sand, 150 mm thick layer under floors including, watering, ramming consolidating and dressing complete.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS	
1.4	GRADE SLAB AT PLINTH LEVEL	Structural / Non-Structural grade slab as per the necessity at site / design requirement and as per the functional requirement of supported flooring shall be provided accordingly.  RCC slab of minimum grade of M-30 with 150 mm thick with 8 mm dia 200 mm C/C both ways including centering, shuttering, finishing, curing, etc.			

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.5	DAMP PROOF COURSE/BAND	AS per site requirement. Damp proof course shall be provided wherever required as per DSR'23 Item No. 4.11 and as per CPWD specifications 2019 with upto date correction slips.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.6	P.C.C	PCC as mention in structural drawing below-Raft.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.7	PILE	500 mm dia Pile with M-30 grade concrete with reinforcement as per the particular specifications & as per GFC structural drawings and as per CPWD DSR'23 Item no 20.2a.1 & 5.22.6 including vertical, lateral load and integrity test on piles as mention in I.S. 2911 (Part IV) & CPWD Specifications 2019 with upto date correction slips.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.8	PILE CAPPING BEAM	As per structural drawing M-30 grade capping beam alround boundary over piles i/c Earth work, PCC as per drawing and RCC, steel & shuttering as per the GFC structural drawings and as per DSR'23 item No. 5.33.1.3 & 5.22.6 & 5.9.5 & 4.20.1.1		

## 2. CEMENT CONCRETE WORK:

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
2.1	PCC	All PCC works in levelling course below Foundation, Plinth, Pathways, Drains, Trenches, Pipes, Paver Blocks, Kerb Stones, etc. as per Drawings	PCC shall be as per DSR'23 Item No. 4.20.1.2 and as per CPWD Specifications 2019 with upto date correction slips.	Any undulations of excavated surface shall be levelled with plum concrete.

## 3. RCC WORK:

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.1	RCC WORK	In foundation and Super structure of Main Buildings, Security Rooms, Caretakers offices substation, STP, UGT, OHT, RWHT, Compound wall,	All RCC works shall be as per DSR'23 Item No. 5.33 and as per CPWD Specifications 2019 with upto date correction slips.  The RCC work shall be	

		Podiums, Club House, Peripheral storm Drainage & other allied RCC works as per structural design and drawings.	with design mixed self-compacting concrete/normal reinforced cement concrete of specified grade as directed by the Engineer-in-Charge.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.2	<b>EXTERNAL WALLS &amp; INTERNAL WALLS (DRY &amp; WET AREA)</b>  (All Walls are with RCC Monolithic Construction Technology)		In case of structural walls, specifications of RCC walls shall be as per Structural drawings. in case of Non-structural walls, specifications of RCC walls shall be as per structural drawings.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.3	SHUTTERING	Main Building from foundation to Ground Floor, Security Rooms, Caretakers offices Substation, STP, UGT, OHT, RWHT, Compound Wall, Podiums, Peripheral storm drainage & other allied structures	All shuttering of RCC members shall be as per DSR'23 Sub-head 5 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.4	ALUMINIUM FORM WORK/ SHUTTERING	Typical floor as per drawings attached.	All customized aluminium Form work for monolithic construction of RCC members shall be as per DSR'23 Item No. 26.48 and as per CPWD Specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.5	STEEL REINFORCEMENT	As per structural drawings	All steel reinforcement work shall be <b>CRS grade Fe 500D / 550D</b> for RCC work including supplying, straightening and cutting, bending, placing in position and binding and as per CPWD Specifications 2019 with upto date correction slips.	

#### 4. MASONRY WORK :

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
4.1	MASONRY WORK	All Residential Blocks, Sub-station, compound wall.	<p>External wall RCC with thickness as per mentioned in drawings &amp; latest IS Codes. All external RCC surfaces to have levelling course and putty and paint. AAC blocks to be provided for insulation as per drawings.</p> <p>Internal walls in RCC (thickness as per latest codes and as per the drawings) Brick masonry wall shall be as per DSR'23 Item. 6.1.1, 6.4.1 and 6.5, CPWD Specifications 2019 with upto date correction slips. As per the drawings.</p>	Fibre Mesh shall be provided at junction of concrete and block masonry.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
4.2		Club 1&2, RD Bungalow and all other Ancillary Structures. (as per attached drawings)	Conventional RCC framed structure as per the latest code and ACC Block Work.	Fibre Mesh shall be provided at junction of concrete and block masonry.

#### 5. CLADDING WORK :

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.1	18 mm thick Granite Work	Granite work in, Doors sills, all around windows/ ventilators, facias, ledge wall tops, parapet wall top, retaining wall top and similar locations, main door threshold, granite top on balcony bund wall. granite for opening, granite coping for planter beds.	All Granite work shall be as per DSR'23 Item No. 8.2.2 and CPWD Specifications 2019 with upto date correction slips.	Exposed edges of granite at all locations shall be finished with moulding / edge champhering with high glass finish.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.2	30 mm thick polished granite dado upto bottom of False ceiling height as per drawings	Entrance lobby, lift lobbies at all floor level.	30 mm thick polished granite dado/cladding as per specification of mentioned. dry cladding with 30 mm thick granite of approved size, shade, colour and texture in approved pattern to be secured to backing by means of SS cramps/ pins etc. As approved and directed by Engineer-in-Charge.	Exposed edges of granite at all locations shall be finished with moulding / edge champhering with high gloss finish.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.3	30 mm thick polished granite dado upto 1.5 mt / false ceiling height from floor finish level in combination of colours and patterns.	Common circulation space of building, central core (except ground floor)	30 mm thick polished granite dado as per Specification mentioned. Dry cladding with clamp cladding with 30 mm thick granite of approved size, shade, color and texture in approved pattern to be secured to backing by means of SS cramps/ pins etc. as approved and directed by Engineer-in-Charge.	Exposed edges of granite at all locations shall be finished with molding / edge champhering with high gloss finish. Dado edge shall be properly secured in the wall.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.4	18 mm thick honed finish granite stone with 3 set of Anti-skid grooves	Staircase	Flooring-granite in staircases, Risers, Treads, Landings, Mid Landings. Treads shall have non-slippery grooves or strips near edges. Dado- natural stone finish up to 1.5 m height  (i) SS-316 grade railing with knockdown system as per drawing  (ii) false ceiling-not applicable but pop molding and cornice	Exposed edges of granite at all locations shall be finished with molding / edge champhering with high gloss finish. Dado edge shall be properly secured in the wall with suitable locking arrangement.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.5	300 x 600 Ceramic wall tiles dado upto 7-8 feet, above wall painting and grid false ceiling, may be provided as shown in drawing	Toilets / Bath Rooms as per drawings.	1st quality ceramic glazed wall tiles as per DSR'23 Item No.8.31 and as per approved design & pattern and CPWD Specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.6	300 mm x 600 mm polished vitrified tiles full height upto ceiling	Kitchen	As per approved design & pattern and CPWD Specifications 2019 with upto date correction slips.	Wall tiles should be provided at the bottom of the false ceiling height where overhead cabinets are not provided

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.7	150 mm x 1200 mm full body Anti-skid vitrified tiles with wooden look	Kitchen Balcony, Bed Room Balcony	150 mm x 1200 mm full body Anti-skid vitrified tiles with wooden look and as per approved design & pattern and CPWD Specifications 2019 with upto date correction slips	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.8	Kitchen platforms and base	Factory-built modular kitchen as per specifications.	Jet black 18 mm thick gang saw cut, mirror polished, Pre moulded and pre polished, machine cut for kitchen platforms, facias (in single length) and similar locations of required size, approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. complete at all levels.as per DSR'23 item no 8.2.2.	

15 mm thick korean marble (corian) kitchen platform top for RD's Bungalow and BO's (Grade-D) flats as per manufacturer

## 6. WOOD WORK AND PVC WORKS :

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
<b>6.1</b>	<b>DOORS</b>			
(A)	2 <sup>nd</sup> Class Melamine Polished Teak Wood Door frame with 40 mm thick flush door with decorative veneer on both sides with melamine polish and SS Grade 316 security door with wire mesh and SS 316 hardware.	Main Entrance Door (for all officers flats)	As per particular specifications	Granite sill/ umra patti, jams of approved shade/ colour as per design pattern.
(B)	38 mm thick flush door with decorative veneer on both sides with melamine polish wherever required and SS Grade 316 hardware.	For RD Bungalow & Grade D flats	As per particular specifications.	Granite sill/ umra patti of approved shade/ colour as per design pattern.
(C)	38 mm thick flush door with both side commercial ply with melamine polish wherever required and SS Grade 316 hardware.	For officers flats Grade A, B & C	As per particular specifications	Granite sill/ umra patti of approved shade/ colour as per design pattern.
(D)	2 hrs. Fire rated metal doors.	All staircases, electric room, meter room, pumproom, electric shaft, lv shafts, fire hydrant shaft, STP, other shafts doors.	As per particular specifications.	Granite sill/ umra patti of approved shade/ colour as per design pattern.
(E)	Frameless glass door with 12mm thick. toughened clear glass with patch fittings, floor spring and all hardware.	Main entrance lobby, entrance lobby of security rooms.	Glazed door shutter as per specification of DSR'23 Item No. 21.18, and CPWD Specifications 2019 with upto date correction slips.	Granite sill/ umra patti of approved shade/ colour as per design pattern.
(F)	38 mm thick flush door with decorative veneer on both sides with melamine polish wherever required and SS grade 316 hardware with	All doors other than fire resistant doors, glass doors and toilet doors. (except doors provided in the quarters)	Flush doors & frames shall be as per DSR'23 Item No. 9.1.1, 9.21.1, 9.23, 9.40.1.1 & 9.127.1, 13.116 and CPWD	The SS ball bearing hinges shall be provided to door shutter and granite sill/ umra patti of approved shade/ colour as per design pattern.

	double layer granite frame all around door.		Specifications 2019 with upto date correction slips.	
(G)	WPC 35 mm thick doors shutter and door frame for the toilets SS 316 hardware with double layer granite frame as frame.	All toilets doors.	WPC door shutter shall be as per DSR'23 Item No. 26.87.1 26.88.2 and as per CPWD Specifications 2019 with upto date correction slips.	-do-
(H)	factory made 3-track high quality aluminium / upvc doors with LOW-E DGU glasses and SS wire mesh shutter)	As per drawings	Glazed aluminium uPVC door shall be as per drawings and CPWD Specifications 2019 with upto date correction slips. Glazing shall be as per particular specifications.	-do-
(I)	Wardrobes	As per tender drawings. factory-made built-in cupboard/ wardrobes made up of 19 mm thick marine ply confirming to IS : 710 for the carcase, box, sides, top and bottom and 20 mm thick prelaminated HDF shutters, and 12 mm thick prelaminated marine ply with balancing laminate for back portion, with stainless steel hardware as per architectural design and detailed technical specifications.	All the bedrooms shall be provided with built-in modular wardrobe / cupboard of suitable size as per drawing.	
(J)	Modular OH(Over kitchen head) cabinet	As per drawing	Factory-made built-in 18mm thick both side balancing laminated high moisture resistant HDHMR board shelves, in tiers up to height as mentioned in drawing in niche and covered with 18	

			mm thick one side decorative and other side balancing laminated high density high moisture resistant HDHMR board, and 12 mm thick back HDHMR with balancing laminate, with stainless steel hardware as per architectural design and specifications.	
(K)	Modular cabinet counter	kitchen below	<p>Best quality State-of-the-Art modular kitchen having sleek looks and spacious capacity designed for maximum functional efficiency and comfort of use will be provided.</p> <p>Kitchen-platform along with underneath covered modular storage units (pullout drawer etc.). minimum 18mm thick mirror polished granite top on RCC cooking platform (edge rounded) and 200 mm deep granite fascia (edge rounded)/ korean marble platform and fascia for RD &amp; grade F, with a suitable size satin finish stainless-steel sink-SS fluted drain-board unit (for RD &amp; grade F flat - twin basins with drain board, for all other officers' flats - single bowl with drain board) having CP brass swan-neck swivel type mixer cock for freshwater and hot water inlet,</p>	<p>Factory-made built-in cabinets, carcass made up of box and shelves with both sides balancing laminated and shutters with one side decorative and other side balancing laminated 18 mm thick high moisture resistant prelaminated HDHMR board of E1 grade and 12 mm thick prelaminated HDHMR back panels and drawer bottoms, with SS hardware (to be included) 316 grade with cooking platform as per design &amp; details approved by engineer-in-charge with:-</p> <p>a) pre-polished granite with nosing cooking platform basic rate of polished granite of minimum rs.175/- per sqft excluding GST and duly supported by tax invoice.</p> <p>stainless steel SS 304 kitchen 1 mm thick, double bowl sink and</p>

	<p>and wastewater outlet through a suitable floor trap shall be provided. the modular kitchen furniture like cabinets (made from HDHMR board with both side laminate and edge banding, etc.), drawers with SS telescopic channel, SS pull out baskets of various utilities viz. cutlery, cup saucer, plates (both large and small sizes), bottles, grains pull outs, plain baskets (of various depths), etc. shall be provided in below the cooking platform cabinets. All the shutters shall be modular post formed shutters made from HDHMR board with both side laminate and requisite edge banding. A water-purifier with CP brass plumbing fittings and fixtures and a wet utensils cabinet with SS grills, SS drain boards* for collecting water etc. shall be fixed over the sink drain-board-unit. an electric chimney / kitchen hood (soft touch / automatic; 1000 cum/ hr.) shall be suitably fixed and shall be camouflaged between overhead modular storage units. all with SS ironmongery, handles etc. kitchen</p>	<p>single bowl sink with drain board as per is 13983 with drain board &amp; extended swinging spout (mixer). Density shall be 850 kg/m<sup>3</sup> each panel shall be precisely cut by the beam saw machine and edge banding done on edge banding machine with PVC edge band bonded with pur glue. The machining of panels like holes for minifix, housing for hinges, grooves for back panels are done by CNC machining center. all the panels shall be made and packed in the factory. only installation shall be done at site.</p> <p>All modules shall be independent and no common vertical panels shall be acceptable. The kitchen shall be installed on adjustable legs cladded with 100 mm skirting.</p>	
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		hood exhaust shall be concealed.		
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>6.2</b>	<b>DOOR FITTINGS AS PER SCHEDULE FOR DOORS FITTINGS AND CPWD SPECIFICATION 2019 VOL. I, WITH UPTO DATE CORRECTION SLIPS.</b>			
(A)	<b>300 MM D' TYPE HANDLE BACK TO BACK</b>	All doors shutters except Toiltes and Shaft shutters	Stainless Steel 316 Grade satin finish D' type handle of approved make 19 mm dia (minimum) & 300 mm long, 1.2 mm tube thickness (minimum) back to back (In Pair) withrose, with adjustable fixing for wood and metal door with required brass bush insert, necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per direction of Engineer-in-Charge.	
(B)	<b>150 MM D' TYPE HANDLE BACK TO BACK</b>	Toiltes and Shaft shutters	Stainless Steel 316 grade satin finish D' type handle of approved make 19 mm dia (minimum) & 150 mm long, 1.2 mm tube thickness (minimum) <b>back to back (In Pair) withrose</b> , with adjustable fixing for wood and metal door with required brass bush insert, necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per direction of Engineer-in-Charge.	
(C)	<b>ALDROP 300 MM</b>	Main door, Bed Room Doors,	Stainless Steel 316 grade satin finish aldrop of approved make, 300 mm long rod of 16mm (minimum) diameter, locking patti thickness 2mm (minimum) with required staples and additional one staple of minimum 2 mm	

			thickness along with necessary ss screws, bolts, nuts, washers etc. as per approved samples complete as per the direction of the Engineer-in-Charge.	
(D)	Sliding latch/ Tadi of approved make 250 mm long	Main door, Bed room door, Balcony door both sides, Shafts Door front, Kitchen door front, Toilet door.	Stainless Steel 316 grade satin finish sliding latch/ tadi of approved make, 250 mm long rod of 16mm (minimum) diameter, locking patti thickness 2mm (minimum) with required staples of minimum 2 mm thickness along with necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per the direction of the Engineer-in-Charge.	
(E)	Baby Latch with indicator	Toilet inside	Stainless Steel 316 grade 100 mm long baby latch along with indicator of approved make along with necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per the direction of the Engineer-in-Charge.	
(F)	Tower bolt	All door shutters at top	Stainless Steel 316 grade satin finish square tower bolt of approved make 300mm long, 10mm width along with necessary ss screws, bolts, nuts, washers etc. as per approved samples complete as per the direction of the Engineer-in-Charge.	
(G)	Tower bolt	All door shutters one horizontally at bottom	Stainless Steel 316 grade satin finish square tower bolt of approved make 150mm long, 10mm width along with necessary SS	

			screws, bolts, nuts, washers etc. as per approved samples complete as per the direction of the Engineer-in-Charge.	
(H)	Magnetic catcher door stopper	All doors except Toilet and shafts	Door stopper as magnet catcher and ball catch with 100mm length with cover to conceal screws fixed to the door shutter and wall respectively of approved make along with necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per the direction of the Engineer-in-Charge	
(I)	hydraulic closer	Ground floor lobby doors, recreational area doors, common use area doors	Aluminium extruded section body tubular type universal hydraulic Door closer (having brand logo with IS : 3564, embossed on the body, door weight upto 36 kg to 80 kg), with double speed adjustment with necessary accessories and screws etc. complete.	
(J)	Stainless Steel ball bearing butt hinges	All door shutters	SS ball bearing hinges of size 100x89x3mm (heavy weight) with stainless steel screws etc. complete	
(K)	Magic eye / Peep holes	Main door shutter	Best make and quality as per the direction of the Engineer-in-Charge	
(L)	Night lock	Main door	Brass night latch of approved make with three keys	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
6.3	WINDOWS			

(A)	Factory made three track high quality aluminium / uPVC windows with LOW-E-DGU glasses and SS wire mesh shutter inside and double layer granite frame all around window i/c MS safety grill and all fittings and fixtures as mentioned in drawing	All window / ventilator openings as per drawings	Specifications of frames and shutter shall be as per design drawings and as per CPWD Specifications 2019 with upto date correction slips.	<ol style="list-style-type: none"> <li>1. factory made three track high quality aluminium/ uPVC windows with LOW-E-DGU glasses and aluminium / SS wire mesh shutter inside.</li> <li>2. In case of ventilators of toilets, etc. it shall be provided with glass louvers of frosted.</li> <li>3. Powder coated aluminium / uPVC to be used.</li> <li>4. MS security grills painted with epoxy paint for all window.</li> <li>5. Windows along with glazing shall be designed for wind loads applicable to the area/location as per relevant is codes.</li> </ol>
(B)	Filling the gap in between aluminium frame & adjacent RCC /brick / stone work	All window / ventilator openings as per drawings	Weather silicon sealant over backer rod of approved quality as per architectural drawings and direction of engineer-in- charge complete upto 5mm depth and 5 mm width as per	

			DSR'23 Item no 21.8	
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## 7. STEEL WORK:

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.1	<b>STEEL WORK</b>			
(A)	BALCONIES	All balconies, Dry balcony except refuge area	1350 mm high railing with SS handrail and toughened laminated glass and SS fittings as per drawing	
(B)	Factory made stainless steel (grade 316) knock down (no welding) railing including all fittings, fixtures, Hardwares, anchor fastener etc. required for complete the railing works.	Staircase, Fire staircase, Terrace Tanks, Podium and all staircases	SS (grade 316) railing as per particular Specifications and as per drawings.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.2	Windows grill-windows should be fitted with MS safety grill as per approved drawings including painting with epoxy paint over approved steel primer.	All windows / ventilator	All openings should be fitted with decorative MS grill including painting with epoxy paint as per approved drawings. the size of MS bar shall not be less than 10mm and thickness of MS flat shall not be less than 5mm. MS grill as per DSR'23 Item No. 9.48.2 and 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.3	Ladders/ Railing with chequered plates incl. primer and epoxy paint.	For OHT, STP, Pump Rooms etc.	All MS ladders /railing shall be provided as per DSR'23 Item No. 10.25, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.4	Railing/ grill over compound wall / including painting with epoxy paint over approved steel primer.	Compound wall	Compound wall shall be fitted with decorative MS grill including painting with epoxy paint as per approved Drawings. All MS railing/ grill shall be provided as per DSR'23 Item No. 10.25, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.5	Entrance gates including painting with epoxy paint over approved steel primer.	Entrance gates	Entrance gates shall be fitted with MS box type tubes / decorative MS grill including painting with epoxy paint as per approved drawings. gate shall be provided as per DSR'23 Item No. 10.25, 10.16.2, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.6	Curtain rods	All windows and doors in all rooms except kitchen, toilets	Decorative curtain rods 25 mm dia, 1.6 mm thick with double track required accessories of SS grade 316 with SS brackets and SS screws	

## 8. FLOORING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS

<b>8.1</b>	<b>LEVELING COURSE TO BE PROVIDED ON THE TOP OF RCC SLAB BEFORE LAYING FLOORING AS PER SITE REQUIREMENT, IF REQUIRED.NOTHING EXTRA ON THIS ACCOUNT SHALL BE PAYABLE.</b>			
(A)	800 mm x 800 mm full body homogenous vitrified tiles	Living / Dining area, Bedrooms, Dressing room & kitchen	Glazed vitrified tiles as per DSR'23 Item No. 11.41a. 2.3 and as per CPWD specifications 2019 with upto date correction slips.	800 mm x 800 mm full body homogenous vitrified tiles. 2. 100mm high skirting.
(B)	150 mm x 1200 mm Polished glazed vitrified tiles with wooden look	Master Bedroom	Polished glazed vitrified tiles as per drawing and as per CPWD Specifications 2019 with upto date correction slips.	Mirror finished vitrified tiles preferably double charge flooring with skirting upto 100 mm in all rooms including guest room above skirting low VOC washable acrylic paint
(C)	300 mm x 300 mm full body homogenous anti skid vitrified tiles	Toilets/ Bath rooms	Anti-skid/ matt finish vitrified tiles of size 300mm x 300 mm. specification as per item no.: 11.41a3.1 of dsr-2023and as per CPWD specifications 2019 with upto date correction slips.	-do-
(D)	150 mm x 1200 mm full body anti-skid vitrified tiles with wooden look	Balconies / Utility area	Full body anti-skid vitrified tiles with wooden look as per drawing and as per CPWD specifications 2019 with upto date correction slips.	-
(E)	25 mm thick rubbed and polished kota stone	Refuge area, Pump Room, Substation, Electrical Room, STP room etc.	Kota stone specification as per DSR'23 Item No. 11.26 and as per CPWD Specifications 2019 with upto date correction slips.	-
(F)	18mm thick flamed finish / honed granite flooring	Fire staircase, entrance pathways leading to open area platform, open terrace of podiums	18 mm thick flamed finish granite stone flooring of shades & samples as approved by engineer-in-charge, in required design and in patterns, as per DSR'23 Item No. 11.55.1 and as per CPWD specifications 2019 with upto date correction slips.	Treads and risers shall be provided in single piece of stone. tread to be in flamed/honed finish and riser to be provided in polished granite stone. Nosing design shall be as per drawings.

(G)	18mm thick polished granite flooring as per approved pattern	Common staircase, entrance lobby, lift lobbies, common circulation space of building, security rooms.	18 mm thick polished granite stone flooring of approved shades & samples as approved by engineer-in-charge, in required design and in patterns, as per DSR'23 Item No. 11.56.1 and CPWD	treads and risers shall be provided in single piece of stone. treads shall have non slippery grooves or strips near edges. nosing design shall be as per drawings.
(H)	Tremix- cement concrete + road marking stripes	Podium/ ground floor level, driveway + ramp as per drawing	Tremix cement concrete pavement as per DSR'23 Item No. 16.75, 16.62 & and as per CPWD Specifications 2019 with upto date correction slips and attached drawings.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>8.1 DADO/ SKIRTING</b>				
(A)	100mm high skirting in vitrified tiles matching with floor	Living / Dinning area/foyer, drawing room, bedrooms, balconies/ utility area, care takers office, bank engineers room, BMS room, changing rooms, drivers room.	Skirting in vitrified tiles matching with floor specification as per item no: 11.47 of dsr-2023 and as per CPWD specifications 2019 with upto date correction slips.	
(B)	100-150 mm high kota stone skirting	Service rooms, meter room, control room, stores, stp, pump room.	Kota stone skirting specification as per item no.: 11.27 of DSR'23 and as per CPWD specifications 2019 with upto date correction slips.	
(C)	100 to 150 mm height granite skirting	All granite flooring areas	Skirting in granite matching with floor specification as per item no: 11.47 of DSR'23 and as per CPWD specifications 2019 with upto date correction slips.	

## 9. ROOFING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
9.1	Rain water pipes	All buildings as	Rain water pipes and	

	including all fittings and accessories.	per drawings.	fittings shall be hubless centrifugally cast-iron epoxy coated inside & outside as per IS : 15905 the vertical pipes shall be fixed with GI fame and u bolt and horizontal pipes, traps and fittings shall be ceiling suspended and supported on GI frame work and u bolt which shall be covered by providing metallic false ceiling wherever required. Rain water pipes and fittings shall be fixed as per DSR'23 Item No. 17.77.	
	Khurras at terrace with CI gratings	Terrace podiums and	Khurras shall be as per DSR'23 Item No. 12.22 & 12.44	The suitable size stainless steel 316 cover shall be made as per typical drawing given at Page No. 838 of tender. The cover shall be of stainless steel instead of MS as shown in the drawing.
	Poly Carbonate roofing over STP opening and mechanical ventilation shafts		Fixing of co-extruded UV protected multi-cell polycarbonate panel system 16mm thick (min.) in approved shade and color. Panel width shall be 900mm to ensure best performance for wind uplift, vibration, oil canning and visual appearance. The panel shall be uniform in color with an integral multi-cell core. Panels shall be manufactured with vertical standing seam at both sides. The height of the standing seam shall be 10 – 15 mm to ensure best connector engagement. Snap-on connectors to interlock the panels shall have double teeth grip-lock locking mechanism ensure to maximum uplift capability. Panel shall be with additional end cap/aluminum u profile / glazing bar (mill finish) for ends as required. Panel shall be fixed over structural steel / MS purlin (to be designed by the agency) conforming to the detail technical specifications as per approved architectural drawings.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
9.2	<b>FALSE CEILING</b>			
(A)	Decorative gypsum false ceiling	RD's Bungalow & grade F flats living Room &	In RD's bungalow & Grade D flats decorative gypsum false ceiling with moulding	

		Dining area	and cornice as per approved design and pattern as per DSR'23 Item No. 12.45.3 and as per CPWD specifications 2019 with upto date correction slips.	
(B)	Aluminium False Ceiling	Tile	Toiltes / Bathrooms,	Framing will be as per DSR'23 Item No.12.52.1 and tiling will be with 0.7mm thick aluminium sheet of tegular edge in required colour and finish plain or perforated with acoustical fleece. The tile shall be electrostatically polyester powder coated using ROHS compliant powder having coating thickness ranging from 60-80 microns and as per CPWD specifications 2019 with upto date correction slips.
(C)	<b>Pop Moulding and cornice</b>	(In grade C, B & A flats pop moulding and cornice )		Pop moulding and cornice as per specification and NIT drawings.
(D)	Open cell ceiling	Area as per drawing		as per particular specification.

## 10. FINISHING

SL. NO.	DESCRIPTION	AREAS/ LOCATION S	BRIEF SPECIFICATIONS	REMARKS
10.1	WALL FINISH ABOVE SKIRTING OR DADO			

(A)	Internal finishing with 6 mm thick white cement based polymer modified self curing mortar over rcc surface/ 12mm thick white cement based polymer modified self curing mortar over masonry + putty + primer + premium acrylic emulsion paint  Note: <b>Premium acrylic emulsion paints (interior) (for RD bungalow, officers flat, club 1&amp;2, community halls &amp; recreation area):-</b> Asian paints: Royale luxury emulsion, Nerolac : Impression series, Dulux : Velvet touch, Birla: One pure Elegance	All internal areas walls / ceilings	Internal finishing as per DSR'23 Item No. 13.86, 13.4.1, 13.80, 13.43.1, 13.83.2 and as per CPWD specifications 2019 with upto date correction slips.	Necessary drip course shall be provided in chhajjas, balcony, projecting roof, beams etc. all paints shall be used with low VOC content less than 50 grams per liter.
(B)	External finishing with 6 mm modified plaster + putty 1 mm thick + exterior grade high quality texture paint with stone dust and trowel texture with primer.  15 mm cement plaster with 1:6 mortar + putty + exterior grade high quality texture paint with stone dust and trowel texture with primer where AAC / brick wall are being used as external wall instead of 6 mm given above and remaining will be same.	All external faces of buiding / security room s/ ESS, all balconies, service shafts, compound wall	External finishing as per DSR'23 Item No. 22.24a and as per CPWD specifications 2019 with upto date correction slips.	Necessary gola at corner of chajja junction to be provided as per DSR'23 Item No. 12.21
(C)	Painting of exposed rain water, soil/waste and water supply pipes	Painting with synthetic enamel paint of required colour to give an even shade two or more coats over a coat of suitable steel primer as per DSR'23 Item No. 13.56.		
(D)	Painting of underground rain water, soil/ waste and	Two or more coats black anticorrosive bitumastic paint over and including a priming of ready mixed zinc chromate yellow primer as per DSR'23 Item No. 13.55		

	water supply pipes	
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## 11. SANITARY INSTALLATION

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
	SANITARY INSTALLATION	As per sanitary fittings schedule and drawings.	As per sanitary fittings schedule & CPWD DSR'23 and as per CPWD specifications 2019 with upto date correction slip.	
(A)	EWC Toilets		Rimless, blind installation wall hung WC with UF soft close slim seat cover, hinges, fixing accessories and accessories set size : 375x520x400 mm white vitreous china European type wall hung water closet of size 375x520x400 mm rimless shape including concealed cistern with 39mm drainage l-bend pipe with gasket & installation kit (suitable for EWC) dual flush fitting including soft close seat cover, and cistern fittings, nuts, bolts and gasket. The design of EWC shall be such that the rack bolts /studs and trap are not visible i/c hand shower (health faucet) with 8mm dia, 1 meter long flexible tube & wall hook with N.R.V. (back flow preventer) with CP brass 2 Way bib cock with wall flange	
(B)	Wash Basins		With over the counter white vitreous china wash basin size 560x415x200 mm with granite counter and single lever quarter turn CP brass pillar cock & single piece cover plate and CP brass bottle trap (with internal partition) 32mm size with 300mm & 190mm long wall connection pipes & wall flange and CP brass waste coupling complete with CP brass angular stop cock with triangular handle and wall flange + PVC connecting pipe with CP brass nuts	
(C)	Concealed (mixer)	Diverter	Concealed body for single lever diverter 40mm cartridge with button assembly (button on top) but without exposed parts + single lever exposed parts kit of diverter consisting of operating lever, cartridge sleeve, wall flange (with seals) & button assembly sleeve & button + shower arm casted 160mm long light body round shape for wall mounted showers with flange + overhead shower 120mm dia round shape single flow (face plate stainless steel & abs body in chrome finish) with rubit cleaning system + bathtub spout with wall flange stainless steel	
(D)	Connecting Hose Pipe		450/600 mm long braided hoses for geyser of approved model or equivalent.	
(E)	Paper Holder		Toilet roll holder with stainless steel flap of approved model or equivalent	
(F)	Soap Dispenser		Soap dispenser with metallic bottle of approved model or equivalent	
(G)	Soap Holder		Soap dish holder of approved model or equivalent	
(H)	Tumbler Holder		Tumbler holder of approved model or equivalent	
(I)	Over head Towel Rack		Towel rack 600mm long without lower hangers, stainless steel of approved model or equivalent	
(J)	Towel Rod		Single towel rail 600mm, stainless steel of approved model or equivalent	
(K)	Towel Ring		Towel ring round with round flange of approved model or equivalent	

(L)	Coat Hook	Robe Hook (2 Nos. on each door) of approved model or equivalent
(M)	Grab bar vertical	Grab bar 692mm long, satin of approved model or equivalent
(N)	Grab bar vertical	Grab bar vertical swing , satin of approved model or equivalent
(O)	SS sink with Draing board + sink cock	SS kitchen sink 1000x510 mm overall size with bowl size of 560x410x215 mm + sink cock with regular swinging spout (wall mounted model) with wall flange + CP brass angular stop cock with triangular handle and wall flange + PVC connecting pipe with CP brass nuts of approved model or equivalent
(P)	Glass shelf	As per schedule of sanitary & CP brass fittings
(Q)	Mirror	6 mm thick 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with or without frame shall be provided on SS studs as per the approved drawing
(R)	All floor traps in toilet, Kitchen, balcony	Chilly cockroach trap square flat cut stainless steel AISI 304 (18/8) floor drain cover with Jali grating glossy finish CCT-SFC-153-GF drain pipe 100 mm outer frame size 153x153 mm
(S)	C. P. Brass fittings	Required pillar cocks, angle cocks, 2 Way bib cocks, health faucet, long body bib cocks, towel ring, hot & cold-water mixer, along with other miscellaneous fittings like bottle trap, waste couplings etc. Shall be of approved make and model and as per the direction of engineer – in – charge. (The above are indicative only. However, the contractor has to provide all fixtures and fittings for functional suitability). All fittings shall be single lever with quarter turn ceramic cartridges and complying to green norms. All CP brass fittings/ bathroom accessories shall be of single brand and of the same series. In case of accessories not available in same series, the decision of the engineer in charge shall be binding.
(T)	Plumbing for Water Purifier and Geyser	The provision shall be made for plumbing for Water Purifier and Geyser
(U)	Testing	All water supply and sanitary pipe lines shall be tested as per CPWD specifications 2019 with upto date correction slip and direction of the Engineer-in-Charge.
(V)	Exhaust Fan	Provision shall be made for fixing exhaust fan in kitchen and toilet windows.

## 12. WATER SUPPLY :

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
INTERNAL SANITARY AND WATER SUPPLY INSTALLATIONS:				

12.1	Pipeline from Tank distribution line to OHW tank (exposed on wall)	GI pipe complete with GI fittings and clamps, including cutting and making good the walls etc. including control valve, pressure release valve, NRV as per approved design and drawings. The pipes shall be fixed with GI frame and U Bolt which will keep the GI pipes minimum 30mm away from the wall.
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.2	Internal piping- exposed on walls (loop line on terrace and down-take supply pipes)	CPVC pipes complete with CPVC fittings and clamps, including control valve, pressure release valve, NRV including cutting and making good the walls etc. As per approved design and drawings. The pipes shall be fixed with GI frame and u bolt which will keep the pipes minimum 30mm away from the wall.		

SL. NO.	DESCRIPTION	AREAS/ LOCATION S	BRIEF SPECIFICATIONS	REMARKS
12.3	Internal piping- concealed work	Chlorinated polyvinyl chloride (CPVC) pipes, having thermal stability for hot & cold- water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing including jointing of pipes & fittings with one step CPVC solvent cement including cutting chase and making good the walls etc. For concealed pipes and testing of joints as per direction of engineer in charge.		

SL. NO.	DESCRIPTION	AREAS/ LOCATION S	BRIEF SPECIFICATIONS	REMARKS
12.4	Soil & waste, rain water pipes And fittings	Soil, waste, vent pipes, rain water pipes and fittings shall be hubless centrifugally cast-iron epoxy coated inside & outside as per IS : 15905 the vertical pipes shall be fixed with GI fame and u bolt and horizontal pipes, traps and fittings shall be ceiling suspended and supported on GI frame work and u bolt which shall be covered by providing metallic false ceiling wherever required.  Soil & waste, rain water pipes and fittings shall be fixed as per DSR'23 Item No. 17.77.		
<ul style="list-style-type: none"> <li>❖ Plumbing shall have provision for geysers, water purifier, washing machines, dish washers, cage washers or any other equipment as per functional requirement.</li> <li>❖ Plumbing system shall be designed and provided as per the functional requirements of the buildings.</li> <li>❖ All drainage in balconies shall have their inlets in plan. All drainage through balconies/as per drawings shall be connected to rain water harvesting.</li> <li>❖ Utility balcony drainage shall be suitably treated and shall be not connected to rain water harvesting system.</li> </ul>				

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
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12.5	Valves	<p>Following types of control and other valves shall be provided in distribution grid, supply mains etc. As per local bye laws, NBC 2016, CPWD Specifications and sound engineering practice at easily accessible locations for operation and maintenance</p> <ul style="list-style-type: none"> <li>i. Bronze/ forged brass ball valve (screwed) confirming to is standards complete</li> <li>ii. Butterfly valves (80mm and above) shall be of centric disc construction with single piece body of cast iron with disc of CF 8 stainless steel with nitrile seat, stem shall be stainless steel and shall conform to PN 10/16 rating and shall be provided with suitable matching flanges</li> <li>iii. Non-return valve (80mm and above) shall be cast iron dual plate non-return valve of PN 10/16 rating with ductile iron disc and SS 304 spring&amp; hinge pin</li> <li>iv. Ball valves (65 mm and above) shall be lever operated, screwed type of gun metal ball valve of PN 10/16 rating as per is:318 with SS ball and SS stem with mild steel lever.</li> <li>v. Non-return valve (65mm and below) shall be gun metal non-return valve of PN 10/16 rating (class 2) as per IS : 778 with screwed ends.</li> </ul> <p>Special type of control valves like, pressure reducing valves (PRV) and solenoid valves as per requirement</p>
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.6	<p>CHAMBERS FOR: -</p> <p>(A) VALVES</p> <p>(B) FIRE HYDRANTS</p>	<p>Chambers of required size and shape shall be constructed class 2<sup>nd</sup></p> <p>Non modular clay brick in cement mortar with C.I. surface box of required shape and size i/c RCC top slab i/c necessary excavation, foundation concrete and 12 mm thick inside plastering finished with a floating coat of neat cement complete as per standard designs per approved design and drawings</p>		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.7	Thrust blocks	<p>Thrust Block shall be of cement concrete i/c necessary excavation, centring and shuttering etc. Shall be provided at locations specified as per direction of the Engineer-in-Charge.</p>		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.8	Puddle Flanges	<p>Galvanized iron (120 GSM minimum) puddle flanges of 60 cm length with flange on one / both ends and welded to mild steel plate (6mm thick) in the centre etc. complete as directed by Engineer-in-Charge.</p>		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.9	Overhead water tanks, UG Sump, STP tanks and other tanks	i. RCC tanks shall be RMC of specified grade of required capacity and as per approved design including required fittings like ball valve (brass) high/ low pressure with floats, inlet, outlet, scour, over flow pipe, vent pipe inside SS ladder, mosquito proof covers, outside MS ladder etc. ii. Separate overhead RCC shall be constructed for each building with separate horizontal/ vertical compartments for domestic and fire requirements. iii. Separate RCC underground tank for storage of treated water received from STP for use in flushing / horticulture be provided. iv. Inside of overhead water tank, UG sump shall be provided white glazed ceramic tiles over 12 mm thick bed of cement mortar 1:3 of size not less than 300mm x 300mm on floor and full height of walls. Inside of overhead water tank with waterproofing as mentioned in water proofing specifications. v. MS ladder for terraces, lift room shall be Galvanised MS with the size of MS bar shall not be less than 16 mm and thickness of MS flat shall not be less than 10 mm or IS 50506.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.10	DISINFECTION	All water supply lines and water tanks shall be disinfected.  Disinfection to be done using bleaching powder @ 0.5gm/litre of water and cleaned with fresh water operation to be repeated minimum 3 times as per CPWD specifications 2019 with upto date correction slips or method approved by the Engineer-in-Charge		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.11	MANHOLES	Manholes of required size and depth as per CPWD specifications 2019 with upto date correction slips with masonry wall in cement mortar with foundation concrete m10 with ready mixed cement plaster with floating coat of neat cement inside and outside cement plaster with FRP / DI covers as per approved drawings.  The manholes on the main sewer line shall be placed at not more than 30 meters length.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.12	Testing and Commissioning	All water supply and sanitary pipe line shall be tested as per CPWD specification and direction of Engineer-in-Charge.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.13	SEWER CONNECTION	The sewer line shall be connected to the sewage treatment plant as well as municipal sewer line to keep the line functioning in case of non-operation of STP		

**13. STORM WATER: SW DRAINAGE SYSTEM SHALL BE COMBINATION OF PIPES AND OPEN DRAINS AS PER APPROVED DRAWINGS**

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
13.1	Storm & Drain pipe	NP3 pipes of required diameter under the ground and below the CC pavement laid wherever required as per CPWD specifications 2019 with upto date correction slip and direction of the Engineer-in-Charge.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
13.2	S.W. DRAIN	I. Base & walls: the base & walls of drain shall be of RCC in M-30 grade as per approved design & drawings.  II. Plastering: 12mm ready mixed cement plaster in cm 1:3 (1 cement: 3 coarse sand) with neat finish in side and top of the drain and 15cm out side		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
13.3	Road Gully Chambers	The masonry road gully chamber of required size and depth with masonry wall in cement mortar including precast RCC / FRP horizontal/ vertical grating with frame complete as per standard design as per CPWD specifications 2019 with upto date correction slip and approved drawings.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
13.4	COVERS	Pre Cast perforated FRP cover with GI frame shall cover all the drains as per approved design.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
13.5	CONNECTIONS	The storm water drain, pipes shall be connected to rain water harvesting tanks and connection to municipal drains for surplus water as per attached drawings.		

Inspection chambers / manholes / gullies chambers / valves and other accessories of approved specifications and make shall be provided considering all the site conditions and reduced level as per design parameters. As far as possible green and recyclable materials shall be preferred as per approved drawings.

**14. ALUMINIUM WORK**

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
14.1	Double glazed units (DGUS) comprising of hermetically-sealed 6-12-6 mm insulated glass	All glazed windows & doors (glazing in ventilator is not mention.)	High performance coloured tinted toughened glass 6 mm thick substrate with reflective soft coating on outer face, + 12mm airgap + 6mm heat strengthened clear glass of approved make colour-neutral/ clear, SHGC value: 0.34 (max), vlt-50% to 55%, u-value less than -3 and as per particular	

			specifications.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
14.2	SS 304 Grade Wire Mesh	All windows as per drawings	SS wire mesh as per DSR'23 Item No. 9.135 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
14.3	Ventilation louvers at opening of shafts at ground floor and STP natural ventilation opening	Fabricating, supplying and fixing in position at all levels, aluminium extruded tubular and other aluminium sections for aluminium louver, fins, box sections, trellis, capping, strips and other locations as per the architectural drawings and approved shop drawings weight not less than 20kg /sqm , the aluminium quality as per grade 6063 t5 or t6 as per IS 1474, including PVDF spray / coil coating (35 microns) having minimum content of 70% of kynar 500 of required metallic colour and shade as approved by the engineer-in-charge. The aluminium sections will be fixed using stainless steel screws, nuts, bolts, washers, cleats, etc. on main frame work of aluminium sections as per the designs and shop drawings.		

## 15. WATER PROOFING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.1	<p><b>Fully bonded HDPE sheet Water Proofing</b></p> <p>Membrane (the fully bonded HDPE sheet waterproofing membrane shall have following typical properties:</p> <p>Peel adhesion to concrete &gt; 800 n/m (as per ASTM d 903: 1998).  Elongation (HDPE film)&gt; 400% (ASTM d 412 modified).</p> <p>Tensile strength&gt;25mpa. (ASTM d 412 modified).</p> <p>Thickness: 1.5mm composite thickness, HDPE thickness not less than 0.9mm (ASTM d 3767).</p> <p>Puncture resistance - 1000 n (ASTM e154).</p> <p>Resistance to hydrostatic head &gt;70 m (ASTM d 5385 modified).</p> <p>Lap joint strength at overlaps &gt;</p>	Raft bottom	As per particular specification	

	15000 n/m (ASTM d 6392:2012) (side and end laps).			
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.2	Crystalline Admixture:	RCC structures like retaining walls, swimming pool, UGT, STP & OHT.	As per particular specification and as per CPWD DSR'23 Item No. 22.22	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.3	Wet Areas Water Proofing	Toilets, Lift Pits, Balcony area	Providing & applying 2 components, solvent free, liquid applied elastomeric seamless hybrid polyurea membrane coating @ 1.6 kg/sqm, using high pressure two components spray/brush equipment, to form a minimum system thickness of 1.5 mm in two or more alternative coats.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.4	Water Proofing	Terrace / Refuge areas:	Applying two component high solids content cold applied pure polyurethane liquid elastomeric seamless waterproofing membrane, <b>insulation layer:</b> spray applied an average minimum 75mm thick GRIHA enlisted cfc & HCFC polyurethane foam, on top of polyurethane foam, applying single component, elastomeric 100% pure polyurethane coating free from bitumen & tar, the coating shall be applied with a total consumption of minimum 1.5 kg/sqm in two coats and shall be applied on the entire horizontal surface extending up to 300mm above the FFL on the vertical surface as per the methodology. It shall be followed by laying 150 GSM geotextile (non-woven polyester) over the entire membrane on horizontal areas maintaining proper overlaps. Providing 100 mm average thick	

			m25 grade pp fiber reinforced concrete screed mixed with crystalline admixture. Top surface shall be provided with heat resistant tiles of approved make and specifications as per directions of the engineer-in-charge.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.5	<p>Providing and spray applying two component hybrid Polyurea polyurethane waterproofing system at all levels for podium garden waterproofing by the manufacturer or his approved applicator consisting following operations a) brushing and vacuum cleaning the surface to make free from any loose material, oil, greas, dust etc. B) repairing the surface if required, as per recommendation of manufacture or his approved applicator to make it water tight for which nothing extra shall be paid. C) 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 in dry condition, having consumption varies from 0.20 to 0.40 kg/sqm depending on the porosity and undulations in the surface. D) providing and sprinkling washed coarse sand, as recommended by manufacturer, over freshly laid primed tacky surface @ 0.25 to 0.40 kg/sqm as directed by the engineer-in-charge. E) over primed sandy surface, providing and spray applying two component hybrid polyurea polyurethane coating system, which shall be solvent free, mixed in proportion by volume / 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 /astm and tear strength minimum 30n/mm as per din 53515 or minimum 45 n/mm as per astiv d624 and 20 second maximum gel time / reaction lime with minimum 1.5 mm dry film thickness of two coals. 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 d 4595.</p>	Podiums	<p>As per particular specification &amp; CPWD DSR'23 correction slips 20 Item No. 22.27.1 &amp; 22.28.1.</p>	

G) providing and laying screed of cement concrete 1:1.5:3 (1 cement: 1.5 coarse sand: 3 graded stone aggregate 20mm nominal size) of minimum thickness 50 mm al khurra with a slope of 1:100 towards khurra to ridge of roof. H) providing and laying dimple drain boards with inbuilt geo textile drainage membrane on top having dimple height of 20-25 mm, average number of dimples 400 per sqm, compressive strength not less than 180 kn/m <sup>2</sup> and geotextile drainage member having mass of 120 GSM. Laid with minimum overlap of 50 mm note HDPE drain cells / drainmats along with a layer of geotextile having weight of 120 GSM and tensile strength not less than 2.4 kn/m as per ASTM d 4595 is provided in place of dimple drain board with inbuilt geotextile, it shall not be paid as extra. (Sr. No. F, G & H not applicable for vertical surface)			
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.6	Water Proofing for Water Retaining Structures –	UGT / OHT internal water tanks	<p>First step shall be treatment to concrete defects like construction joints, cold joints, honeycombs &amp; porous concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with IWP non shrink additive of approved make and sealing all the construction joints with styrene butadiene latex.</p> <p><b>wall and slab joint / construction joint treatment</b></p> <p>After the entire surface preparation has been</p>	

		<p>completed on the mother slab, all the wall and slab joints / construction joints to be treated with joint tapes having minimum tensile elongation more than 300% of size 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of waterproofing slurry on the wall – slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire wall – slab joints / construction joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner. As per original manufacturer's specifications all over the entire horizontal and upto full height vertical surface.</p> <p><b>waterproof coating</b></p> <p>After the entire surface preparation has been done, pre wetting of the entire concrete surface and providing and application of the 1st coat of approved make flexible cementitious waterproofing slurry with quick curing and waterproofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry.</p>	
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		<p>The total consumption of the product should be as per manufacturer specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1mpa, adhesion strength of 2mpa, crack bridging capacity of 2mm as per EN 1062-7 complete as per manufacturer's specifications and approved by engineer-in-charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.</p> <p>Providing and laying of protection plaster 20mm thickness with 1:4 cement and sand mortar as per approved specification admixed with integral waterproofing compound as per original manufacturer's specifications. To prevent the waterproof coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system</p>	
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		warranty against leakage.	
		Laying slope making and protection with 40mm avg. Thick of m25 grade fibrated screed and applying waterproof plastering with cm 1:4 of thickness 20mm admixed with integral waterproofing compound as per original manufacturer's specifications.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.7	Water Proofing for Water Retaining Structures -	<b>STP tanks</b>  <b>Wall and slab joint / construction joint treatment</b>	First step shall be treatment to concrete defects like construction joints, cold joints, honeycombs & porous concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with iwp non shrink additive of approved make and sealing all the construction joints with master latex mortar.  After the entire surface preparation has been completed on the mother slab, all the wall and slab joints / construction joints to be treated with joint tapes having minimum	

		<p>tensile elongation more than 300% of sizes 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of waterproofing slurry on the wall – slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire wall – slab joints / construction joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner as per original manufacturer's specifications all over the entire horizontal and upto full height vertical surface.</p> <p><b>Waterproof coating:</b></p> <p>After the entire surface preparation has been done, pre wetting of the entire concrete surface and providing and application of the 1st coat of flexible cementitious waterproofing slurry with quick curing and water proofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry. The total consumption of the product should be as per manufacturer specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1mpa, adhesion</p>	
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		<p>strength of 2mpa, crack bridging capacity of 2mm as per EN 1062-7 as per manufacturer's specifications and direction of engineer-in-charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.</p> <p>Providing and laying of protection plaster 20mm thickness to prevent the waterproof coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against leakage.</p> <p>Laying slope making and protection with 40mm avg. Thick of m-40 grade fibrated screed and applying waterproof plastering with cm 1:4 of thickness 20mm admixed with integral waterproofing compound as per original manufacturer's specifications.</p> <p>Controlling specifications shall be of original manufacturer shop drawings (private label supplier shop drawings</p>	
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		<p>not acceptable) and original manufacturer method statement (Pvt. Label supplier method statement not acceptable) after due approval of engineer-in-charge.</p> <p><b>Moisture sensitive bituminous epoxy coating:</b> Over the plaster providing &amp; applying 2 coats of moisture sensitive bituminous epoxy coating at a consumption of @500/gms/ sq.mtr with bonding / adhesion of 1.2 to 1.4 n/mm<sup>2</sup> as per ASTM d 4541, water resistance, immersion – 7 days passes as per ASTM d 870-09, chemical resistance, immersion in dilute acid alkali &amp; salt solutions – 7 days -passes as per ASTM 868 as per manufacturer's instruction.</p>	
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#### 16. ROADS, OPEN PARKING & PATHS (AS PER THE DRAWINGS)

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.1	Inter-locking Pavers for drive ways, surrounding of buildings and balance area	80 mm thick ISI marked Heavy-Duty pavers as per shape & pattern in M-30 grade Colour (Red, Green, Grey, Yellow etc.) Made by table vibratory method using PU mould laid in required colour and pattern over and including 50mm thick compacted bed of sand and 100 mm bed concrete of m10 etc. complete as per approved drawing and as per direction of Engineer-in-Charge		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.2	KERB STONE	Factory made high grade concrete precast block. M-25 grade of size 150x450 mm of approved design jointed with cement mortar including making drainage opening wherever required and painting in pattern complete etc. As per direction of Engineer-in-		

	Charge.
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.3	ROADS		Road as per CPWD specification 2019 with upto date correction slips.  C.C. pavement minimum 150 mm thick or as per drawing attached with nit of mix minimum M-30 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.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.4	Road Painting Works		i. Providing and applying minimum 75mm wide and 2.5mm thick road marking strips (retro- reflective) of specified shade/ colour using hot thermoplastic material by fully/ semi-automatic thermoplastic paint applicator machine including cost of material, labour, T&P, cleaning the road surface of all dirt, seals, oil, grease and foreign material etc. complete as per drawing and as per direction of Engineer-in-Charge.  ii. Glow studs of size 100x20 mm made of heavy-duty body shall be molded ASA (acrylic styrene acryloretite) or hip (high impact polystyrene) or abs having electronically welded micro prismatic lens with abrasion resistant coating.  iii. Marking parking places, road surface marking with adequate no. Of coats to give uniform finish with ready mixed road marking paint conforming to is: 164, including cleaning the surface of all dirt, scales, oil, grease and foreign material etc. complete  iv. All road signages as per particular specifications.	
16.5	Compound Wall / Boundary wall		As per attached drawing.	

## 17. NEW TECHNOLOGY

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
17.1	Architectural Aluminium louvres	As per drawing attached.	As per proposed location mentioned in drawing.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
17.2	2 mm thick Aluminium CNC Cut Jali with Aluminium	Toilet shafts	As per proposed location mentioned in drawing.	

	frame		
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## 18. MISELLANEOUS

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.1	Fan clamps/ Fan boxes in each room except toilets		M.S. Fan clamp Type I or Type II of 16 mm dia M.S. bar bent to shape with hooked ends in RCC terrace slabs, fan boxes in other slabs. During laying of slab including painting the exposed portion of loop, all as per standard design complete.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.2	Speed Breakers on Ramps		Compound rubber UV stabilized, modular 410 mm width 75 mm thickness 35 Tonnes compressive strength of required length with end trim fixed with fasteners as per manufacturers specification.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.3	Irrigation Works for Horticulture Works		<p>The scope of work consists of :</p> <ul style="list-style-type: none"> <li>i. Laying of network of pipe from treated effluent of STP</li> <li>ii. Provision of garden hydrant posts, control valve, chambers etc.</li> <li>iii. The irrigation pipes for main grid and branches shall be CPVC.</li> <li>iv. The provision for alternate arrangement from municipal supply</li> </ul>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.4	Cable Trenches		Cable Trenches shall be with minimum 200 mm thick masonry work as per drawings using polymer modified adhesive mortar and RCC bands of minimum 100 mm thickness including centring and shuttering and reinforcements including internal 12 mm thick ready- mix plaster cement mortar 1:4 MS cover shall be 8 mm chequered plates fixed to MS frame of 40x40x6mm angle iron including painting with two or more coats synthetic enamel paint of required colour over approved steel primer as per the approved drawing.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS

<b>18.5</b>	Accessibility of Buildings	Provision should comply as per the attached list of accessibility norms of buildings
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<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
<b>18.6</b>	SHAFTS		<ol style="list-style-type: none"> <li>1. All shafts (Civil and E&amp;M) shall be appropriately closed horizontally and covered with appropriate door system vertically. This arrangement may be augmented as per fire requirements.</li> <li>2. Kitchen should be so designed so as to ensure that various gadgets ducts are conveyed to service ducts for example ducting for electric chimney.</li> <li>3. Accessible roofs shall have parapets.</li> </ol>	

**SCHEDULE OF FINISHES – STAFF QUARTERS & OTHER ANCILLARY STRUCTURE**

DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>GENERAL SPECIFICATIONS/ GUIDELINES</b>		<ol style="list-style-type: none"> <li>1. All the items of Delhi Schedule of Rates are in the scope of work against the tender, as may be applicable, according to the discharged by the Engineer-in-Charge by way of Good For Construction drawings.</li> <li>2. CPWD specifications Vol - I and Vol - II 2019 with upto date correction slips as amended from time to time shall be applicable for all the items to be executed as per Good for Construction drawings.</li> <li>3. Provisions contained in harmonized guidelines &amp; standards for universal Accessibility in India 2021 (available on CPWD website) of ministry of housing and urban affairs, government of India shall be complied.</li> <li>4. C&amp;D waste products and recycled aggregates to the extent provided in is codes shall be used as per extant provisions of green building measures.</li> <li>5. Type of cement to be used in the work shall be as per provisions of is: 456 with regard to exposure conditions including sulphate attack.</li> <li>6. Only RO water shall be used in the work.</li> <li>7. DSR items are only indicative, items are to be executed for all heights and all levels.</li> <li>8. Provision contain in IGBC green building norms for platinium rating.</li> </ol>	

DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>Earth Work Foundation and plinth.</b>  For foundation of main building, substation, security rooms , RWHT, OWC, retaining wall, services, road works, podium, club house, boundary wall, STP, UGT & other allied RCC works as per structural design and drawings		<ol style="list-style-type: none"> <li>1. Scope of work includes all items of DSR-23 as contemplated in the sub head earthwork of DSR-23 (including bailing and pumping out water, strutting etc.) As may be applicable to the work as per design and drawings and as confirmed by the engineer-in-charge and are to be executed as per CPWD Specifications 2019 with upto date correction slips.</li> <li>2. Surplus excavated earth shall be disposed of by the contractor after remittance of due royalty to concerned authority, as applicable, by the contractor.</li> <li>3. Filling available earth or earth brought from outside shall be done as per requirement to level the ground as per approved drawings.</li> <li>4. Post construction anti-termite treatment as per the necessity of ground shall be carried out as per relevant Indian Standard Codes / CPWD specifications 2019 with upto date correction slips.</li> <li>5. Structural / Non-structural grade slab as per the necessity at site/design requirement and as per the functional requirement of supported flooring shall be designed &amp; provided accordingly.</li> <li>6. Damp proof course shall be provided where ever required as per CPWD specification 2019 with upto date correction slips.</li> <li>7. Drainage and plinth protection along the perimeter of the buildings shall</li> </ol>	

	be provided as per CPWD specifications or as per specific functional requirement.
	8. Water proofing as particular per specifications 2019 with upto date correction slips.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.1	Anti Termite Treatment		Post construction Anti Termite Treatment as per the necessity of ground shall be carried out as per relevant Indian Standard Codes / CPWD specifications DSR'2023 Item Nos. 2.34, 2.35.2 & 2.35.3	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.2	Filling available Earth		Filling available earth or earth brought from outside shall be done as per requirement to level the ground as per approved drawings. Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. In layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, surplus excavated / unsuitable earth shall be taken out of the campus or shall be used in campus itself as per direction of the Engineer-in-Charge. Additional good earth fit for filling, if required, for the work shall be procured from outside of the campus at his own cost.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.3	Plinth Filling		Plinth filling shall be done with sand of grading Zone IV as per CPWD specifications 2019 with upto date correction slips.  Plinth filling shall be with sand, 150 mm thick layer under floors including, watering, ramming consolidating and dressing complete.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.4	Grade Slab at Plinth Level		Structural / non- structural grade slab as per the necessity at site / design requirement and as per the functional requirement of supported flooring shall be provided accordingly.  RCC slab of minimum grade of M-30 with 150 mm thick with 8 mm dia 200mm C/C both ways including centering, shuttering, finishing, curing, etc.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.5	Damp Proof course / Band		As per site requirement.  Damp proof course shall be provided wherever required as per DSR'23 Item No. 4.11 and as per CPWD Specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.6	P.C.C as per structural drawing.		PCC as mention in structural drawing below-raft	

SL.	DESCRIPTION	AREAS/	BRIEF SPECIFICATIONS	REMARKS

NO.		LOCATIONS	
1.7	PILE	500 mm dia Pile with M-30 grade concrete with reinforcement as per the particular specifications & as per GFC structural drawings and as per CPWD DSR'23 Item No. 20.2A. & 5.22.6 including vertical, lateral load and integrity test on piles as mention in I.S. 2911 (Part IV) & CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.8	Pile Capping Beam	As per structural drawing, M-30 grade capping beam alround boundary over piles i/c earth work, PCC and RCC, steel & shuttering as per the GFC structural drawings and as per DSR'23 Item No. 5.33.1.3 & 5.22.6, 5.9.5 & 4.20.1.1		

## 2. CEMENT CONCRETE WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
2.1	PCC (as per structural drawing.)	All PCC works in levelling course below foundation, plinth, pathways, drains, trenches, pipes, paver blocks, kerb stones, etc. As per drawings	PCC shall be as per DSR'23 Item No. 4.20.1.2 and as per CPWD specifications 2019 with upto date correction slips.	Any undulations of excavated surface shall be levelled with plum concrete.

## 3. RCC WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.1	RCC Work	In foundation and Super Structure of main building, covered car parking (stilt 1 &2)/podium, club house, security rooms, caretaker offices, substation, STP, UGT, OHT, RWHT, compound wall & other allied RCC works as per structural design and drawings.	All RCC works shall be as per DSR Item No. 5.33 and as per CPWD Specifications 2019 with upto date correction slips. The RCC work shall be with design mixed self-compacting concrete/normal reinforced cement concrete of specified grade as directed by the engineer-in-charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.2	Swimming Pool	Work should be carried out as per the structural drawing.		

SL.	DESCRIPTION	AREAS/	BRIEF SPECIFICATIONS	REMARKS
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Correction... Nil Deletion... Nil Insertion... Nil Overwriting... Nil AE (C) AE(E) EE(C)

NO.		LOCATIONS		
3.3	Underground Sump	Work should be carried out as per the structural drawing.		
SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.4	Sewage Treatment plant (STP)	Work should be carried out as per the structural drawing.		
SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.5	External walls & internal walls (Dry & Wet area) (All walls are with RCC monolithic construction technology)	In case of structural walls, specifications of RCC walls shall be as per structural drawings. In case of Non-structural walls, specifications of RCC walls shall be as per structural drawings		
SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.6	SHUTTERING	Main building from foundation to ground floor, podium, security rooms, sub-station, STP, UGT, OHT, RWHT, compound wall & other allied structures.	All shuttering of RCC members shall be as per DSR'23 subhead 5 and as per CPWD Specifications 2019 with upto date correction slips.	
SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.7	Aluminium Form work / Shuttering	Typical floor as per drawings attached	All customized aluminium formwork for monolithic construction of RCC members shall be as per DSR'23 Item No. 26.48 and as per CPWD Specifications 2019 with upto date correction slips.	
SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.8	Steel Reinforcement	As per structural drawings	All steel reinforcement work shall be <b>CRS Grade Fe 500D / 550D</b> for R.C.C. work including supplying, straightening and cutting, bending, placing in position and binding and as per CPWD specifications 2019 with upto date correction slips..	

#### 4. MASONRY WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
4.1	Masonry Work	All Residential Blocks	External wall RCC with thickness as per latest codes. All external RCC surfaces to have levelling course and putty and paint. AAC blocks to be provided for insulation as per drawings. Internal walls in RCC (thickness as per latest codes and as per the drawings) brick masonry wall shall be as per DSR'23 Item No. 6.1.1, 6.4.1 and 6.5 CPWD Specifications 2019 with upto date correction slips as per the drawings.	Fiber mesh shall be provided at junction of concrete and block masonry.

## 5. CLADDING WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.1	18mm thick Granite Work	Granite Work in, doors sills, all around windows/ ventilators, facias, ledge wall tops, parapet wall top, retaining wall top and similar locations, main door threshold, granite top on balcony bund wall. Granite for opening, granite coping for planter beds.	All granite work shall be as per DSR'23 Item No. 8.2.2 and CPWD specifications 2019 with upto date correction slips as per the drawings..	Exposed edges of granite at all locations shall be finished with moulding / edge champhering with high gloss finish .

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.2	30 mm thick polished granite dado upto bottom of false ceiling height as per drawings	Entrance lobby, lift lobbies at all floor level.	30 mm thick polished granite dado/cladding as per specification of Mentioned. Dry cladding with 30 mm thick granite of approved size, shade, colour and texture in	Exposed edges of granite at all locations shall be finished with moulding / edge champhering with high gloss

			approved pattern to be secured to backing by means of SS cramps/pins etc. As approved and directed by engineer in charge.	finish.
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.3	30 mm thick polished granite dado false ceiling height from FFL in combination of colours and patterns.	Common circulation space of Building, central core (except ground floor)	30 mm thick polished granite dado as per specification mentioned. Dry cladding with clamp cladding with 30 mm thick granite of approved size, shade, color and texture in approved pattern to be secured to backing by means of SS cramps/pins etc. As approved and directed by engineer in charge.	Exposed edges of granite at all locations shall be finished with molding / edge champhering with high gloss finish. Dado edge shall be properly secured in the wall.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.4	18 mm thick honed/flamed finish granite stone with 3 set of anti skid Grooves	STAIRCASE	Flooring- granite in staircases, risers, treads, landings, mid landings. Treads shall have non- slippery grooves or strips near edges. Dado- natural stone finish up to 1.5 m height (i) SS-316 grade railing with knockdown system as per drawing (ii) false ceiling –not applicable but pop molding and cornice	Exposed edges of granite at all locations shall be finished with molding / edge champhering with high gloss finish. Dado edge shall be properly secured in the wall with suitable locking arrangement.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.5	300 x 600 ceramic wall tiles dado upto false ceiling or up to beam bottom	Toilets / Bath Rooms as per Drawings.	1st quality Ceramic Glazed Wall Tiles as per DSR'23 Item No. 8.31 and as per approved design & pattern and CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.6	300 mm x 600 mm polished vitrified tiles full height on exposed vertical wall surface.	Kitchen and other area as per Drawings.	As per approved design & pattern and CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.7	150 mm x 1200 mm full body anti-skid vitrified tiles with wooden look	Kitchen Balcony, Bed Room Balcony and other area as per Drawings.	150 mm x 1200 mm full body anti-skid vitrified tiles with wooden Look and as per approved design & pattern and CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATION S	BRIEF SPECIFICATIONS	REMARKS
5.8	Kitchen platforms and base		<p>Factory-built modular kitchen as per specifications.</p> <p>Jet black 18 mm thick gang saw cut, mirror polished, pre moulded and pre polished, machine cut for kitchen platforms, facias (in single length) 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 up, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. Complete at all levels.as per dsr item no 8.2.2</p>	

## 6. WOOD WORK AND PVC WORKS

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
6.1	<b>DOORS</b>			
(A)	35 mm thick paneled door (kiln seasoned & chemically treated hollock wood/hard wood) with synthetic enamel paint	Main & other doors of Staff Qtrs.	As per DSR'23 item No. 9.5.2 & 9.6 CPWD specifications with upto date correction slips	Granite sill/ umra patti, jams of approved shade/ colour as per design pattern.

SL.	DESCRIPTION	AREAS/	BRIEF SPECIFICATIONS	REMARKS
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Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

NO.		LOCATIONS		
(B)	38 mm thick Flush door with decorative veneer on both sides with melamine polish wherever required and SS Grade 316 hardware.	Refuge area, entrance lobby, care taker's office, service room bank engineer dispensary (doctor's room) changing room, changing room, control room & all other doors opening into common/lobby area of main building,	As per particular specifications.	Granite sill / umra patti of approved shade/ colour as per design pattern.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(C)	2 Hrs. Fire rated Metal Doors	All staircases, electric room, meter room, Pump Room, electric shaft, lv shafts, fire hydrant shaft, stp, other shafts doors.	As per particular specifications.	Granite sill/ umra patti of approved shade/ colour as per design pattern.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(D)	Frameless glass door with 12mm thk. Toughened clear glass with patch fittings, floor spring and all hardware.	Main entrance lobby, entrance lobby of security rooms.	Lazed door shutter as per DSR'23 Item No. 21.18, and CPWD specifications 2019 with upto date correction slips.	Granite sill/ umra patti of approved shade/ colour as per design pattern.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(E)	38 mm thick flush door with decorative veneer on both sides with melamine polish wherever required and SS grade 316 hardware.	All doors other than fire rated wooden doors, metallic fire rated doors, glass doors and Toilet doors.	Flush doors& frames shall be as per DSR'23 Item No. 9.1.1, 9.21.1, 9.23, 9.40.1.1, 9.127.1 & 13.116 and CPWD specifications 2019 with upto date correction slips.	The SS ball bearing hinges shall be provided to door shutter and granite sill/ umra patti of approved shade/ colour as per design pattern.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(F)	WPC doors 35 mm thick and door frame for the toilets SS 316 hardware with double layer granite frame as frame.		WPC door shutter shall be as per DSR'23 Item No. 26.88.2 and as per CPWD specifications 2019 with upto date correction slips.	-do-

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(G)	Factory made 3-track high quality aluminium/UPVC doors with LOW-E DGU glasses and SS wire mesh shutter)	As per drawings	Glazed aluminium /UPVC door shall be as per drawings and CPWD specifications 2019 with upto date correction slips. Glazing shall be as per particular specifications.	-do-

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(H)	WARDROBES	As per tender drawings. Factory-made built-in cupboard/ wardrobes made up of 19 mm thick marine ply confirming to is: 710 for the carcase, box, sides, top and bottom and 20 mm thick prelaminated HDF shutters, and 12 mm thick prelaminated marine ply with balancing laminate for back portion, with stainless steel hardware as per architectural design and detailed Technical specifications.	All the bedrooms shall be provided with built-in modular wardrobe / cupboard of suitable size as per drawing.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(I)	Modular kitchen OH cabinet	As per drawing	Factory-made 18mm thick with both side balancing laminated high moisture resistant HDF HDHMR board shelves, in tiers up to 2100 mm height in niche and covered with 18	

			mm thick one side decorative and other side balancing laminated high density high moisture resistant	
			HDF HDHMR board, and 12 mm thick back HDHMR With balancing laminate, with stainless steel hardware as per Architectural design and specifications.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(J)	Modular Cabinet Counter	Kitchen Below	<p>Best quality State-Of-The-Art Kitchen with sufficient storages space for different types of kitchen equipment subject to space availability having sleek looks and spacious capacity designed for maximum functional efficiency and comfort of use will be provided. Minimum 18mm thick mirror polished granite top on RCC cooking platform (edge rounded) and 200 mm deep granite fascia (edge rounded) with a suitable size stainless-steel sink-drain-board-unit (single bowl, satin finish, with SS fluted drain board) having CP brass swan-neck swivel type mixer cock for freshwater and hot water inlet, and waste water outlet through a suitable floor trap shall be provided. The kitchen-platform shall be provided along with underneath covered storage units (along with shelves &amp; vertical partitions made of HDHMR board with both side laminate &amp; edge banding and post formed shutters made of HDHMR board and both side laminate with edge banding), water-purifier etc. Complete. A water-purifier with CP brass plumbing fittings and fixtures and a wet utensils cabinet shall be fixed over the sink-drain-board-unit. All with ss ironmongery, handles etc. Kitchen hood exhaust shall be concealed or exhaust fan with gravity louvre flaps.</p> <p>Factory-made built-in cabinets, carcass made up of box and shelves with both sides balancing laminated and shutters with one side decorative and other side balancing laminated 18 mm thick high moisture resistant prelaminated HDHMR board of e1 grade and 12 mm thick prelaminated HDHMR back panels and drawer bottoms, with S.S. hardware (to be included) 316 grade with cooking platform as per design &amp; details approved by engineer-in-charge with :-  A) pre-polished granite with nosing cooking platform basic rate of polished granite of minimum rs.175/- per sqft excluding GST and duly supported by tax invoice.  Stainless Steel 304 kitchen 1 mm thick, double bowl sink as per is 13983 with drain board &amp; extended swinging spout (mixer). Density shall be 800 kg/m<sup>3</sup> each panel shall be precisely cut by the beam saw machine and edge banding done on edge banding machine with PVC edge band bonded with pur glue. The machining of panels like holes for minifix, housing for hinges, grooves for back panels are done by CNC machining center.</p>	As per drawing

			All the panels shall be made and packed in the factory. Only installation shall be done at site. All modules shall be independent and no common vertical panels shall be acceptable. The kitchen shall be installed on adjustable legs cladded with 100 mm skirting.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>6.2</b>	<b>DOOR FITTINGS AS PER SCHEDULE FOR DOORS FITTINGS AND CPWD SPECIFICATION 2019 VOL. I, WITH UPTO DATE CORRECTION SLIPS.</b>			
(A)	300 mm D' type handle <b>Back to Back</b>	All doors shutters except toilets and shaft shutters	Stainless Steel 316 grade satin finish D' type handle of approved make 19 mm dia (minimum) & 300mm long, 1.2mm tube thickness (minimum) <b>Back to Back (In Pair) with rose</b> , with adjustable fixing for wood and metal door with required brass bush insert, necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per direction of Engineer-in-Charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(B)	150 mm D' type handle <b>Back to Back</b>	Toilets and shaft shutters	Stainless Steel 316 grade satin finish D' type handle of approved make 19 mm dia (minimum) & 150 mm long, 1.2 mm tube thickness (minimum) <b>back to back (In Pair) with rose</b> , with adjustable fixing for wood and metal door with required brass bush insert, necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per direction of engineer-in-	

		charge.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(C)	ALDROP 300mm	Main door, Bed Room Doors	Stainless Steel 316 grade satin finish ALDROP of approved make, 300 mm long rod of 16mm (minimum) diameter, locking patti thickness 2mm (minimum) with required staples and additional one staple of minimum 2 mm thickness along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the engineer-in-charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(D)	Sliding latch/ Tadi of approved make 250 mm long	Main door, Bed room door, Balcony door both sides, Shafts door front, Kitchen door front, Toilet door.	Stainless Steel 316 grade satin finish sliding latch/ Tadi of approved make, 250 mm long rod of 16mm (minimum) diameter, locking patti thickness 2mm (minimum) with required staples of minimum 2 mm thickness along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer-in-Charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(E)	Baby latch with indicator	Toilet inside	Stainless steel 316 grade <b>100 mm long baby latch</b> along with <b>indicator</b> of approved make along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer-in-Charge.	

SL.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF	REMARKS
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Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

NO.			SPECIFICATIONS	
(F)	Tower Bolt	All Door shutters at top	<p>Stainless Steel 316 grade satin finish square tower bolt of approved make 300mm long, 10mm width along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer-in-Charge.</p>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(G)	Tower Bolt	All door shutters one horizontally at bottom	<p>Stainless Steel 316 grade satin finish square tower bolt of approved make 150mm long, 10mm width along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer-in-Charge.</p>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(H)	Magnetic Catcher Door Stopper	All doors except toilet and shafts	<p>Door stopper as <b>magnet catcher and ball catch with 100mm length with cover to conceal</b> screws fixed to the door shutter and wall respectively of approved make along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer-in-Charge</p>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(I)	Hydraulic Door closer	Ground floor lobby doors, recreational area doors, common use area doors	<p>Aluminium extruded section body tubular type universal hydraulic door closer (having brand logo with IS :3564, embossed on the body, door weight upto 36 kg to 80 kg), with double speed adjustment with necessary accessories and screws etc. Complete.</p>	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
(J)	Stainless Steel Ball Bearing butt hinges	All door shutters	SS ball bearing Hinges of size 100x89x3mm (heavy weight) with stainless steel screws etc. complete	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
(K)	Magic Eye / Peep Holes	Main door shutter	Best make and quality as per the direction of the Engineer-in-Charge.	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
(L)	Night Lock	Main Door	Brass night latch of approved make with three keys	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
<b>6.3</b>	<b>WINDOWS</b>			
(A)	Factory made 3-track high quality aluminium/uPVC windows with LOW-E-DGU glasses and SS wire mesh shutter inside and double layer granite frame all around window i/c MS safety grill and all fittings and fixtures as mentioned in drawing	All window / ventilator openings as per drawings	Specifications of frames and shutter shall be as per design drawings and as per CPWD specifications 2019 with upto date correction slips.	<ul style="list-style-type: none"> <li>1. Factory made 3-track high quality aluminium/uPVC windows with LOW-E-DGU glasses and aluminium/SS wire mesh shutter inside.</li> <li>2. In case of ventilators of toilets, etc. It shall be provided with glass louvers offrosted.</li> <li>3. Powder coated aluminium / uPVC to be used.</li> <li>4. M.S. security grills painted with epoxy paint for all window.</li> <li>5. Windows along with glazing shall be designed for wind loads applicable to the area/location as per relevant is codes.</li> </ul>

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
(B)	Filling the gap in between aluminium frame & adjacent RCC/brick/stone work	All window / ventilator Openings as per drawings	Weather silicon sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-Charge complete. Upto 5mm depth and 5 mm width as per DSR'23 Item No. 21.8	

## 7. STEEL WORK :

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.1	<b>BALCONY / STAIRCASE RAILING</b>			
(A)	Balconies	All Balconies, Dry Balcony, except refuge area	1350 mm high railing with SS handrail and toughened laminated glass as per drawing	Balconies

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(B)	Factory made stainless Steel (Grade 316) knock down (no welding) railing including all fittings, fixtures, hardware, anchor fastener, etc. Required for complete railing Works.	Staircase, fire staircase, terrace tanks, podium and all staircases	SS (grade 316) railing as per particular specifications and as per drawings.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.2	Windows grill-windows should be fitted with MS safety grill as per approved drawings including painting with epoxy paint over approved steel Primer.	All windows / ventilator	All openings should be fitted with decorative MS grill (minimum weight 12 kg per sqm) including painting with epoxy paint as per approved drawings. The size of MS bar shall not be less than 10mm and thickness of MS flat shall not be less than 5mm. MS grill as per DSR'23 Item No. 9.48.2 and 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.2	Ladders/ railing with Chequered plates incl. Primer And epoxy paint.	For OHT, STP, Pump Rooms etc.	All MS ladders /railing shall be provided as per DSR'23 Item No 10.25, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.3	Ladders/ railing with Chequered plates incl. Primer and epoxy paint.	For OHT, STP, pump Rooms etc.	All MS ladders /railing shall be provided as per DSR'23 Item No. 10.25, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
7.4	Railing/ Grill over Compound wall / including painting with epoxy paint over approved steel primer.	Compound wall	Compound wall shall be fitted with decorative MS grill (minimum weight 40 kg per sqm) including painting with epoxy paint as per approved drawings. The size of MS bar shall not be less than 16mm and thickness of MS flat shall not be less than 5mm. All MS railing/ grill shall be provided as per DSR'23 Item no. 10.25, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
7.5	Entrance gates including painting with epoxy paint over approved steel primer.	Entrance gates	Entrance gates shall be fitted with MS Box type tubes / decorative MS grill (minimum weight 150 kg per sqm.) including painting with epoxy paint as per approved drawings. The size of MS bar shall not be less than 16mm and thickness of MS tubes shall not be less than 4.5mm. Gate shall be provided as per DSR'23 Item No. 10.25, 10.16.2, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
7.6	Curtain Rods	All windows and doors in all rooms except Kitchen, Toilets	Curtain rods 25 mm dia, 1.6 mm thick with required accessories of SS grade 316 with SS brackets and SS Screws.	

## 8. FLOORING

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
8.1	Leveling course to be provided on the top of RCC slab before laying flooring as per site requirement, if required. Nothing extra on this account shall be payable.			
(A)	800 mm x 800 mm Full body homogenous vitrified tiles	Living/dining area, bedrooms, dressing room, kitchen and other area as per Drawings.	Glazed vitrified tiles as per Item no. : 11.41a.2.3 of DSR'23 and as per CPWD specifications 2019 with upto date correction slips.	800 mm x 800 mm Full body homogenous vitrified tiles. 2. 100mm high skirting. 3.ceiling and moulding as per direction of engineer in charge
(B)	150 mm x 1200 mm polished glazed Vitrified tiles with Wooden look	Master bedroom and other area as per Drawings.	Polished glazed vitrified tiles as per drawing and as per CPWD specifications 2019 with upto date correction slips.	Mirror finished vitrified tiles preferably double charge flooring with skirting upto 100 mm in all rooms including guest room above skirting low VOC washable Acrylic paint

(C)	300 x 600 Ceramic wall tiles dado upto 7-8 feet, above wall painting and grid false ceiling, may be provided as shown in drawing	Toilets/ Bath rooms,	Antiskid/ matt finish vitrified tiles of size 600mm x 600 mm. Specification as per item no. : 11.41a3.1 of dsr-2023and as per CPWD specifications 2019 with upto date correction slips.	-do-
(D)	150mm x 1200 mm full body anti- skid vitrified tiles with wooden Look	Balconies/ Utility Area,	Full body anti-skid vitrified tiles with wooden Look as per Drawing and as per CPWD specifications 2019 with upto date correction slips.	
(E)	25 mm thick rubbed and polished Kota Stone	Refuge Area	Kota Stone specification as per DSR'23 Item No. : 11.26 and as per CPWD specifications 2019 with upto date correction slips.	
(F)	18mm thick flamed finish / honed granite flooring	Fire staircase, entrance pathways leading to open area platform, open terrace of podiums and other area as per Drawings.	18 mm thick flamed finish granite stone flooring of shades & samples as approved by engineer-in-charge, in required design and in patterns, as per dsr-2023 item no. 11.55.1 and as per CPWD specifications 2019 with upto date correction slips.	Treads and risers shall be provided in single piece of stone. Tread to be in flamed finish and riser to be provided in polished granite stone. Nosing design shall be as per drawings.
(G)	18mm thick Polished Granite flooring as per approved pattern	Common staircase, entrance lobby, lift lobbies, common circulation space of building, security rooms and other area as per Drawings.	18 mm thick polished granite stone flooring of approved shades & samples as approved By engineer-in-charge, in required design and in patterns, as per DSR'23 Item No. 11.56.1 and CPWD specifications 2019 with upto date correction slips.	Treads and risers shall be provided in single piece of stone. Treads shall have non slippery grooves or strips near edges. Nosing design shall be as per drawings.
(H)	25mm thick Kota Stone Flooring	Service Rooms, Meter Room, Control Room, Stores, Pump room, Mumty and other area as per drawings.	25 mm thick kota stone flooring as per DSR'23 Item No. 11.26.1 and as per CPWD specifications 2019 with upto date correction slips.	
(I)	Tremix- Cement concrete + road	Podium / ground floor level, driveway+ramp	Tremix cement concrete pavement as per	

	marking stripes		DSR'23 Item No. 16.75 & 16.62 and as per CPWD specifications 2019 with upto date correction slips.	
(J)	IPS flooring + Self levelling 3.45mm homogenous vinyl flooring	Badminton Court / Multipurpose Hall.	IPS flooring as per DSR'23 Item No. 11.4 and as per CPWD specifications 2019 with upto date correction slips. Homogenous vinyl flooring shall be as per particular specifications.	
(K)	25mm thick wooden flooring including melamine polishing.	Stage of multipurpose hall and other area as per Drawings.	Wooden flooring as per DSR'23 Item No. 11.33.1 & 13.116 and as per CPWD specifications 2019 with upto date correction slips.	
(L)	EPDM Flooring	GYM	EPDM Flooring as per particular specifications.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>8.2 DADO/SKIRTING</b>				
(A)	100mm high skirting in vitrified tiles matching with floor	Living/dinning area/foyer, drawing Room, bedrooms, balconies/ utility area, care takers office, bank engineers room, BMS room, changing rooms, Drivers room and other area as per drawings.	Skirting in vitrified tiles matching with floor specification as per DSR'23 Item No: 11.47 and as per CPWD specifications 2019 with upto date correction slips.	
(B)	100-150 mm high Kota stone Skirting	Service rooms, meter room, Control room, stores, pump room and other area as per Drawings.	Kota stone skirting specification as per DSR'23 Item No. 11.27 of DSR'23 and as per CPWD specifications 2019 with upto date correction slips.	
(C)	100 to 150 mm height granite skirting	All granite flooring areas and other area as per Drawings.	Skirting in granite matching with floor specification as per item no: 11.47 of DSR'23 and as per CPWD specifications 2019 with upto date correction slips.	

## 9. ROOFING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>9.1</b>	<b>Rain Water Pipes including all fittings and accessories.</b>	All buildings as per drawings.	<p>Rain water pipes and fittings shall be hubless centrifugally cast-iron epoxy coated inside &amp; outside as per IS:15905 the vertical pipes shall be fixed with GI frame and u bolt and horizontal pipes, traps and fittings shall be ceiling suspended and supported on GI frame work and u bolt which shall be covered by providing metallic false ceiling wherever required. Rain water pipes and fittings shall be fixed as per DSR'23 Item No. 17.77.</p>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>9.2</b>	<b>FALSE CEILING</b>			
(A)	Decorative gypsum false ceiling	Entrance lobby, Lift lobby and common circulation area at each floor	<p>Decorative gypsum false ceiling as per approved design and pattern and as per DSR'23 Item No. 12.45.3 and as per CPWD specifications 2019 with upto date correction slips.</p>	
(B)	Aluminium tile false ceiling	Multipurpose hall, Toilets/bathrooms,	<p>Framing will be as per DSR'23 Item No. 12.52.1 and tiling will be with 0.7mm thick aluminium sheet of regular edge in required colour and finish plain or perforated with acoustical fleece. The tile shall be electrostatically polyester powder coated using ROHS compliant powder having coating thickness ranging from</p>	

			60-80 microns and as per CPWD specifications 2019 with upto date correction slips.	
(C)	Pop moulding and cornice	(In staff flats false ceiling not needed only pop moulding and cornice may be provided.)	Pop moulding and cornice as per specification and nit drawings.	
(D)	Open cell ceiling	Area as per drawing.	As per particular specification.	

## 10. FINISHING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>10.1 WALL FINISH ABOVE SKIRTING OR DADO</b>				
(A)	<p>Internal finishing with 6 mm thick white cement based polymer modified self curing mortar over RCC surface/ 12mm thick white cement based polymer modified self curing mortar over masonry + putty + primer + premium acrylic emulsion paint</p> <p><b>Note:</b> <b>Premium acrylic emulsion paints (interior) (for staff flat &amp; ancillary area) :</b> Asian Paints : Apcolite emulsion, Nerolac : Beauty series, Dulux : Superclean 3in1, Birla: Opus prime 150</p>	All internal areas walls/ ceilings	Internal finishing as per DSR'23 Item No. 13.86, 13.4.1, 13.80, 13.43.1, 13.83.2 and as per CPWD specifications 2019 with upto date correction slips.	Necessary drip course shall be provided in chhajjas, balcony, projecting roof, beams etc. All paints shall be used with low VOC content less than 50 grams per liter.
(B)	<p>External finishing with 6 mm plaster modified plaster+ putty 1 mm thick + exterior grade high quality texture paint with stone dust and trowel texture with primer.</p> <p>15 mm cement plaster with 1:6 mortar + putty + exterior grade high quality texture paint with stone dust and trowel texture with primer where aac / brick wall are being used as external wall instead of 6 mm given above and remaining will be same.</p>	All external faces of building/ security rooms/ ESS, all balconies, service shafts, compound wall	External finishing as per DSR'23 item no. 22.24a and as per CPWD specifications 2019 with upto date correction slips.	Necessary gola at corner of chajja junction to be provided as per dsr item no 12.21
(C)	Painting of Rain Water, Soil / Waste and Water Supply Pipes		Painting with Synthetic Enamel paint of required colour to give an even shade two or more coats over a coat of suitable steel primer as per DSR'23 Item No 13.56.	
(D)	Painting of underground Rain Water, Soil / waste and Water Supply pipes		Two or more coats black anticorrosive bitumastic paint over and including a priming of ready mixed zinc chromate yellow primer as per DSR '23 Item No. 13.55	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
11.	As per sanitary fittings schedule and drawings		As per sanitary fittings schedule & CPWD DSR'23 and as per CPWD Specifications 2019 with upto date correction slips.	
(A)	EWC Toilets		Rimless, blind installation wall hung WC with UF soft close slim seat cover, hinges, fixing accessories and accessories set size: 375x520x400 mm white vitreous china European type wall hung water closet of size 375x520x400 mm rimless shape including concealed cistern with 39mm drainage l-bend pipe with gasket & installation kit (suitable for EWC) dual flush fitting including soft close seat cover, and cistern fittings, nuts, bolts and gasket. The design of EWC shall be such that the rack bolts /studs and trap are not visible i/c hand shower (health faucet) with 8mm dia. 1 meter long flexible tube & wall hook with N.R.V. (back flow preventer) with CP brass 2-way bib cock with wall flange.	
(B)	Wash Basins		Vitreous china Ware Wash basin with C.I. brackets, 15 mm dia CP brass single hole basin mixer of approved quality and make, including painting of fittings and brackets, cutting and making good the walls and CP brass bottle trap (with internal partition) 32 mm size with 300mm & 190mm long wall connection pipes & wall flange and CP brass waste coupling complete with CP brass angular stop cock with triangular handle and wall flange + PVC connecting pipe with CP brass nuts	
(C)	Concealed Diverter (mixer)		Concealed body for single lever diverter 40mm cartridge with button assembly (button on top) but without exposed parts + single lever exposed parts kit of diverter consisting of operating lever, cartridge sleeve, wall flange (with seals) & button assembly sleeve & button + shower arm casted 160mm long light body round shape for wall mounted showers with flange + overhead shower 120mm dia round shape single flow (face plate stainless steel & abs body in chrome finish) with Rubit cleaning system + bathtub spout with wall flange stainless steel	
(D)	Connecting Hose Pipe		450mm long braided hoses for geyser of approved model or equivalent	
(E)	Paper Holder		Toilet roll holder with stainless steel flap of approved model or equivalent	
(F)	Soap Dispenser		Soap dispenser with metallic bottle of approved model or equivalent	
(G)	Soap Holder		Soap dish holder of approved model or equivalent	
(H)	Tumbler Holder		Tumbler holder of approved model or equivalent	
(I)	Overhead Towel Rack		Towel rack 600mm long without lower hangers, stainless steel of approved model or equivalent	
(J)	Towel Rod		Single towel rail 600mm, stainless steel of approved model or equivalent	
(K)	Towel Ring		Towel ring round with round flange of approved model or equivalent	
(L)	Coat Hook		Robe hook (2 Nos. on each door) of approved model or equivalent	
(M)	Grab Bar Vertical		Grab bar 692mm long, satin of approved model or equivalent	
(N)	Grab Bar Vertical		Grab bar vertical swing , satin of approved model or equivalent	

(O)	SS sink with draing board + sink cock	SS kitchen sink 1000x510 mm overall size with bowl size of 560x410x215 mm + sink cock with regular swinging spout (wall mounted model) with wall flange + CP brass angular stop cock with triangular handle and wall flange + PVC connecting pipe with CP brass nuts of approved model or equivalent
(P)	Glass Self	Jaguar: continental ACN 1171n or equivalent
(Q)	Mirror	6 mm thick 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with or without frame shall be provided on SS studs as per the approved drawing
(R)	All floor traps in toilet, Kitchen, balcony	Chilly cockroach trap square flat cut stainless steel AISI 304 (18/8) floor drain cover with jali grating glossy finish cct-sfc-153-gfdrain pipe 100 mm outer frame size 153x153 mm
(S)	C. P. Brass Fittings	Required pillar cocks, angle cocks, 2way bib cocks, health faucet, long body bib cocks, towel ring, hot & cold-water mixer, along with other miscellaneous fittings like bottle trap, waste couplings etc. Shall be of approved make and model and as per the direction of engineer – in – charge. (the above are indicative only. However, the contractor has to provide all fixtures and fittings for functional suitability). All fittings shall be single lever with quarter turn ceramic cartridges and complying to green norms. All CP brass fittings/ bathroom accessories shall be of single brand and of the same series. In case of accessories not available in same series, the decision of the engineer in charge shall be binding.
(T)	Plumbing for water purifier and geyser	The provision shall be made for plumbing for water purifier, and geyser
(U)	Testing	All water supply and sanitary pipe lines shall be tested as per CPWD specifications and direction of the engineer-in-charge
(V)	Exhaust fan	Provision shall be made for fixing exhaust fan in kitchen and toilet windows.

## 12. WATER SUPPLY

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>INTERNAL SANITARY AND WATER SUPPLY INSTALLATIONS:</b>				
12.1	Pipeline from tank distribution line to OHW Tank (exposed on wall) (G.I. pipe proposed in nit Part-B)	G.I. pipe complete with G.I. fittings and clamps, including cutting and making good the walls etc. including control valve, pressure release valve, NRV as per approved design and drawings. The pipes shall be fixed with G.I. frame and u bolt which will keep the G.I. pipes minimum 30mm away from the wall.		
12.2	Internal piping - Exposed on walls (loop line on terrace and down-take supply pipes)	CPVC pipes complete with CPVC fittings and clamps, including control valve, pressure release valve, NRV including cutting and making good the walls etc. As per approved design and drawings. The pipes shall be fixed with GI fame and U Bolt.		
12.3	Internal piping-concealed work	Chlorinated polyvinyl chloride (CPVC) pipes, having thermal stability for hot & cold-water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing including jointing of pipes & fittings with one step CPVC solvent cement including cutting chase and making good the walls etc. For concealed pipes and testing of joints as per direction of engineer in charge		
12.4	Soil & waste, rain water pipes and	Soil, waste, vent pipes and fittings shall be hubless centrifugally cast-iron epoxy coated inside & outside as per IS : 15905 the vertical pipes shall be		

	fittings	fixed with GI fame and u bolt and horizontal pipes, traps and fittings shall be ceiling suspended and supported on gi frame work and u bolt which shall be covered by providing modular calcium silicate false ceiling tiles.
		<ul style="list-style-type: none"> <li>❖ Plumbing shall have provision for Geysers, Water Purifier, Washing Machines, Dish Washers, Cage Washers or any other equipment as per functional requirement.</li> <li>❖ Plumbing system shall be designed and provided as per the functional requirements of the buildings.</li> <li>❖ All drainage in balconies shall have their inlets in plan. All drainage through balconies/as per drawings shall be connected to rain water harvesting.</li> <li>❖ Utility balcony drainage shall be suitably treated and shall be not connected to rain water harvesting system.</li> </ul>
<b>12.5</b>	Valves	<p>Following types of control and other valves shall be provided in distribution grid, supply mains etc. As per local bye laws, NBC 2016, CPWD specifications 2019 with upto date correction slips and sound engineering practice at easily accessible locations for operation and maintenance</p> <ol style="list-style-type: none"> <li>i. Bronze/ forged brass ball valve (screwed) confirming to is standards complete</li> <li>ii. Butterfly valves (80mm and above) shall be of centric disc construction with single piece body of cast iron with disc of CF 8 stainless steel with nitrile seat, stem shall be stainless steel and shall conform to PN 10/16 rating and shall be provided with suitable matching flanges</li> <li>iii. Non-return valve (80mm and above) shall be cast iron dual plate non-return valve of PN 10/16 rating with ductile iron disc and SS 304 spring&amp; hinge pin</li> <li>iv. Ball valves (65 mm and above) shall be lever operated, screwed type of gun metal ball valve of PN 10/16 rating as per is:318 with SS ball and SS stem with mild steel lever.</li> <li>v. Non-return valve (65mm and below) shall be gun metal non-return valve of pn 10/16 rating (class 2) as per is:778 with screwed ends. Special type of control valves like, pressure reducing valves (prv) and solenoid valves as per requirement</li> </ol>
<b>12.6</b>	Chambers for: - A) Valves B) Fire hydrants	Chambers of required size and shape shall be constructed in clay bricks in cement mortar with CI surface box of required shape and size i/c RCC top slab i/c necessary excavation, foundation concrete and 12 mm thick inside plastering finished with a floating coat of neat cement complete as per standard designs per approved design and drawings
<b>12.7</b>	Thrust blocks	Thrust block shall be of cement concrete i/c necessary excavation, centering and shuttering etc. Shall be provided at locations specified as per direction of the engineer - in - charge.
<b>12.8</b>	Puddle flanges	Galvanised iron (120 gsm minimum) puddle flanges of 60 cm length with flange on one / both ends and welded to mild steel plate (6mm thick) in the centre etc. Complete as directed by engineer-incharge.

12.9	Overhead water tanks, UG sump, STP tanks and other tanks	<ul style="list-style-type: none"> <li>i. RCC tanks shall be RMC of specified grade of required capacity and as per approved design including required fittings like ball valve (brass) high/ low pressure with plastic floats, inlet, outlet, scour, over flow pipe, vent pipe inside SS ladder, mosquito proof covers, outside MS ladder etc.</li> <li>ii. Separate overhead RCC shall be constructed for each building with separate horizontal/ vertical compartments for domestic and fire requirements.</li> <li>iii. Separate underground RCC tank for storage of treated water received from STP for use in flushing / horticulture be provided.</li> <li>iv. Inside of overhead water tank, UG sump shall be provided white glazed ceramic tiles over 12 mm thick bed of cement mortar 1:3 of size not less than 200mm x 300mm on floor and full height of walls.</li> <li>v. MS ladder for terraces, lift room shall be galvanised MS with the size of MS bar shall not be less than 16 mm and thickness of MS flat shall not be less than 10 mm or is a 50506.</li> </ul>
12.10	Disinfection	All water supply lines and water tanks shall be disinfected. Disinfection to be done using bleaching powder @ 0.5gm/litre of water and cleaned with fresh water operation to be repeated minimum 3 times as per CPWD Specifications with upto date correction slips or method approved by the Engineer-in-Charge
12.11	Manholes	Manholes of required size and depth as per CPWD Specifications with masonry wall in cement mortar with foundation concrete m10 with ready mixed cement plaster with floating coat of neat cement inside and outside cement plaster with FRP / DI covers as per approved drawings. The manholes on the main sewer line shall be placed at not more than 30 meters length.
12.12	Testing and commissioning	All water supply and sanitary pipe line shall be tested as per CPWD Specification with upto date correction slips and direction of Engineer-in-Charge
12.13	Sewer connection	The sewer line shall be connected to the sewage treatment plant as well as municipal sewer line to keep the line functioning in case of non-operation of STP

### 13. STORM WATER: SW DRAINAGE SYSTEM SHALL BE COMBINATION OF PIPES AND OPEN DRAINS AS PER APPROVED DRAWINGS

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>INTERNAL SANITARY AND WATER SUPPLY INSTALLATIONS:</b>				
13.1	STORM & DRAIN PIPE	NP 3 pipes of required diameter under the ground and below the CC Pavement laid wherever required as per CPWD specifications 2019 with upto date correction slips and direction of the Engineer-in-Charge. Diameter of pipe should be as per approved drawings.		
13.2	S.W. DRAIN	<ul style="list-style-type: none"> <li>I. Base &amp; walls: the base &amp; walls of drain shall be of RCC in M-30 grade as per approved design &amp; drawings.</li> <li>II. Plastering: 12mm ready mixed cement plaster in cm 1:3 (1 cement: 3 coarse sand) with neat finish in side and top of the drain and 15cm out side</li> </ul>		

<b>13.3</b>	<b>ROAD GULLY CHAMBERS</b>	The masonry road gully chamber of required size and depth with masonry wall in cement mortar including precast RCC/ FRP horizontal/ vertical grating with frame complete as per standard design, as per CPWD Specifications 2019 with upto date correction slips and approved drawings.
<b>13.4</b>	<b>COVERS</b>	Pre cast perforated FRP cover with frame shall cover all the drains as per approved design
<b>13.5</b>	<b>CONNECTIONS</b>	The Strom water drain, pipes shall be connected to rain water harvesting tanks and connection to Municipal drains for surplus water as per attached drawings.
Inspection Chambers / Manholes / Gullies Chambers/ Valves and other accessories of approved specifications and make shall be provided considering all the site conditions and reduced level as per design parameters. As far as possible green and recyclable materials shall be preferred, as per approved drawings.		

#### 14. ALUMINIUM WORK

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
<b>14.1</b>	Double glazed units (DGUS) comprising of hermetically-sealed 6-12-6 mm insulated glass	All glazed windows & doors	High performance coloured tinted toughened glass 6 mm thick substrate with reflective soft coating on outer face, + 12mm Airgap + 6mm heat strengthened clear glass of approved make colour-neutral/ clear, SHGC value: 0.34 (max), vlt-50% to 55%, u-value less than -3 and as per particular specifications.	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
<b>14.2</b>	SS 304 grade Wire Mesh	All windows as per drawings	SS wire mesh as per DSR'23 Item No. 9.135 and as per CPWD specifications 2019 with upto date correction slips.	

<b>SL. NO.</b>	<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>

14.3	Ventilation louvers at opening of shafts at ground floor	Fabricating, supplying and fixing in position at all levels, aluminium extruded tubular and other aluminium Sections for aluminium louver, fins, box sections, trellis, capping, strips and other locations as per the architectural drawings and approved shop drawings weight not less than 20kg / sqm , the aluminium quality as per grade 6063 t5 or t6 as per bs 1474, including pvdf spray / coil coating (35 microns) having minimum content of 70% of kynar 500 of required metallic colour and shade as approved by the Engineer-in-Charge. The aluminium sections will be fixed using stainless steel screws, nuts, bolts, washers, cleats, etc. On main frame work of aluminium sections as per the designs and shop drawings.
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### 15. WATER PROOFING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.1	<b>Fully bonded hdpe sheet waterproofing</b>  Membrane(the fully bonded hdpe sheet waterproofing membrane shall have following typical properties: a) Peel adhesion to concrete > 800 n/m (as per ASTM d903: 1998). b) Elongation (HDPE film)> 400% (ASTM d 412 modified). c) Tensile strength>25mpa. (ASTM d 412 modified). d) Thickness: 1.5mm composite thickness, HDPE thickness not less than 0.9mm (ASTM d 3767). e) Puncture resistance - 1000 n(ASTM e154). f) Resistance to hydrostatic head >70 m (ASTM d 5385 modified). g) Lap joint strength at overlaps > 15000 n/m (ASTM d 6392:2012) ( side and end laps).	Raft bottom	As per particular specification	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.2	Crystalline Admixture:	RCC structures like retaining walls, Swimming pool, UGT, STP, & OHT.	As per particular specification and as per CPWD DSR'23 Item No. 22.22	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.3	Wet areas Water Proofing	Toilets, Lift Pits, Balcony Area)	Providing & applying	2

			components, solvent free, liquid applied elastomeric seamless hybrid polyurea membrane coating @ 1.6 kg/sqm, using high pressure two components spray/brush equipment, to form a minimum system thickness of 1.5 mm in two or more alternative coats.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.4	Water proofing	Terrace / Refuge areas :	Applying two component high solids content cold applied pure polyurethane liquid elastomeric seamless waterproofing membrane, <b>insulation layer:</b> spray applied an average minimum 75mm thick GRIHA enlisted CFC & HCFC polyurethane foam, on top of polyurethane foam, applying single component, elastomeric 100% pure polyurethane coating free from bitumen & tar, the coating shall be applied with a total consumption of minimum 1.5 kg/sqm in two coats and shall be applied on the entire horizontal surface extending up to 300mm above the FFL on the vertical surface as per the methodology. It shall be followed by laying 150 GSM geotextile (non-woven polyester) over the entire membrane on horizontal areas maintaining proper overlaps. Providing 100 mm average thick M-25 grade pp fiber reinforced concrete screed mixed with crystalline admixture. Top surface shall be provided with heat resistant tiles of approved make and specifications as per directions of the Engineer-in-Charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICA TIONS	REMARKS
	Providing and spray applying two component hybrid polyurea polyurethane waterproofing system at all levels for podium garden waterproofing by the manufacturer or his approved applicator	PODIUMS		As per particular specification & CPWD DSR'23, Correction Slip - 02 Item No. 22.27.1 & 22.28.1

<p>consisting following operations</p> <p><b>A)</b> Brushing and vacuum cleaning the surface to make free from any loose material, oil, grease, dust etc.</p> <p><b>B)</b> Repairing the surface if required, as per recommendation of manufacturer or his approved applicator to make it water tight for which nothing extra shall be paid.</p> <p><b>C)</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 in dry condition, having consumption varies from 0.20 to 0 40 kg/sqm depending on the porosity and undulations in the surface.</p> <p><b>D)</b> Providing and sprinkling washed coarse sand, as recommended by manufacturer, over freshly laid primed tacky surface @ 0.25 to 0.40 kg/sqm as directed by the engineer-in-charge.</p> <p><b>E)</b> Over primed sandy surface, providing and spray applying two component hybrid polyuria polyurethane coating system, which shall be solvent free, mixed in proportion by volume / 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 / ASTM and tear strength minimum 30n/mm as per din 53515 or</p>		
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<p>minimum 45 n/mm as per astiv d624 and 20 second maximum gel time / reaction lime with minimum 1.5 mm dry film thickness of two coals. 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 d 4595.</p> <p><b>G)</b> Providing and laying screed of cement concrete 1:1.5:3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20mm nominal size) of minimum thickness 50 mm al khurra with a slope of 1:100 towards khurra to ridge of roof. H) providing and laying dimple drain boards with inbuilt geo textile drainage membrane on top having dimple height of 20-25 mm, average number of dimples 400 per sqm, compressive strength not less than 180 kn/m<sup>2</sup> and geotextile drainage member having mass of 120 GSM. Laid with minimum overlap of 50 mm note if HDPE drain cells / drainmats along with a layer of geotextile having weight of 120 GSM and tensile strength not less than 2.4 kn/m as per ASTM d 4595 is provided in place of dimple drain board with inbuilt geotextile, it shall not be paid as</p>			
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	extra. (Sr. No. F, G & H not applicable for vertical surface)			
SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.6	Water Proofing for Water Retaining structures –	UGT / OHT internal Water Tanks	<p>First step shall be treatment to concrete defects like construction joints, cold joints, honeycombs &amp; porous concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with iwp non shrink additive of approved make and sealing all the construction joints with styrene butadiene latex.</p> <p><b>wall and slab joint / construction joint treatment</b></p> <p>After the entire surface preparation has been completed on the mother slab, all the wall and slab joints / construction joints to be treated with joint tapes having minimum tensile elongation more than 300% of size 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of waterproofing slurry on the wall – slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire wall – slab joints / construction joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner. As per original manufacturer's specifications all over the entire horizontal and upto full height vertical surface.</p> <p><b>waterproof coating</b></p> <p>After the entire surface preparation has been done, pre wetting of the entire concrete</p>	

		<p>surface and providing and application of the 1st coat of approved make flexible cementitious waterproofing slurry with quick curing and waterproofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry. The total consumption of the product should be as per manufacturer specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1mpa, adhesion strength of 2mpa, crack bridging capacity of 2mm as per En 1062-7 complete as per manufacturer's specifications and approved by engineer-in-charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.</p> <p>Providing and laying of protection plaster 20mm thickness with 1:4 cement and sand mortor as per approved specification admixed with integral waterproofing compound as per original manufacturer's specifications. To prevent the waterproof coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against leakage.</p> <p>Laying slope making and protection with 40mm avg. Thick of m25 grade fibrated screed and applying waterproof plastering with cm 1:4 of thickness 20mm admixed with integral waterproofing compound as per original manufacturer's specifications.</p>
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICA TIONS	REMARKS
15.7	Water Proofing for Water Retaining structures	STP Tanks	<p>First step shall be treatment to concrete defects like construction joints, cold joints, honeycombs &amp; porous concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with IWP non shrink additive of approved make and sealing all the construction joints with master latex mortar.</p> <p><b>Wall and slab joint / construction joint treatment</b></p> <p>After the entire surface preparation has been completed on the mother slab, all the wall and slab joints / construction joints to be treated with joint tapes having minimum tensile elongation more than 300% of sizes 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of waterproofing slurry on the wall – slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire wall – slab joints / construction joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner as per original manufacturer's specifications all over the entire horizontal and upto full height vertical surface.</p> <p><b>Waterproof Coating:</b></p> <p>After the entire surface preparation has been done, pre wetting of the entire concrete surface and providing and application of the 1st coat of flexible cementitious waterproofing slurry with quick</p>	

		<p>curing and water proofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry. The total consumption of the product should be as per manufacturer specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1mpa, adhesion strength of 2mpa, crack bridging capacity of 2mm as per En 1062-7 as per manufacturer's specifications and direction of engineer-in-charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.</p> <p>Providing and laying of protection plaster 20mm thickness to prevent the waterproof coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against leakage.</p> <p>Laying slope making and protection with 40mm avg. Thick of m-40 grade fibrated screed and applying waterproof plastering with cm 1:4 of thickness 20mm admixed with integral waterproofing compound as per original manufacturer's specifications.</p> <p>Controlling specifications shall be of original manufacturer shop drawings (private label supplier shop drawings not acceptable) and original manufacturer method statement (Pvt. Label supplier method statement not acceptable) after due approval of engineer-in-charge.</p> <p><b>Moisture sensitive bituminous epoxy coating:</b></p>
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			Over the plaster providing & applying 2 coats of moisture sensitive bituminous epoxy coating at a consumption of @500/gms/sqm with bonding / adhesion of 1.2 to 1.4 n/mm <sup>2</sup> as per ASTM d 4541, water resistance, immersion – 7 days passes as per ASTM d 870-09, chemical resistance, immersion in dilute acid alkali & salt solutions – 7 days -passes as per ASTM 868 as per manufacturer's instruction.
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#### 16. ROADS, OPEN PARKING & PATHS (AS PER THE DRAWINGS)

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICA TIONS	REMARKS
16.1	Inter-locking pavers for drive ways, surrounding of buildings and balance area	80 mm thick heavy-duty pavers ISI mark as per shape & pattern in M-30 grade colour (red, green, grey, yellow etc.) Made by table vibratory method using pumould laid in required colour and pattern over and including 50mm thick compacted bed of sand and 100 mm bed concrete of m10 etc. Complete as per approved drawing and as per direction of Engineer-in-Charge		
16.2	KERB STONE	Factory made high grade concrete precast block M-25 grade of size 100 mm x 450 mm of approved design jointed with cement mortar including making drainage opening wherever required and painting in pattern complete etc. As per direction of Engineer-in-Charge.		
16.3	Roads	Road as per CPWD specification 2019 with upto date correction slips. CC pavement minimum 150 mm thick of mix minimum m-30 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.		
16.4	Road painting works	i. Providing and applying minimum 75mm wide and 2.5mm thick road marking strips (retro-reflective) of specified shade/ colour using hot thermoplastic material by fully/ semi-automatic thermoplastic paint applicator machine including cost of material, labor, T&P, cleaning the road surface of all dirt, seals, oil, grease and foreign material etc. Complete as per drawing and as per direction of engineer-in-charge ii. Glow studs of size 100x20 mm made of heavy-duty body shall be molded asa (acrylic styrene acrylonitrile) or hip (high impact polystyrene) or abs having electronically welded micro- prismatic lens with abrasion resistant coating iii. Marking parking places, road surface marking with		

		<p>adequate no. Of coats to give uniform finish with ready mixed road marking paint conforming to is: 164, including cleaning the surface of all dirt, scales, oil, grease and foreign material etc. Complete</p> <p>iv. All road signages as per particular specification</p>
16.5	Compound wall / boundary wall	Boundary wall along with retaining wall should be constructed as per attached drawing. Cost of retaining wall is included in the cost of boundary wall. Nothing extra shall be paid in this regard.
16.6	Open air platform	It is shown in the drawing but not in the scope of work. However, provisions should be made during construction so that the amphitheater can be constructed in the future. Nothing extra shall be paid in this regard.

## 17. NEW TECHNOLOGY

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICA TIONS	REMARKS
17.1	Architectural Aluminium louvres	As per drawing attached.	As per proposed location mentioned in drawing.	
17.2	2 mm thick aluminium CNC cut jali with aluminium frame	Toilet shafts	As per proposed location mentioned in drawing.	

## 18. MISELLANEous

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICA TIONS	REMARKS
18.1	Fan clamps /fan boxes in each room except toilets	M.S. Fan clamp type I or II of 16 mm dia MS bar bent to shape with hooked ends in RCC terrace slabs, fan boxes in other slabs. During laying of slab including painting the exposed portion of loop, all as per standard design complete.		
18.2	Speed breakers on ramps	Compound Rubberized UV stabilized, modular 410 mm width 75 mm thickness 35 tones compressive strength of required length with end trim fixed with fasteners as per manufacturers specification.		
18.3	Cable trenches	Cable trenches shall be with minimum 300 mm thick masonry work as per drawings using polymer modified adhesive mortar and rcc bands of minimum 100 mm thickness including centering and shuttering and reinforcements including internal 12 mm thick ready- mix plaster cement mortar 1:4 MS cover shall be 8 mm chequered plates fixed to MS frame of 40x40x6mm angle iron including painting with two or more coats synthetic enamel paint of required Colour over approved steel primer as per the approved drawing.		
18.4	Accessibility of buildings	Provision should comply as per the attached list of accessibility norms of buildings.		
18.5	Shafts	1. All shafts (Civil and E&M) shall be appropriately closed horizontally and covered with appropriate door system vertically. This arrangement may be augmented as per fire		

	<p>requirements.</p> <p>2. Kitchen should be so designed so as to ensure that various gadgets ducts are conveyed to service ducts for example ducting for electric chimney.</p> <p>3. Accessible roofs shall have parapets.</p>
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**SCHEDULE OF FINISHES – CLUB**

<b>DESCRIPTION</b>	<b>AREAS/ LOCATIONS</b>	<b>BRIEF SPECIFICATIONS</b>	<b>REMARKS</b>
<b>GENERAL SPECIFICATIONS/ GUIDELINES</b>		<p>1. All the items of Delhi Schedule of Rates are in the scope of work against the tender, as may be applicable, according to the discharged by the engineer-in-charge by way of Good For Construction drawings.</p> <p>2. CPWD specifications Vol-I and Vol-II 2019 as amended from time to time shall be applicable for all the items to be executed as per good for construction drawings.</p> <p>3. Provisions contained in harmonized guidelines &amp; standards for universal Accessibility in India 2021 (available on CPWD website) of ministry of housing and urban affairs, Government of India shall be complied.</p> <p>4. C&amp;D waste products and recycled aggregates to the extent provided in is codes shall be used as per extant provisions of green building measures.</p> <p>5. Type of cement to be used in the work shall be as per provisions of is: 456 with regard to exposure conditions including sulphate attack.</p> <p>6. Only RO water shall be used in the work.</p> <p>7. DSR items are only indicative, items are to be executed for all heights and all levels.</p> <p>8. Provision contain in IGBC Green Building norms for platinium rating.</p>	
<b>Earth Work Foundation and plinth.</b>  For foundation of main building, substation, security rooms ,rwht, owc, retaining wall, services, road works & other allied RCC works as per structural design and drawings.		<p>1. Scope of work includes all items of DSR'23 as contemplated in the sub head Earthwork of DSR'23 (including bailing and pumping out water, strutting etc.) As may be applicable to the work as per design and drawings and as confirmed by the engineer-in-charge and are to be executed as per CPWD specifications with upto date correction slips.</p> <p>2. Surplus excavated earth shall bed is posed of by the contractor after remittance of due royalty to concerned authority, as applicable by the contractor.</p> <p>3. Filling available earth or earth brought from outside shall be done as per requirement to level the ground as per approved drawings.</p> <p>4. Post construction anti-termite treatment as per the necessity of ground shall be carried out as per relevant Indian Standard Codes / CPWD Specifications with upto date correction slips.</p> <p>5. Structural/non- structural grade slab as per the necessity at site/design requirement and as per the functional requirement of supported flooring shall be designed &amp; provided accordingly.</p> <p>6. Damp proof course shall be provided where ever required as per</p>	

	<p>CPWD specification.</p> <p>7. Drainage and plinth protection along the perimeter of the buildings shall be provided as per cpwd specifications or as per specific functional requirement</p> <p>8. Water proofing as particular per specifications.</p>
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
1.1	Anti Termite Treatment	1. Post construction Anti-termite treatment as per the necessity of ground shall be carried out as per relevant Indian Standard Codes / CPWD Specifications DSR'23 Item Nos. 2.34, 2.35.2 & 2.35.3		
1.2	Filling available earth	Filling available earth or earth brought from outside shall be done as per requirement to level the ground as per approved drawings. Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. In layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, surplus excavated / unsuitable earth shall be taken out of the campus or shall be used in campus itself as per direction of the engineer-in-charge. Additional good earth fit for filling, if required, for the work shall be procured from outside of the campus at his own cost.		
1.3	Plinth filling	Plinth filling shall be done with sand of grading Zone IV as per CPWD specifications. Plinth filling shall be with sand, 150 mm thick layer under floors including, watering, ramming Consolidating and dressing complete.		
1.4	Grade slab at plinth level	Structural / non- structural grade slab as per the necessity at site / design requirement and as per the functional requirement of supported flooring shall be provided accordingly. RCC slab of minimum grade of m30 with 150 mm thick with 8 mm dia. 200mm c/c both ways including Centering, shuttering, finishing, curing, etc.		
1.5	Damp proof course/ band	As per site requirement. Damp proof course shall be provided wherever required as per DSR'23 Item No. 4.11 and as per CPWD Specifications 2019 with upto date correction slips.		
1.6	P.C.C as per structural drawing.	(PCC as mention in structural drawing below-raft)		
1.7	Pile	500 mm dia. Pile with m 30 grade concrete with reinforcement as per the particular specifications & as per GFC structural drawings and as per CPWD DSR'23 Item No. 20.2A. & 5.22.6 including vertical, lateral load and integrity test on piles as mention in I.S. 2911 (Part IV) & CPWD specifications 2019 with upto date correction slips.		

## 2. CEMENT CONCRETE WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
2.1	Anti Termite Treatment	All PCC works in levelling course below foundation, plinth, pathways, drains, trenches, pipes, paver blocks, kerb stones, etc. as per drawings	PCC shall be as per DSR'23 Item No. 4.20.1.2 and as per CPWD specifications 2019 with upto date correction slips.	Any undulations of excavated surface shall be levelled with plum concrete.

## 3. RCC WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
3.1	RCC WORK	In foundation and super structure of main building, & other allied RCC works as per structural design and drawings.	All RCC works shall be as per DSR'23 Item No. 5.33 and as per CPWD specifications 2019 with upto date correction slips. The RCC work shall be with design mixed self compacting concrete/ normal reinforced cement concrete of specified grade as directed by the Engineer-in-Charge.	
3.2	<b>External Walls &amp; Internal walls (dry &amp; wet area)</b>  (All walls are with RCC monolithic construction technology)	In case of structural walls, specifications of RCC walls shall be as per structural drawings. In case of non-structural walls, specifications of RCC walls shall be as per structural drawings	External walls & internal walls(dry & wet area) (All walls are with RCC monolithic construction technology)	
3.3	SHUTTERING	Main building from foundation to ground floor & other allied structures.	All shuttering of RCC members shall be as per DSR'23 Sub-head 5 and as per CPWD Specifications 2019 with upto date correction slips.	

Correction... Nil

Deletion... Nil

Insertion... Nil

Overwriting... Nil

AE (C)

AE(E)

EE(C)

3.4	Aluminium formwork/shuttering	Typical floor as per drawings attached	All customized aluminium form work for monolithic construction of RCC members shall be as per DSR'23 item no. 26.48 and as per CPWD specifications 2019 with upto date correction slips.	
3.5	Steel reinforcement	As per structural drawings	All steel reinforcement work shall be <b>CRS grade FE500D/550D</b> for RCC work including supplying, straightening and cutting, bending, placing in position and binding and as per CPWD specifications 2019 with upto date correction slips.	

#### 4. MASONRY WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
4.1	Masonry work	Club house	External wall RCC with thickness as per latest codes. All external RCC surfaces to have levelling course and putty and paint. AAC blocks to be provided for insulation as per drawings. Internal walls in RCC (thickness as per latest codes and as per the drawings) brick masonry wall shall be as per DSR'23 item No. 6.1.1 and 6.4.1 and 6.5 and CPWD specifications 2019 with up to date correction slips as per the drawings.	Fiber mesh shall be provided at junction of concrete and block masonry.

#### 5. CLADDING WORK :

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
5.1	18mm thick granite work	Granite work in, doors sills, all around windows/ ventilators, facias, ledge wall tops, parapet wall top, similar locations,	All granite work shall be as per DSR'23 Item No. 8.2.2 and CPWD Specifications 2019 with up to date correction slips.	Exposed edges of granite at all locations shall be finished with moulding / edge chamfering with high glass finish.

		main door threshold, granite top on balcony bund wall. Granite for opening, granite coping for planter beds and other area as per drawing.		
5.2	30 mm thick polished granite dado upto bottom of false ceiling height as per drawings	Entrance lobby, lift lobbies at all floor level and other area as per drawing.	30 mm thick polished granite dado/cladding as per specification of Mentioned. Dry cladding with 30 mm thick granite of approved size, shade, colour and texture in approved pattern to be secured to backing by means of SS cramps/ pins etc. As approved and directed by Engineer-in-Charge.	Exposed edges of granite at all locations shall b be finished with moulding / edge chamfering with high glass finish.
5.3	30 mm thick polished granite Dado upto 1.5 metre height from FFL in combination of clours and patterns.	Common circulation space of Building, central core (except ground floor) and other area as per drawing.	30 mm thick polished granite dado as per specification mentioned. Dry cladding with clamp cladding with 30 mm thick granite of approved size, shade, color and texture in approved pattern to be secured to backing by means of SS cramps/ pins etc. As approved and directed by engineer in charge.	Exposed edges of granite at all locations shall b be finished with moulding / edge chamfering with high glass finish. Dado edge shall be properly secured in the wall with suitable locking arrangement.
5.4	18 mm thick honed/flamed finish granite stone with 3 set of anti skid Grooves	Staircase	Flooring- granite in staircases, Risers, treads, landings, mid landings. Treads shall have non- slippery grooves or strips near edges. Dado- natural stone finish upto 1.5 m height (i) ss-316 grade railing with knockdown system as per drawing	Exposed edges of granite at all locations shall b be finished with moulding / edge chamfering with high glass finish. Dado edge shall be properly secured in the wall with suitable locking arrangement.
5.5	300x600 ceramic	Toilets/ bath rooms	1st quality ceramic glazed	

	wall tiles dado upto false ceiling or up to beam bottom	as per Drawings.	wall tiles as per DSR'23 Item No. 8.31 and as per approved design & pattern and CPWD specifications 2019 with upto date correction slips.	
5.6	300 mm x 600 mm polished vitrified tiles 600 mm high above counter or 1400 mm high and acrylic emulsion paint on balance wall	Kitchen and other area as per drawing.	As per approved design & pattern and CPWD specifications 2019 with upto date correction slips.	
5.7	150 mm x 1200 mm full body anti-skid vitrified tiles with wooden look	Kitchen balcony, bed room balcony and other area as per drawing.	150 mm x 1200 mm full body anti-skid vitrified tiles with wooden look and as per approved design & pattern and CPWD Specifications 2019 with upto date correction slips.	
5.8	6mm thick mirrors up to beam Bottom / false ceiling	Gym	Wall lining with full height 6 mm thick mirrors fixed on suitable backing.	
5.9	Kitchen platforms and base	Factory-built modular kitchen as per specifications.  Jet black 18 mm thick gang saw cut, mirror polished, premoulded and prepolished, machine cut for kitchen platforms, facias (in single length) and similar locations of required size, approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement :4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing,		

		curing, moulding and polishing to edges to give high gloss finish etc. Complete at all levels.as per DSR'23 Item No 8.2.2		
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## 6. WOOD WORK AND PVC WORKS

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>6.1</b>	<b>DOORS</b>			
	2nd class melamine polished teak wood door frame with 40 mm thick flush door with decorative veneer on both sides with melamine polish and SS security door with wire mesh and SS 316 hardware.	Main entrance door	As per particular specifications.	Granite sill/ umra patti, jams of approved shade/ colour as per design pattern.
(A)	38 mm thick flush door with decorative veneer on both sides with melamine polish wherever required and SS grade 316 hardware.	Main entrance door of unit, Refuge area, entrance lobby, care taker's office, service room bank engineer dispensary (doctor's room) changing room, changing room, control room& all other doors opening into common/lobby area of main building,	As per particular specifications.	Granite sill/ umra patti of approved shade/ colour as per design pattern.
(B)	2hrs. Fire rated metal doors	All staircases, electric room, meter room, pump room, electric shaft, lv shafts, fire hydrant shaft, STP, other shafts doors.	As per particular specifications.	Granite sill/ umra patti of approved shade/ colour as per design pattern.
(C)	Frameless glass	Main entrance	Glazed door shutter	Granite sill/ umra patti

	door with 12mm thick Toughened clear glass with patch fittings, floor spring and all Hardware.	lobby, entrance lobby of security rooms.	as per specification of dsr item no. 21.18, and CPWD specifications 2019 with upto date correction slips.	of approved shade/ colour as per design pattern.
(D)	2nd class melamine polished teak wood door frame with 38 mm thick flush door with decorative veneer on both sides with melamine polish And ss grade 316 hardware with double layer granite frame all around door.	All doors other than, metallic fire rated doors, glass doors and toilet doors.	Flush doors& frames shall be as per DSR'23 item no. 9.1.1, 9, 21.1, 9.23 9.40.1.1 & 9.127.1, 13.116 and CPWD specifications 2019 with upto date correction slips.	The SS ball bearing hinges shall be provided to door shutter and granite sill/ umra patti of approved shade/ colour as per design pattern.
(E)	WPC doors 35 mm thick and door frame for the toilets SS 316 hardware with double layer granite frame as frame .	All toilets doors.	WPC door shutter shall be as per DSR 2023 item no. 26.87.1 and as per CPWD specifications 2019 with upto date correction slips.	-do-
(F)	Factory made 3-track high quality aluminium/UPVC C doors with low-e DGU glasses and SS wire mesh shutter)	As per drawings	Glazed aluminium UPVC door shall be as per drawings and CPWD specifications 2019. Glazing shall be as per particular specifications.	-do-

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
6.2	<b>Door fittings as per schedule for doors fittings and CPWD specification 2019 Vol. I, with upto date correction slips.</b>			
(A)	300 mm D' type handle <b>back to back</b>	All doors shutters except toilets and shaft shutters	Stainless steel 316 grade satin finish d' type handle of approved make 19 mm dia (minimum) & 300mm long, 1.2mm tube thickness (minimum) <b>back to back (inpair) with rose</b> , with adjustable fixing for wood and metal door with required brass	

			bush insert, necessary SS screws, bolts, nuts, washers etc.as per approved samples complete as per direction of Engineer-in- Charge.
(B)	150 mm D' type handle <b>back to back</b>	Toilets and shaft shutters	Stainless steel 316 grade satin finish d' type handle of approved make 19 mm dia (minimum) & 150 mm long, 1.2 mm tube thickness (minimum) <b>back to back (inpair) with rose</b> , with adjustable fixing for wood and metal door with required brass bush insert, necessary SS screws, bolts, nuts, washers etc. as per approved samples complete as per direction of Engineer-in-Charge.
(C)	Aldrop 300mm	Main door, bed room doors,	Stainless steel 316 grade satin finish aldrop of approved make, 300 mm long rod of 16mm (minimum) diameter, locking patti thickness 2mm (minimum) with required staples and additional one staple of minimum 2 mm thickness along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the engineer- in-charge.
(D)	Sliding latch/ tadi of approved make 250 mm long	Main door, bed room door, balcony door both sides, shafts door front, kitchen door front, toilet door.	Stainless steel 316 grade satin finish sliding latch/ tadi of approved make, 250 mm long rod of 16mm (minimum) diameter, locking patti thickness 2mm (minimum) with required staples of minimum 2 mm thickness along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer-in- Charge.
(E)	Baby latch with indicator	Toilet inside	Stainless steel 316 grade 100 mm long baby latch along with indicator of approved make along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer- in-Charge.
(F)	Tower bolt	All door shutters at top	Stainless steel 316 grade satin finish square tower bolt of approved make 300mm long, 10mm width along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer - in -Charge.
(G)	Tower bolt	All door shutters one horizontally at bottom	Stainless steel 316 grade satin finish square tower bolt of approved make 150mm long, 10mm width along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer - in -Charge.
(H)	Magnetic catcher door stopper	All doors except toilet and shafts	Door stopper as magnet catcher and ball catch with 100mm length with cover to conceal screws fixed to the door shutter and wall respectively of approved make along with necessary SS screws, bolts, nuts, washers etc. As per approved samples complete as per the direction of the Engineer-in-

			Charge
(I)	Hydraulic door closer	Ground floor lobby doors, recreational area doors, common use area doors	Aluminium extruded section body tubular type universal hydraulic door closer (having brand logo with IS: 3564, embossed on the body, door weight upto 36 kg to 80 kg), with double speed adjustment with necessary accessories and screws etc. Complete.
(J)	Stainless steel ball bearing butt hinges	All door shutters	SS ball bearing Hinges of size 100x89x3mm (heavy weight) with stainless steel screws etc. Complete
(K)	Magic eye/ peep holes	Main door shutter	Best make and quality as per the direction of the Engineer-in-Charge
(L)	Night lock	Main door	Brass night latch of approved make with three keys

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>6.3</b>	<b>WINDOWS</b>			
(A)	Factory made 3-track high quality aluminium/ UPVC windows with low-e DGU glasses and SS wire mesh shutter inside and double layer granite frame all around window i/c MS safety grill and all fittings and fixtures as mentioned in drawing	All window / ventilator openings as per drawings	Specifications of Frames and shutter shall be as per design drawings and as per CPWD specifications 2019 with upto date correction slips.	<p>1. Factory made 3-track high quality aluminium/ UPC windows with low-e DGU glasses and SS wire mesh shutter inside.</p> <p>2. In case of ventilators of toilets, etc. It shall be provided with glass louvers offrosted.</p> <p>3. Powder coated aluminium/UPVC to be used.</p> <p>4. M.S. security grills with epoxy paint for all window.</p> <p>5. Windows along with glazing shall be designed for wind loads applicable to the area/location as per relevant is codes.</p>
(B)	Filling the gap in between aluminium frame & adjacent RCC/ brick/ stone work	All window / ventilator openings as per drawings	Weather silicon sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-Charge complete. Upto 5mm depth and 5 mm width as per DSR item no 21.8	

## 7. STEEL WORK

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
7.1	<b>BALCONY / STAIRCASE RAILING</b>			
(A)	Balconies	All balconies, dry balcony, except refuge area	1350 mm high railing with SS handrail and toughened laminated glass and aluminum as per drawing	
(B)	Factory made stainless steel (grade 316) knock down (no welding) railing including all fittings, fixtures, hardwares, anchor fastener, etc. Required for complete the railing works.	Staircase, fire staircase, terrace tanks, podium and all staircases	SS (grade 316) railing as per particular specifications and as per drawings.	
7.2	Windows grill-windows should be fitted with MS safety grill as per approved drawings including painting with epoxy paint over approved steel primer.	All windows / ventilator	All openings should be fitted with decorative MS grill (minimum weight 12 kg per sqm) including painting with epoxy paint as per approved drawings. The size of MS bar shall not be less than 10mm and thickness of MS flat shall not be less than 5mm. MS grill as per DSR item no. 9.48.2 and 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	
7.3	Ladders/ railing with chequered plates incl. Primer and epoxy paint.	For OHT, STP, Pump Rooms etc.	All MS ladders /railing shall be provided as per DSR 2023 item no 10.25, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.	

7.4	Railing/ grill over compound wall / including painting with epoxy paint over approved steel primer.	Compound wall	Compound wall shall be fitted with decorative MS grill including painting with epoxy paint as per approved drawings. All MS railing/ grill shall be provided as per DSR 2023 item no. 10.25, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.
7.5	Entrance gates including painting with epoxy paint over approved steel primer.	Entrance gates	Entrance gates shall be fitted with MS box type tubes / decorative MS grill including painting with epoxy paint as per approved drawings. Gate shall be provided as per DSR 2023 item no. 10.25, 10.16.2, 13.52.1 and as per CPWD specifications 2019 with upto date correction slips.
7.6	Curtain rods	All windows and doors in all rooms except kitchen, toilets	Decorative curtain rods 25 mm dia. 1.6 mm thick with double track required accessories of SS grade 316 with SS brackets and SS screws

## 8. FLOORING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
8.1	Flooring leveling course to be provided on the top of RCC slab before laying flooring as per site requirement, if required. nothing extra on this account shall be payable.			
(A)	800 mm x 800 mm Full body homogenous vitrified tiles	TT room, creche and other area as per drawing	Glazed vitrified tiles as per Item no. : 11.41a.2.3 of dsr-2023 and as per CPWD specifications 2019 with upto date correction slips.	800 mm x 800 mm Full body homogenous vitrified tiles. 2. 100mm High skirting.
(B)	300 x 600 ceramic wall tiles dado upto 7-8 feet, above wall painting and grid false ceiling, may be provided as shown in drawing	Toilets/ bath rooms,	Antiskid/ matt finish vitrified tiles. Specification as per item no. : 11.41A3.1 of DSR-2023 and as per CPWD specifications 2019 with upto date correction slips.	-do-

(C)	150 mm x 1200 mm full body anti-skid vitrified tiles with wooden Look	Balconies/ utility area and other area as per drawing	Full body anti-skid vitrified tiles with wooden look as per Drawing and as per CPWD specifications 2019 with upto date correction slips	
(D)	25 mm thick rubbed and polished kota stone	Refuge area	Kota stone specification as per item no. : 11.26 of dsr-2023 and as per CPWD specifications 2019 with upto date correction slips.	
(E)	18mm thick flamed finish/ honed granite flooring	Fire staircase, entrance pathways leading to open area platform, open terrace of podiums and other area as per drawing	18 mm thick flamed/honed finish granite stone flooring of shades & samples as approved by engineer-in-charge, in required design and in patterns, as per dsr-2023 item no. 11.55.1 and as per CPWD specifications 2019 with upto date correction slips.	Treads and risers shall be provided in single piece of stone. Tread to be in flamed finish and riser to be provided in polished granite stone. Nosing design shall be as per drawings. Directory board and name painted letter box with letter slit, locking arrangement and name, flat no. In lift/staircase lobby at ground floor of each building
(F)	18mm thick polished granite flooring as per approved pattern	Common staircase, entrance lobby, lift lobbies, common circulation space of building, security Rooms. And other area as per drawing	18 mm thick polished granite stone flooring of approved shades & samples as approved By engineer-in-charge, in required design and in patterns, as per DSR'23 item no. 11.56.1 and CPWD specifications 2019 with upto date correction slips.	Treads and risers shall be provided in single piece of stone. Treads shall have non slippery grooves or strips near edges. Nosing design shall be as per drawings.
(G)	25mm thick kota stone flooring	Service rooms, meter room, control stores, pump room.	25 mm thick kota stone flooring as per DSR'23 item no. 11.26.1 and as per CPWD specifications 2019 with upto date correction slips.	25 mm thick kota stone flooring
(H)	Tremix - cement concrete + road	Podium/ ground floor	Tremix cement concrete pavement as per DSR'23 item no. 16.75, 16.62 & and as per CPWD	

	marking stripes	level, driveway + ramp	specifications 2019 with upto date correction slips.
(I)	IPS flooring + self levelling 3.45mm homogenous vinyl flooring	Badminton court/ multipurpose hall and other area as per drawing	IPS flooring as per DSR'23 item no. 11.4 and as per CPWD specifications 2019 with upto date correction slips. Homogenous vinyl flooring shall be as per particular specifications.
(J)	25mm thick wooden flooring including melamine polishing.	Stage of multipurpose hall and other area as per drawing	Wooden flooring as per DSR'23 item no. 11.33.1, 13.116 and as per CPWD specifications 2019 with upto date correction slips.
(K)	EPDM flooring	Gym	EPDM flooring as per particular specifications.
(L)	Porcelain vitrified swimming pool floor and wall tiles	Swimming pool	Porcelain vitrified tiles as per drawing and specification
(M)	Basketball Court		It is shown in the drawing but not in the scope of work. However, provisions should be made during construction so that the basketball court can be constructed in the future. Nothing extra shall be paid in this regard.

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>8.2 DADO/SKIRTING</b>				
(A)	7-8 ft. height granite dado	Entrance lobby, reception and other area as per drawing	Dado in granite matching with floor specification as per item no. 11.47 of DSR'23 and as per CPWD specifications 2019 with upto date correction slips.	
(B)	100-150 mm high kota stone skirting	Service rooms, meter room, control room, stores and other area as per drawing	Kota stone skirting specification as per item no. : 11.27 of DSR'23 and as per CPWD specifications 2019.	
(C)	100 to 150 mm height granite skirting	All granite flooring areas	Skirting in granite matching with floor specification as per item no. 11.47 of DSR'23 and as per CPWD specifications 2019 with upto date correction slips.	
(D)	100 mm EPDM skirting	Gym	Skirting matching to flooring	
(E)	Glass mosaic tiles	Swimming pool	Glass mosaic tiles as per drawing and specification	
(F)	Acoustic paneling	Badminton court/ multipurpose hall	Full height acoustic paneling	

## 9. ROOFING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
(A)	Khurras at terrace with CI Gratings	Terrace and podiums	Khurras shall be as per DSR item no; 12.22 & 12.44	The suitable size stainless steel 316 cover

				shall be made as per typical drawing given at Page No. 838 of tender. The cover shall be of stainless steel instead of MS as shown in the drawing.
(B)	Poly carbonate roofing over STP opening and mechanical ventilation shafts	Fixing of Co-extruded UV protected multi-cell polycarbonate panel system 16mm thick (min.) In approved shade and color. Panel width shall be 900mm to ensure best performance for wind uplift, vibration, oil canning and visual appearance. The panel shall be uniform in color with an integral multi-cell core. Panels shall be manufactured with vertical standing seam at both sides. The height of the standing seam shall be 10 – 15 mm to ensure best connector engagement. Snap-on connectors to interlock the panels shall have double teeth grip-lock locking mechanism ensure to maximum uplift capability. Panel shall be with additional end cap/aluminum u profile / glazing bar (mill finish) for ends as required. Panel shall be fixed over structural steel / MS purlin (to be designed by the agency) conforming to the detail technical specifications as per approved architectural drawings.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
9.2	<b>FALSE CEILING</b>			
(A)	Decorative gypsum false ceiling	Study room, rest room, living room, green room and other area as per drawing.	Decorative gypsum false ceiling as per approved design and pattern and as per DSR'23 item no. 12.45.3 and as per CPWD specifications 2019 with upto date correction slips.	
(B)	Aluminium tile false ceiling	Multipurpose hall. Toilets/ bathrooms	Framing will be as per DSR item 12.52.1 and tiling will be with 0.7mm thick aluminium sheet of tegular edge in required colour and finish plain or perforated with acoustical fleece. The tile shall be electrostatically	

			polyester powder coated using rohs compliant powder having coating thickness ranging from 60-80 microns and as per CPWD specifications 2019 with upto date correction slips.	
C	Pop moulding and cornice	Area as per drawing.	Pop moulding and cornice as per specification and NIT drawings	
D	Open cell ceiling	Area as per drawing.	As per particular specification.	

## 10.FINISHING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
10.1	WALL FINISH ABOVE SKIRTING OR DADO			

(A)	Internal finishing with 6 mm thick white cement based polymer modified self curing mortar over rcc surface/ 12mm thick white cement based polymer modified self curing mortar over masonry + putty + primer + premium acrylic emulsion paint  Note: <b>Premium acrylic emulsion paints (interior) (for Club 1&amp;2, community halls &amp; recreation area):-</b> <b>Asian paints: Royale luxury emulsion,</b> <b>Nerolac : Impression,</b> <b>Dulux : velvet touch,</b> <b>Birla: One pure Elegance</b>	All internal areas walls / ceilings	Internal finishing as per DSR'23 Item No. 13.86, 13.4.1, 13.80, 13.43.1, 13.83.2 and as per CPWD specifications 2019 with upto date correction slips.	Necessary drip course shall be provided in chhajjas, balcony, projecting roof, beams etc. all paints shall be used with low VOC content less than 50 grams per liter.
(B)	External finishing with 6 mm modified plaster + putty 1 mm thick + exterior grade high quality texture paint with stone dust and trowel texture with primer.  15 mm cement plaster with 1:6 mortar + putty + exterior grade high quality texture paint with stone dust and trowel texture with primer where AAC / brick wall are being used as external wall instead of 6 mm given above and remaining will be same.	All external faces of buidng / security room s/ ESS, all balconies, service shafts, compound wall	External finishing as per DSR'23 Item No. 22.24a and as per CPWD specifications 2019 with upto date correction slips.	Necessary gola at corner of chajja junction to be provided as per DSR'23 Item No. 12.21
(C)	Painting of exposed rain water, soil/waste and water supply pipes	Painting with synthetic enamel paint of required colour to give an even shade two or more coats over a coat of suitable steel primer as per DSR'23 Item No. 13.56.		
(D)	Painting of underground rain water, soil/ waste and water supply pipes	Two or more coats black anticorrosive bitumastic paint over and including a priming of ready mixed zinc chromate yellow primer as per DSR'23 Item No. 13.55		

## 11. SANITARY INSTALLATION

SL.	DESCRIPTION	AREAS/	BRIEF	REMARKS
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Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

NO.		LOCATIONS	SPECIFICATIONS	
	<b>SANITARY INSTALLATION</b>	As per sanitary fittings schedule and drawings.	As per sanitary fittings schedule & CPWD DSR'23 and as per CPWD specifications 2019 with upto date correction slip.	
(A)	EWC Toilets	Rimless, blind installation wall hung WC with UF soft close slim seat cover, hinges, fixing accessories and accessories set size : 375x520x400 mm white vitreous china European type wall hung water closet of size 375x520x400 mm rimless shape including concealed cistern with 39mm drainage l-bend pipe with gasket & installation kit (suitable for EWC) dual flush fitting including soft close seat cover, and cistern fittings, nuts, bolts and gasket. The design of EWC shall be such that the rack bolts /studs and trap are not visible i/c hand shower (health faucet) with 8mm dia, 1 meter long flexible tube & wall hook with N.R.V. (back flow preventer) with CP brass 2 Way bib cock with wall flange		
(B)	Wash Basins	With over the counter white vitreous china wash basin size 560x415x200 mm with granite counter and single lever quarter turn CP brass pillar cock & single piece cover plate and CP brass bottle trap (with internal partition) 32mm size with 300mm & 190mm long wall connection pipes & wall flange and CP brass waste coupling complete with CP brass angular stop cock with triangular handle and wall flange + PVC connecting pipe with CP brass nuts		
(C)	Concealed (mixer) Diverter	Concealed body for single lever diverter 40mm cartridge with button assembly (button on top) but without exposed parts + single lever exposed parts kit of diverter consisting of operating lever, cartridge sleeve, wall flange (with seals) & button assembly sleeve & button + shower arm casted 160mm long light body round shape for wall mounted showers with flange + overhead shower 120mm dia round shape single flow (face plate stainless steel & abs body in chrome finish) with rubit cleaning system + bathtub spout with wall flange stainless steel		
(D)	Connecting Hose Pipe	450/600 mm long braided hoses for geyser of approved model or equivalent.		
(E)	Paper Holder	Toilet roll holder with stainless steel flap of approved model or equivalent		
(F)	Soap Dispenser	Soap dispenser with metallic bottle of approved model or equivalent		
(G)	Soap Holder	Soap dish holder of approved model or equivalent		
(H)	Tubmler Holder	Tumbler holder of approved model or equivalent		
(I)	Over head Towel Rack	Towel rack 600mm long without lower hangers, stainless steel of approved model or equivalent		
(J)	Towel Rod	Single towel rail 600mm, stainless steel of approved model or equivalent		
(K)	Towel Ring	Towel ring round with round flange of approved model or equivalent		

(L)	Coat Hook	Robe Hook (2 Nos. on each door) of approved model or equivalent
(M)	Grab bar vertical	Grab bar 692mm long, satin of approved model or equivalent
(N)	Grab bar vertical	Grab bar vertical swing , satin of approved model or equivalent
(O)	SS sink with Draing board + sink cock	SS kitchen sink 1000x510 mm overall size with bowl size of 560x410x215 mm + sink cock with regular swinging spout (wall mounted model) with wall flange + CP brass angular stop cock with triangular handle and wall flange + PVC connecting pipe with CP brass nuts of approved model or equivalent
(P)	Glass self	As per schedule of sanitary & CP brass fittings
(Q)	Mirror	6 mm thick 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with or without frame shall be provided on SS studs as per the approved drawing
(R)	All floor traps in toilet, Kitchen, balcony	Chilly cockroach trap square flat cut stainless steel AISI 304 (18/8) floor drain cover with Jali grating glossy finish CCT-SFC-153-GF drain pipe 100 mm outer frame size 153x153 mm
(S)	C. P. Brass fittings	Required pillar cocks, angle cocks, 2 Way bib cocks, health faucet, long body bib cocks, towel ring, hot & cold-water mixer, along with other miscellaneous fittings like bottle trap, waste couplings etc. Shall be of approved make and model and as per the direction of engineer – in – charge. (The above are indicative only. However, the contractor has to provide all fixtures and fittings for functional suitability). All fittings shall be single lever with quarter turn ceramic cartridges and complying to green norms. All CP brass fittings/ bathroom accessories shall be of single brand and of the same series. In case of accessories not available in same series, the decision of the engineer in charge shall be binding.
(T)	Plumbing for Water Purifier and Geyser	The provision shall be made for plumbing for Water Purifier and Geyser
(U)	Testing	All water supply and sanitary pipe lines shall be tested as per CPWD specifications 2019 with upto date correction slip and direction of the Engineer-in-Charge.
(V)	Exhaust Fan	Provision shall be made for fixing exhaust fan in kitchen and toilet windows.

## 12. WATER SUPPLY :

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
<b>INTERNAL SANITARY AND WATER SUPPLY INSTALLATIONS:</b>				
12.1	Pipeline from Tank distribution line to OHW tank (exposed on wall)		GI pipe complete with GI fittings and clamps, including cutting and making good the walls etc. including control valve, pressure release valve, NRV as per approved design and drawings. The pipes shall be fixed with GI frame and U Bolt which will keep the GI pipes minimum 30mm away from the wall.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.2	Internal piping-exposed on walls (loop line on terrace and down-take supply pipes)		CPVC pipes complete with CPVC fittings and clamps, including control valve, pressure release valve, NRV including cutting and making good the walls etc. As per approved design and drawings. The pipes shall be fixed with GI frame and u bolt which will keep the pipes minimum 30mm away from the wall.	

SL. NO.	DESCRIPTION	AREAS/ LOCATION S	BRIEF SPECIFICATIONS	REMARKS
12.3	Internal piping-concealed work		Chlorinated polyvinyl chloride (CPVC) pipes, having thermal stability for hot & cold- water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing including jointing of pipes & fittings with one step CPVC solvent cement including cutting chase and making good the walls etc. For concealed pipes and testing of joints as per direction of engineer in charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATION S	BRIEF SPECIFICATIONS	REMARKS
12.4	Soil & waste, rain water pipes  And fittings		Soil, waste, vent pipes, rain water pipes and fittings shall be hubless centrifugally cast-iron epoxy coated inside & outside as per IS : 15905 the vertical pipes shall be fixed with GI fame and u bolt and horizontal pipes, traps and fittings shall be ceiling suspended and supported on GI frame work and u bolt which shall be covered by providing metallic false ceiling wherever required.  Soil & waste, rain water pipes and fittings shall be fixed as per DSR'23 Item No. 17.77.	
			<ul style="list-style-type: none"> <li>❖ Plumbing shall have provision for geysers, water purifier, washing machines, dish washers, cage washers or any other equipment as per functional requirement.</li> <li>❖ Plumbing system shall be designed and provided as per the functional requirements of the buildings.</li> <li>❖ All drainage in balconies shall have their inlets in plan. All drainage through balconies/as per drawings shall be connected to rain water harvesting.</li> <li>❖ Utility balcony drainage shall be suitably treated and shall be not connected to rain water harvesting system.</li> </ul>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.5	Valves		<p>Following types of control and other valves shall be provided in distribution grid, supply mains etc. As per local bye laws, NBC 2016, CPWD Specifications and sound engineering practice at easily accessible locations for operation and maintenance</p> <ul style="list-style-type: none"> <li>vi. Bronze/ forged brass ball valve (screwed) confirming to is standards complete</li> <li>vii. Butterfly valves (80mm and above) shall be of centric disc construction with single piece body of cast iron with disc of CF 8 stainless steel with nitrile seat, stem shall be stainless steel and shall conform to PN 10/16 rating and shall be provided with suitable matching flanges</li> <li>viii. Non-return valve (80mm and above) shall be cast iron dual plate non-return valve of PN 10/16 rating with ductile iron disc and SS 304 spring&amp; hinge pin</li> <li>ix. Ball valves (65 mm and above) shall be lever operated, screwed type of gun metal ball valve of PN 10/16 rating as per is:318 with SS ball and SS stem with mild steel lever.</li> <li>x. Non-return valve (65mm and below) shall be gun metal non-return valve of PN 10/16 rating (class 2) as per IS : 778 with screwed ends.</li> </ul> <p>Special type of control valves like, pressure reducing valves (PRV) and solenoid valves as per requirement</p>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.6	CHAMBERS FOR: - (C) VALVES (D) FIRE HYDRANTS		Chambers of required size and shape shall be constructed class 2 <sup>nd</sup> Non modular clay brick in cement mortar with C.I. surface box of required shape and size i/c RCC top slab i/c necessary excavation, foundation concrete and 12 mm thick inside plastering finished with a floating coat of neat cement complete as per standard designs per approved design and drawings	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.7	Thrust blocks		Thrust Block shall be of cement concrete i/c necessary excavation, centring and shuttering etc. Shall be provided at locations specified as per direction of the Engineer-in-Charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.8	Puddle Flanges		Galvanized iron (120 GSM minimum) puddle flanges of 60 cm length with flange on one / both ends and welded to mild steel plate (6mm thick) in the centre etc. complete as directed by Engineer-in-Charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.9	Overhead water tanks, UG Sump, STP tanks and other tanks		<ul style="list-style-type: none"> <li>vi. RCC tanks shall be RMC of specified grade of required capacity and as per approved design including required fittings like ball valve (brass) high/ low pressure with floats, inlet, outlet, scour, over flow pipe, vent pipe inside SS ladder, mosquito proof covers, outside MS ladder etc.</li> <li>vii. Separate overhead RCC shall be constructed for each building with separate horizontal/ vertical compartments for domestic and fire requirements.</li> <li>viii. Separate RCC underground tank for storage of treated water received from STP for use in flushing / horticulture be provided.</li> <li>ix. Inside of overhead water tank, UG sump shall be provided white glazed ceramic tiles over 12 mm thick bed of cement mortar 1:3 of size not less than 300mm x 300mm on floor and full height of walls. Inside of overhead water tank with waterproofing as mentioned in water proofing specifications.</li> <li>x. MS ladder for terraces, lift room shall be Galvanised MS with the size of MS bar shall not be less than 16 mm and thickness of MS flat shall not be less than 10 mm or IS 50506.</li> </ul>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.10	DISINFECTION		<p>All water supply lines and water tanks shall be disinfected.</p> <p>Disinfection to be done using bleaching powder @ 0.5gm/litre of water and cleaned with fresh water operation to be repeated minimum 3 times as per CPWD specifications 2019 with upto date correction slips or method approved by the Engineer-in-Charge</p>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.11	MANHOLES		<p>Manholes of required size and depth as per CPWD specifications 2019 with upto date correction slips with masonry wall in cement mortar with foundation concrete m10 with ready mixed cement plaster with floating coat of neat cement inside and outside cement plaster with FRP / DI covers as per approved drawings.</p> <p>The manholes on the main sewer line shall be placed at not more than 30 meters length.</p>	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.12	Testing and Commissioning		All water supply and sanitary pipe line shall be tested as per CPWD specification and direction of Engineer-in-Charge.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
12.13	SEWER CONNECTION		The sewer line shall be connected to the sewage treatment plant as well as municipal sewer line to keep the line functioning in case of non-operation of STP	

**13. STORM WATER: SW DRAINAGE SYSTEM SHALL BE COMBINATION OF PIPES AND OPEN DRAINS AS PER APPROVED DRAWINGS**

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
13.1	Storm & Drain pipe	NP3 pipes of required diameter under the ground and below the CC pavement laid wherever required as per CPWD specifications 2019 with upto date correction slip and direction of the Engineer-in-Charge.		
13.2	S.W. DRAIN	III. Base & walls: the base & walls of drain shall be of RCC in M-30 grade as per approved design & drawings.  IV. Plastering: 12mm ready mixed cement plaster in cm 1:3 (1 cement: 3 coarse sand) with neat finish in side and top of the drain and 15cm out side		
13.3	Road Gully Chambers	The masonry road gully chamber of required size and depth with masonry wall in cement mortar including precast RCC / FRP horizontal/ vertical grating with frame complete as per standard design as per CPWD specifications 2019 with upto date correction slip and approved drawings.		
13.4	COVERS	Pre Cast perforated FRP cover with GI frame shall cover all the drains as per approved design.		
13.5	CONNECTIONS	The storm water drain, pipes shall be connected to rain water harvesting tanks and connection to municipal drains for surplus water as per attached drawings.  Inspection chambers / manholes / gullies chambers / valves and other accessories of approved specifications and make shall be provided considering all the site conditions and reduced level as per design parameters. As far as possible green and recyclable materials shall be preferred as per approved drawings.		

**14. ALUMINIUM WORK**

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
14.1	Double glazed units (DGUS) comprising of hermetically-sealed 6-12-6 mm insulated glass	All glazed windows & doors (glazing in ventilator is not mention.)	High performance coloured tinted toughened glass 6 mm thick substrate with reflective soft coating on outer face, + 12mm airgap + 6mm heat strengthened clear glass of approved make colour-neutral/	

			clear, SHGC value: 0.34 (max), vlt-50% to 55%, u-value less than -3 and as per particular specifications.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
14.2	SS 304 Grade Wire Mesh	All windows as per drawings	SS wire mesh as per DSR'23 Item No. 9.135 and as per CPWD specifications 2019 with upto date correction slips.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
14.3	Ventilation louvers at opening of shafts at ground floor and STP natural ventilation opening		Fabricating, supplying and fixing in position at all levels, aluminium extruded tubular and other aluminium sections for aluminium louver, fins, box sections, trellis, capping, strips and other locations as per the architectural drawings and approved shop drawings weight not less than 20kg /sqm , the aluminium quality as per grade 6063 t5 or t6 as per IS 1474, including PVDF spray / coil coating (35 microns) having minimum content of 70% of kynar 500 of required metallic colour and shade as approved by the engineer-in-charge. The aluminium sections will be fixed using stainless steel screws, nuts, bolts, washers, cleats, etc. on main frame work of aluminium sections as per the designs and shop drawings.	

## 15. WATER PROOFING

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.1	<b>Fully bonded HDPE sheet Water Proofing</b>  Membrane (the fully bonded HDPE sheet waterproofing membrane shall have following typical properties:  Peel adhesion to concrete > 800 n/m (as per ASTM d 903: 1998). Elongation (HDPE film)> 400% (ASTM d 412 modified).  Tensile strength>25mpa. (ASTM d 412 modified).  Thickness: 1.5mm composite thickness, HDPE thickness not less than 0.9mm (ASTM d 3767).  Puncture resistance - 1000 n	Raft bottom	As per particular specification	

(ASTM e154).  Resistance to hydrostatic head >70 m (ASTM d 5385 modified).  Lap joint strength at overlaps > 15000 n/m (ASTM d 6392:2012) (side and end laps).				
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.2	Crystalline Admixture:	RCC structures like retaining walls, swimming pool, UGT, STP, & OHT.	As per particular specification and as per CPWD DSR'23 Item No. 22.22	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.3	Wet Areas Water Proofing	Toilets, Lift Pits, Balcony area	Providing & applying 2 components, solvent free, liquid applied elastomeric seamless hybrid polyurea membrane coating @ 1.6 kg/sqm, using high pressure two components spray/brush equipment, to form a minimum system thickness of 1.5 mm in two or more alternative coats.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.4	Water Proofing	Terrace / Refuge areas:	Applying two component high solids content cold applied pure polyurethane liquid elastomeric seamless waterproofing membrane, <b>insulation layer:</b> spray applied an average minimum 75mm thick GRIHA enlisted cfc & HCFC polyurethane foam, on top of polyurethane foam, applying single component, elastomeric 100% pure polyurethane coating free from bitumen & tar, the coating shall be applied with a total consumption of minimum	

			1.5 kg/sqm in two coats and shall be applied on the entire horizontal surface extending up to 300mm above the FFL on the vertical surface as per the methodology. It shall be followed by laying 150 GSM geotextile (non-woven polyester) over the entire membrane on horizontal areas maintaining proper overlaps. Providing 100 mm average thick m25 grade pp fiber reinforced concrete screed mixed with crystalline admixture. Top surface shall be provided with heat resistant tiles of approved make and specifications as per directions of the engineer-in-charge.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.5	Providing and spray applying two component hybrid Polyurea polyurethane waterproofing system at all levels for podium garden waterproofing by the manufacturer or his approved applicator consisting following operations a) brushing and vacuum cleaning the surface to make free from any loose material, oil, greas, dust etc. B) repairing the surface if required, as per recommendation of manufacture or his approved applicator to make it water tight for which nothing extra shall be paid. C) 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 in dry condition, having consumption varies from 0.20 to 0 40 kg/sqm	Podiums	As per particular specification & CPWD DSR'23 correction slips 20 Item No. 22.27.1 & 22.28.1.	

<p>depending on the porosity and undulations in the surface. D) providing and sprinkling washed coarse sand, as recommended by manufacturer, over freshly laid primed tacky surface @ 0.25 to 0.40 kg/sqm as directed by the engineer-in-charge. E) over primed sandy surface, providing and spray applying two component hybrid polyurea polyurethane coating system, which shall be solvent free, mixed in proportion by volume / 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 /astm and tear strength minimum 30n/mm as per din 53515 or minimum 45 n/mm as per astiv d624 and 20 second maximum gel time / reaction lime with minimum 1.5 mm dry film thickness of two coats. 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 d 4595.</p> <p>G) providing and laying screed of cement concrete 1:1.5:3 (1 cement: 1.5 coarse sand: 3 graded stone aggregate 20mm nominal size) of minimum thickness 50 mm al khurra with a slope of 1:100 towards khurra to ridge of roof.</p> <p>H) providing and laying dimple drain boards with inbuilt geo textile drainage membrane on top having dimple height of 20-25 mm, average number of dimples 400 per sqm, compressive strength not less than 180</p>			
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	kn/m <sup>2</sup> and geotextile drainage member having mass of 120 GSM. Laid with minimum overlap of 50 mm note HDPE drain cells / drainmats along with a layer of geotextile having weight of 120 GSM and tensile strength not less than 2.4 kn/m as per ASTM d 4595 is provided in place of dimple drain board with inbuilt geotextile, it shall not be paid as extra. (Sr. No. F, G & H not applicable for vertical surface)			
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.6	Water Proofing for Water Retaining Structures –	UGT / OHT internal water tanks	<p>First step shall be treatment to concrete defects like construction joints, cold joints, honeycombs &amp; porous concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with IWP non shrink additive of approved make and sealing all the construction joints with styrene butadiene latex.</p> <p><b>wall and slab joint / construction joint treatment</b></p> <p>After the entire surface preparation has been completed on the mother slab, all the wall and slab joints / construction joints to be treated with joint tapes having minimum</p>	

			<p>tensile elongation more than 300% of size 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of waterproofing slurry on the wall – slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire wall – slab joints / construction joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner. As per original manufacturer's specifications all over the entire horizontal and upto full height vertical surface.</p> <p><b>waterproof coating</b></p> <p>After the entire surface preparation has been done, pre wetting of the entire concrete surface and providing and application of the 1st coat of approved make flexible cementitious waterproofing slurry with quick curing and waterproofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry. The total consumption of the product should be as per manufacturer</p>	
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		<p>specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1mpa, adhesion strength of 2mpa, crack bridging capacity of 2mm as per EN 1062-7 complete as per manufacturer's specifications and approved by engineer-in-charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.</p> <p>Providing and laying of protection plaster 20mm thickness with 1:4 cement and sand mortar as per approved specification admixed with integral waterproofing compound as per original manufacturer's specifications. To prevent the waterproof coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against</p>	
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			leakage.  Laying slope making and protection with 40mm avg. Thick of m25 grade fibrated screed and applying waterproof plastering with cm 1:4 of thickness 20mm admixed with integral waterproofing compound as per original manufacturer's specifications.	
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
15.7	Water Proofing for Water Retaining Structures -	STP tanks	<p>First step shall be treatment to concrete defects like construction joints, cold joints, honeycombs &amp; porous concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with iwp non shrink additive of approved make and sealing all the construction joints with master latex mortar.</p> <p><b>Wall and slab joint / construction joint treatment</b></p> <p>After the entire surface preparation has been completed on the mother slab, all the wall and slab joints / construction joints to be treated with joint tapes having minimum</p>	

			<p>tensile elongation more than 300% of sizes 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of waterproofing slurry on the wall – slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire wall – slab joints / construction joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner as per original manufacturer's specifications all over the entire horizontal and upto full height vertical surface.</p> <p><b>Waterproof coating:</b></p> <p>After the entire surface preparation has been done, pre wetting of the entire concrete surface and providing and application of the 1st coat of flexible cementitious waterproofing slurry with quick curing and water proofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry. The total consumption of the product should be as per manufacturer specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1mpa, adhesion</p>	
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		<p>strength of 2mpa, crack bridging capacity of 2mm as per EN 1062-7 as per manufacturer's specifications and direction of engineer-in-charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.</p> <p>Providing and laying of protection plaster 20mm thickness to prevent the waterproof coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against leakage.</p> <p>Laying slope making and protection with 40mm avg. Thick of m-40 grade fibrated screed and applying waterproof plastering with cm 1:4 of thickness 20mm admixed with integral waterproofing compound as per original manufacturer's specifications.</p> <p>Controlling specifications shall be of original manufacturer shop drawings (private label supplier shop drawings not acceptable) and original manufacturer method statement (Pvt. Label</p>	
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			<p>supplier method statement not acceptable) after due approval of engineer-in-charge.</p> <p><b>Moisture sensitive bituminous epoxy coating:</b> Over the plaster providing &amp; applying 2 coats of moisture sensitive bituminous epoxy coating at a consumption of @500/ gms/ sq.mtr with bonding / adhesion of 1.2 to 1.4 n/mm<sup>2</sup> as per ASTM d 4541, water resistance, immersion – 7 days passes as per ASTM d 870-09, chemical resistance, immersion in dilute acid alkali &amp; salt solutions – 7 days -passes as per ASTM 868 as per manufacturer's instruction.</p>	
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#### 16. ROADS, OPEN PARKING & PATHS (AS PER THE DRAWINGS)

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.1	Inter-locking Pavers for drive ways, surrounding of buildings and balance area	80 mm thick ISI marked Heavy-Duty pavers as per shape & pattern in M-30 grade Colour (Red, Green, Grey, Yellow etc.) Made by table vibratory method using PU mould laid in required colour and pattern over and including 50mm thick compacted bed of sand and 100 mm bed concrete of m10 etc. complete as per approved drawing and as per direction of Engineer-in-Charge		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.2	KERB STONE	Factory made high grade concrete precast block. M-25 grade of size 150x450 mm of approved design jointed with cement mortar including making drainage opening wherever required and painting in pattern complete etc. As per direction of Engineer-in-Charge.		

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.3	ROADS	Road as per CPWD specification 2019 with upto date correction slips.  C.C. pavement minimum 150 mm thick or as per drawing attached with nit of mix minimum M-30 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.
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SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.4	Road Painting Works		<p>i. Providing and applying minimum 75mm wide and 2.5mm thick road marking strips (retro- reflective) of specified shade/ colour using hot thermoplastic material by fully/ semi-automatic thermoplastic paint applicator machine including cost of material, labour, T&amp;P, cleaning the road surface of all dirt, seals, oil, grease and foreign material etc. complete as per drawing and as per direction of Engineer-in-Charge.</p> <p>ii. Glow studs of size 100x20 mm made of heavy-duty body shall be molded ASA (acrylic styrene acryloretite) or hip (high impact polystyrene) or abs having electronically welded micro prismatic lens with abrasion resistant coating.</p> <p>iii. Marking parking places, road surface marking with adequate no. Of coats to give uniform finish with ready mixed road marking paint conforming to is: 164, including cleaning the surface of all dirt, scales, oil, grease and foreign material etc. complete</p> <p>iv. All road signages as per particular specifications.</p>	
SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
16.5	Compound Wall / Boundary wall		As per attached drawing.	

## 17. NEW TECHNOLOGY

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
17.1	Architectural Aluminium louvres	As per drawing attached.	As per proposed location mentioned in drawing.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
17.2	2 mm thick Aluminium CNC Cut Jali with Aluminium frame	Toilet shafts	As per proposed location mentioned in drawing.	

## 18. MISELLANEOUS

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.1	Fan clamps/ Fan boxes in each room except toilets		M.S. Fan clamp Type I or Type II of 16 mm dia M.S. bar bent to shape with hooked ends in RCC terrace slabs, fan boxes in other slabs. During laying of slab including painting the exposed portion of loop, all as per standard design complete.	

SL.	DESCRIPTION	AREAS/	BRIEF SPECIFICATIONS	REMARKS
Correction... Nil	Deletion... Nil	Insertion... Nil	Overwriting... Nil	AE(C) AE(E) EE(C)

NO.		LOCATIONS	
18.2	Speed Breakers on Ramps	Compound rubber UV stabilized, modular 410 mm width 75 mm thickness 35 Tonnes compressive strength of required length with end trim fixed with fasteners as per manufacturers specification.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.3	Irrigation Works Horticulture Works	for	The scope of work consists of :  v. Laying of network of pipe from treated effluent of STP vi. Provision of garden hydrant posts, control valve, chambers etc. vii. The irrigation pipes for main grid and branches shall be CPVC. viii. The provision for alternate arrangement from municipal supply	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.4	Cable Trenches		Cable Trenches shall be with minimum 200 mm thick masonry work as per drawings using polymer modified adhesive mortar and RCC bands of minimum 100 mm thickness including centring and shuttering and reinforcements including internal 12 mm thick ready-mix plaster cement mortar 1:4 MS cover shall be 8 mm chequered plates fixed to MS frame of 40x40x6mm angle iron including painting with two or more coats synthetic enamel paint of required colour over approved steel primer as per the approved drawing.	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.5	Accessibility of Buildings		Provision should comply as per the attached list of accessibility norms of buildings	

SL. NO.	DESCRIPTION	AREAS/ LOCATIONS	BRIEF SPECIFICATIONS	REMARKS
18.6	SHAFTS		4. All shafts (Civil and E&M) shall be appropriately closed horizontally and covered with appropriate door system vertically. This arrangement may be augmented as per fire requirements.  5. Kitchen should be so designed so as to ensure that various gadgets ducts are conveyed to service ducts for example ducting for electric chimney.  6. Accessible roofs shall have parapets.	

## Section-II

### **ADDITIONAL CONDITIONS/SPECIFICATIONS FOR CIVIL WORKS**

**(Note:** CPWD specifications 2019 Vol. 1 & 2, with upto date correction slips shall be followed unless otherwise specified.)

**1. Earth work:**

- 1.1 The work shall be done in accordance with CPWD Specifications - 2019 - Vol. I & Vol. II with correction slips upto the last date of submission of tender document and National Building Code 2016.
- 1.2 Excavation shall be undertaken to the width of the retaining wall footing/development work/MEP including necessary margins for construction operation as per drawing or directed otherwise. Where the nature of soil or the depth of the trench and season of the year, do not permit vertical sides, **the contractor at his own expense shall put up the necessary shoring, strutting and planking or cut slopes with or without steps, to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer.** Making steps and slopes etc. as required in the scope of work.
- 1.3 The contractor shall make at his own cost all necessary arrangements for maintaining water level, in the area where works are under execution low enough so as not to cause any harm to the works or problems in carrying out with the execution and the rates for all items of work shall be **considered as inclusive of pumping out or bailing out water, strutting if required, for which no extra payment shall be made.** This will include water coming from any source, such as rains, accumulated rain water, floods, leakages from sewer and water mains, subsoil water table being high or due to any other cause whatsoever. The contractor shall make necessary provision of pumping, dredging, and bailing out water coming from all above sources and excavation and other works shall be kept free of water by providing suitable system approved by the Engineer-in-charge.

Sub-soil ground water table at plot site as per soil investigation report is indicative only. Sub-Soil ground water table may vary. The contractor has to do detailed soil investigation for consideration in design of proposed building. The contractor shall make his own assessment about sub-soil water level likely to be encountered at the time of execution. The water level may vary due to rainy season or due to the percolation of the water from existing drains gallery and dewatering may be required in such cases. The contractor shall make adequate arrangement for pumping out the water to lower the ground water table below the proposed foundation level and appropriate anchoring of foundation must be employed if required as per structural design and relevant IS codes with upto date amendments as approved by Engineer-in-charge and shall be in the scope of work. Sub soil water table shall be maintained at least 50 cm below the P.C.C. level during laying of P.C.C., water proofing treatment, laying of raft foundation including filling of required depth of earth/sand. The water table shall not be allowed to rise above base of raft level until completion of footings including water proofing and back filling until the structure attains such height to counterbalance the uplift pressure. Scope included pumping out or bailing out water, if required. The sequence of construction shall be got approved from the Engineer-in- charge. The Contractor needs to take all safety precautions by using sheet pile works or other alternate arrangement duly get it checked from any

IIT/NIT to avoid any caving in of the adjoining side slope of the excavated area and fee of Institute shall be born by agency. Surplus earth obtained after excavation shall be used for compensatory plantation at separate location as mentioned in this document elsewhere. The earth remaining afterwards, shall be the property of the contractor and shall be removed from the site by the contractor within the scope of this agreement. The removal of surplus material from the site shall be undertaken by the contractor only when instructions in this regard are obtained from the Engineer-in-charge. Dumping shall be at designated place identified by the agency. Contractor shall also obtain necessary permission/approval/authorization from the competent authority of local body/traffic/police as the case may be for removal of excavated earth/material. No payment/fee on this account shall be entertained by the department.

- 1.4 The Royalty of surplus earth, if any, shall be paid by the Contractor to concerned authority of state government at the prevailing royalty rates.
- 1.5 Dewatering: -The dewatering is in the scope of the contract as per condition of this tender document. The Contractor shall arrange to have the entire dewatering system designed in detail, installed, maintained and operated by qualified and experienced personnel throughout the course of the work.
  - 1.5.1 If required, the Contractor shall install, maintain and operate a system of wells, trenches and pumps as required for performing the excavations for the areas and subsequent construction of the structure and placement of backfill, in dry conditions.
  - 1.5.2 Dewatering of the excavation shall be accomplished in a manner that will prevent seepage, boils, loss of fines, corrosion, softening of the strata, and that will maintain the stability of the bottom and slopes of excavation.
  - 1.5.3 In case any damage is caused to the work, in the opinion of Engineer in charge, due to inadequacy or failure of the dewatering system, in part or in whole, then the supply of all labour, materials and plant, such damage shall be undertaken and re-done by the contractor at his own cost.
  - 1.5.4 The cost of any damage caused to the structures or other equipment's due to the failure of the dewatering system shall be borne by the contractor and shall be covered by proper insurance to be provided by the contractor, in accordance with insurance clauses mentioned in this document and in the "General Conditions of Contract-2024- EPC Projects". The Contractor will carry out the detailed investigation from geological expert in field to assess the impact of excavation of the site on the adjoining structures and will make all precautions at site and stabilize the cut slopes of the site to avoid sudden caving in, in order to safeguard adjoining structures located in the vicinity of the site at their own cost. The legal liability in case of any damage to the adjoining structure rest with the Contractor only.
  - 1.5.5 The Dewatering system shall be designed to operate on a continuous basis in such a manner that during excavation, the water level as observed in all piezometers installed near the periphery of the excavation with their tips located below the prevailing excavation level, is at least one meter below the prevailing excavation level. If the water level observed in any or all of the piezometers is higher than that specified, the excavation shall be halted until remedial measures to the dewatering system are done and the specified water levels in the piezometers attained or until the contractor demonstrates to the

- satisfaction of the Engineer in charge that it is safe to proceed with excavation. Piezometers tips shall be installed near the bottom of the hole drilled for that purpose.
- 1.5.6 During construction of structures and subsequent backfill placement and associated work operations, the dewatering system shall operate on a continuous basis in such a manner that the water level, as observed in the piezometers located below the level of construction and backfill placement is at least one meter below the lowest point of construction and backfill placement and the water level in the piezometers is maintained at such level till the concrete if any, has sufficiently hardened and until in the opinion of the Project Engineer, it is safe to allow the water level to rise up to a predetermined level.
- 1.5.7 The dewatering System shall be maintained in operating condition so as to achieve the specified results until the construction of the structures and the backfill placement at all points, has reached at least upto 3rd floor level above the ground level. The approval of the Engineer in Charge shall be obtained if dewatering system is to be cut off.
- 1.5.8 The Contractor shall not permit the accumulation of surface water within the confines of the excavation areas. The Contractor shall control, remove and divert surface water run-off, and water discharging from the dewatering system away from the excavations, to a point outside the working area as required by the Engineer in Charge.
- 1.5.9 The Contractor shall perform all work including, but not limited to, the construction and maintenance of ditches and sumps and provide, install, maintain and operate pumps and pipelines of adequate capacity as are necessary for the effective control of surface run-off and ground water not required to be intercepted by the dewatering system.
- 1.5.10 The Contractor shall make necessary arrangement for power supply which shall be of sufficient capacity to maintain all pumps and equipment for both the Basic and Standby systems, operating on a continuous basis.
- 1.5.11 The Contractor shall supply, install and maintain an alarm system that will alert responsible personnel at the time of power failure and at the same time will automatically activate the standby units.
- 1.5.12 The dewatering system shall be designed in such a manner that all or parts of the standby system may be directly connected to the basic system.
- 1.5.13 The standby dewatering systems shall be operated for a period of at least 3 hours duration each week to demonstrate its complete effectiveness. For such demonstrations, the Contractor shall not be entitled to any payment/ compensation. The factor of safety for the utilization of dewatering pumps in dewatering system should be at least 1.5 meaning thereby that 1.5 times of the required pumping system should be present at site to avoid any dewatering system failure.
- 1.5.14 Contractor's dewatering system shall include the supply, installation, data recording and maintenance of piezometers as may be required to demonstrate the satisfactory performance of the dewatering system.
- 1.5.15 In order to ascertain the continuous effectiveness of the dewatering system, Contractor shall correlate records of the water elevation in each of the piezometric observation wells and records of the discharges from the dewatering system. The Contractor shall also keep the Engineer in Charge advised on a daily or as required basis on the equipment being

utilized to affect the required results during the entire period when the dewatering system is in operation.

- 1.5.16 Contractor shall obtain necessary permissions from the competent authority of local body or regulatory body traffic, irrigation department, GMC at his own level to drain out of dewatering water. The arrangement is including cost of material in respect of laying pipes, making drains from site to the final disposal of dewatering pump out water shall be made by the contractor at his own level and cost. No claim shall be entertained on this account by the department.
- 1.6 **Shoring/ sheet piling/ soil stabilization:** -The scope of this tender is also inclusive of design and execution of Diaphragm wall/ shoring/ sheet piling/ soil stabilization to resist all dead and live loadings (earth pressures, hydrostatic pressures, traffic loads, point loads, line loads and surcharge loads) that the shoring may experience during the service life of the structure. In design following type of loads/forces shall be taken as under :-
- a). Active and passive earth pressure
  - b). Lateral earth pressure due to surcharge loads,
  - c). Differential water pressure and seepage pressure,
  - d). Earthquake force, and
  - e). Stresses due to handling and driving.
- 1.7 Shoring system may be in the form of RCC piles, reinforced concrete, pre- stressed concrete or steel. Depending upon the materials adopted by looking at various parameters, the conformance shall be as per the specifications given for reinforced concrete; pre stressed concrete and steel sheet pile. Sheet pile in accordance with IS: 2911 (part II)-1980, IS: 456-1978, IS: 1343-1980 and IS: 2314 – 1963 respectively.
- 1.8 The contractor shall execute the shoring pile work as per approved design and drawing. The design of diaphragm wall/ shoring shall be carried out in terms of latest editions and up-to date correction/amendment/errata of BIS Codes (Bureau of Indian Standards), other relevant seismic/other codes for making Building Earthquake Resistant, sound engineering practices and as desired by the Employer. The Consultant will get the design of diaphragm wall/ shoring proof checked from Reputed Engineering Institutes like a) IITs b) NITs as approved by the Engineer-in- charge. The fee for proof checking shall be borne by the contractor. The consultant will liaison and co-ordinate with such Institute approved by Engineer-in-Charge as and when required and as per the direction of Engineer- in-charge. The Contractor shall be responsible for the external stability of all diaphragm wall/temporary sheet piles/ shoring piles. Differential and absolute settlements of piles shall be limited to ensure minimal detrimental effects
- 1.9 A general scheme of excavation and shoring piles is to be submitted by the Contractor. Shoring/sheet piles execution Methodology shall be got approved in advance from Engineer-in-charge before commencement of shoring/sheet pile work at site. **The cost of execution operation, materials, labour, and workmanship is included in quoted amount of the project.**

## 2. CEMENT

- 2.1 The agency shall procure 43 grade Ordinary Portland Cement (OPC) conforming to IS: 8112 (Part-I) or other related IS code with upto date amendment till last date of bid

submission or PPC cement conforming to IS:1489 (part I) as required in the work, from reputed manufacturers of cement. Cement required for the work shall be procured by the agency from the list of “Preferred makes of the materials” given in this document.

- 2.2 The supply of cement shall be taken in 50 kg. Bags/ bulkers imprinted with manufacturer's name, ISI marking, brand, quality and quantity of the product. Samples of cement arranged by the agency shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of relevant BIS codes.
- 2.3 The cement godowns/silos shall always be accessible for the Engineer-in-Charge or his representative for regular inspection. The agency shall be responsible for the watch and ward and safety of the cement godowns/silos. The agency shall facilitate the inspection of the cement godowns/silos by the Engineer-in-Charge or his/her authorized representative at any time.
- 2.4 The cement shall be got tested by the Engineer-in-Charge and shall be used on the work only after satisfactory test results have been received. The agency 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 agency.** In case, the test results indicate that the cement arranged by the agency does not conform to the relevant BIS codes, the same shall stand rejected, and it shall be removed from the site by the agency at his own cost within a week time of written order from the Engineer-in-Charge to do so.
- 2.5 The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in clause 10 of the GCC. The theoretical consumption of cement shall be worked out as per procedure prescribed in clause 38 of the GCC- 2024 EPC Projects and shall be governed by conditions laid therein. In case, the cement consumption is less than theoretical consumption including permissible variation, the work shall be rejected. However, if in view of Engineer-in-Charge and third-party quality assurance agency, the matter has merit for review; the same shall be sent to competent authority for further decision in this regard as per GCC clauses.
- 2.6 The cement brought to the site and the cement remaining unused after completion of the work shall not be removed from site without the written permission of the Engineer-in-Charge.
- 2.7 Any damaged/rejected cement shall be removed from the site immediately by the agency on receipt of a 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 agency.
- 2.8 Durability of concrete structure can be achieved by using proper ingredient, Grade of concrete & mix design as per IS 456:2000 & IS 10262:2008.

### **3. Steel Reinforcement**

- 3.1 The agency shall procure Fe 500D/550D **CRS** grade Bar Set-1 (TMT steel/Low alloy steel reinforcement bars) conforming to the latest amendments to IS: 1786:2008 and additional requirement (e.g. Chemical Composition Requirement for Manganese & copper, tempered marten site (TM) ring requirements, marking requirements and compliance of the provisions of ISO 9001:2015 and ISO 14001:2004) mentioned in the recommendations & also conforming to CPWD OM No.-CSQ/SE(TAS)/Steel/ 2024/262-f~~E~~ dt.

14.08.2024 and latest modifications in specifications, directions upto last date of bid submission, para 4.2 note 3 (Indian standard specification for high strength deformed steel bars and wires for concrete reinforcement) as presently applicable and any further amendments issued during & upto the period of execution/completion. The producers of such Low Alloy Steel reinforcement TMT bars shall be as per approved list given in the "Preferred makes of the materials" incorporated in this tender document. For lapping of steel reinforcement bars above 12 mm diameter, bar couplers of appropriate make and design shall be used in the vertical RCC members (Shear walls, columns, retaining walls, walls, D-walls, piles etc.) & horizontal members (Slabs, Beams, stairs etc.).

- 3.2 The agency shall have to obtain and furnish manufacturer's test certificates stating the process of manufacture, chemical composition and test sheet giving result of each mechanical test applicable to the material purchased to the Engineer-in-Charge in respect of all supplies of steel brought by him to the site of work. Each test certificate shall indicate the number of the cast to which it applies, corresponding to the number or identification mark to be found on the material.
- 3.3 Each consignment shall also be taken and got tested by the Engineer-in-Charge for both chemical composition and physical properties (including bend and re-bend test) as per the provisions in this regard in relevant BIS codes from any Government laboratory or approved NABL accredited laboratory. In case, the test results indicate that the steel arranged by the agency does not conform to the specifications, the same shall stand rejected, and it shall be removed from the site of work by the agency at his cost within a week time or written orders from the Engineer-in-Charge to do so.
- 3.4 The steel reinforcement bars shall be brought to the site in bulk supply of generally 100 MT or more, or as decided by the Engineer-in-Charge.
- 3.5 The steel reinforcement bars shall be stored by the agency at site of work in such a way as to prevent their distortion and corrosion, and nothing extra shall be paid on this account. Bars of different size and lengths shall be stored separately to facilitate easy counting and checking.
- 3.6 For checking nominal mass, tensile strength, bend test, re-bend test, elongation etc., specimens of sufficient length shall be cut from each size of the bar at random, and at frequency not less than that specified below:

<b>Size of Bar</b>	<b>For consignment below 100 ton</b>	<b>For consignment above 100 ton</b>
Under 10 mm dia bars	One sample for each 25 ton or part thereof	One sample for each 40 ton or part thereof
10 mm to 16 mm dia bars	One sample for each 35 ton or part thereof	One sample for each 45 ton or part thereof
Over 16 mm dia bars	One sample for each 45 ton or part thereof	One sample for each 60 ton or part thereof

- 3.7 The agency shall supply free of cost the steel required for sampling, testing including its transportation& handling to testing laboratories. **The cost of all tests shall be borne**

by the agency.

3.8 The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as provided in clause 10 of the GCC. The theoretical consumption of steel shall be worked out as per procedure prescribed in clause 38 of GCC-2024 EPC Projects and shall be governed by conditions laid therein. In case, the consumption is less than theoretical consumption including permissible variations, the work shall be rejected. However, if in view of Engineer-in-Charge and third-party quality assurance agency, the matter has merit for review; the same shall be sent to competent authority for further decision in this regard as per GCC clauses.

3.9 The steel brought to site and the steel remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge.

3.10 The ends of Bars in bundle shall be painted as per colour code given in NBC/I.S. Code

**4. Reinforcement coupler/ Mechanical splice:-**

4.1 Reinforcement couplers shall conform to Class ‘L’ of Indian Standard IS 16172-2023 amed upto last date of bid submission and CPWD specifications issued by OM 08/SE(TAS)/BIS/2025/17-H Dated: 24.01.2025 or later till date of bid submission.

4.2 The nominal sizes of reinforcement couplers based on their internal diameter shall correspond to the nominal sizes of bars covered under IS 1786. The couplers are to be procured from Approved make list as specified in the agreement. All the couplers should be manufactured in a factory which is ISO 9001:2008 (or higher revision) certified for “Manufacturing of Mechanical Steel Rebar Couplers & Accessories” and also be certified for “Site Management of Threading & Processing of Rebar including Sales and Distribution”. Mechanical Splicing System with parallel threads shall be used.

4.3 Testing of Mechanical Splicing System:

The reinforcement couplers shall meet the performance requirements as prescribed in the Indian Standard IS 16172-2023 namely:

- (a) Static Tensile Test
- (b) Slip Test
- (c) Cyclic Tensile Test
- (d) Low-Cycle Fatigue Test and High-Cycle Fatigue Test, if required
- (e) Static Tensile Test and as per IS code meet the “fy” not less than 130 % (where “fy” specified minimum yield stress as per proof stress IS 1786).

4.4 The test results shall be submitted to the Engineer-in-Charge for acceptance and use of before execution of work. The number of samples for each test, sampling and criteria for conformity shall be as per Annex F of IS 16172-2023.

4.5 Binding of reinforcement bars shall be done using re-bar tying machine of approved make and quality.

4.6 The agency shall deploy Automatic Ring making for making of all types/shapes of stirrups

4.7 All bending and cutting of reinforcement shall be done by reinforcement bending and

cutting machine.

**5. Anti-Termite Chemical Treatment:**

- 5.1 Anti termite treatment during execution of work shall be adopted for protection against subterranean termites originating both internally from within the plinth and externally from the area surrounding the building. Anti termite treatment shall be executed as per CPWD specifications.
- 5.2 The contractor shall supply chemical emulsion in sealed containers, diluting and injecting chemical emulsion for POST CONSTRUCTIONAL anti termite treatment with Chlorpyriphos / lindane E.C. 20% with 1% concentration for Treatment of soil under existing floors using chemical emulsion @ 1 litre/hole, 300mm apart including drilling 12mm dia holes and plugging with Cement mortar 1:2 to match the existing floors, along the external walls where the apron is not provided: using chemical emulsion @7.5 litre/ sqm of the vertical surface of the substructure to a depth of 300mm including excavation channel along the wall and rodding etc. complete, along the external wall below the concrete or masonry apron: using chemical emulsion @ 2.25 litre per linear meter including drilling and plugging holes etc. complete.

**6. Plain Cement Concrete/Lean concrete:**

Plain Cement Concrete / Lean concrete (M-10) with minimum 100 mm or in required thickness as per design and drawing shall be laid below the raft and all type foundation works, below kerb stone, under floors, below grade slab, under track/road, for levelling course below tile/granite to match level difference of flooring, grading work in wet areas for slop preparation or wherever required.

**7. Reinforced Cement Concrete Work:**

The work shall be done as per CPWD specifications 2019 Volume - I & II with correction slips up to the last date of submission of tender documents.

**8. Design Mix Concrete:**

- 8.1 The agency shall install Batch Mix Plants at site or in nearby area wherever permissible at their own cost and nothing extra shall be payable on this account. The agency can arrange RMC (Ready Mix Concrete) to supplement the demand from RMC Plants after getting the same approved from Engineer-in-Charge for supplying the concrete.
- 8.2 Beside the strength to ensure durability of structure, minimum grade of Design Mix Concrete for Foundations and Shear Walls / Columns / Beams / Slab etc. shall be of M-30 grade or more grade as required as per design requirement. Design Mix Concrete grade (self- compacting concrete using super-plasticizers including and other required materials) shall be used with the prior approval of the Engineer-in-Charge as per structural design and job mix design. For Boundary wall, Minimum M-30 grade or more grade as required as per design will be used as per job mix.
- 8.2.1 All design mix concrete to be procured from batching plant/ approved RMC plant as per inspection and approval by Engineer-in-charge meeting following guidelines.
  - a) The plant should be of minimum 60cum/hr capacity or 2 nos another of minimum

- 30cum/hour capacity, of make Schwing Stetter or equivalent.
- b) The plant should be having facility for automatic dosing.
  - c) Loading hoppers for Fly ash and Silica fume (for Self-Compacting concrete) should be integrated and automated.
  - d) **Only RO treated water to be used for concrete production.**
  - e) The plant should have fully functional lab for tests to be performed on concrete.
- 8.3 The Engineer-in-Charge will reserve the right to inspect at any stage and reject the concrete if he is not satisfied about quality of product at the user's end.
- 8.4 The Engineer-in-Charge reserves the right to exercise control over the :-
- a) Ingredients, water and admixtures, silica fumes, crystalline admixture purchased, stored and to be used in the concrete including conducting of tests for checking quality of materials, recording of test results and declaring the materials fit or unfit for use in production of mix.
  - b) Calibration checks of the batch mix plant/ RMC plant.
  - c) Weight and quantity check on the ingredients, water and admixtures added for batch mixing.
  - d) Time of mixing of concrete.
  - e) Testing of fresh concrete, recording of results and declaring the mix fit or unfit for use. This will include continuous control of the workability during production and taking corrective action, if required.
- 8.5 For exercising such control, the Engineer-in-Charge shall depute his authorized representative at the RMC/ BMC plant. It shall be responsibility of the agency to ensure that all necessary equipment, manpower & facilities are made available to Engineer-in-Charge and/or his authorized representative at batch mix concrete plant/ RMC plant.
- 8.6 All required relevant records of produced and used concrete 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 & transportation of concrete mix which shall be binding on the agency. Self-compacting concrete (SCC) as per IS:456, EFNARC Specifications and Guidelines for Self Compacting Concrete / European Guidelines for Self Compacting Concrete and as approved in design mix by Engineer-in-Charge shall be produced and transported to the site for use.
- 8.7 Crushed stone sand confirming to IS 383:2016, IS: 2386 code and other IS codes with upto date amendment till last date of bid submission are also allowed to be used apart from river sand as fine aggregate in design mix concrete. The supplier of crushed stone sand shall have valid BIS (Bureau of Indian standard) license for production as per IS code and shall be got approved from Engineer-in-Charge before transporting material to the site. The supplier shall satisfy himself that the material complies with the requirements of relevant IS 383:2016 and other IS codes with upto date amendment till last date bid submission and, if requested, shall supply a certificate to this effect to the purchaser.
- 8.8 The concrete mix design will be carried out by the agency, at his own cost, through one of the following laboratories/test houses to be approved by Engineer-in-Charge:

- a) IITs, NITs or any Govt. Engineering College.

**9. Grade Slab (As per Sub-head 4.0 of DSR-2023)**

150mm thick Grade Slab shall be provided over well-compacted filled-up earth, comprising the following layers:

1. With Local fine sand 150mm thick (As per item no. 2.27 of DSR'23)
2. 100 mm thick plain cement concrete below footing in M10 design mix concrete. (As per item no. 4.20.1.1 of DSR 2023)
3. 150 mm thick RCC grade Slab in M30 design mix concrete shall be laid at ground floors (as per Item No. 5.33.1.2 of DSR-2023 for M30 concrete) Specifications:
  - a. M30: Minimum Cement Content 350 kg/cum for RCC works. (As per item no. 5.33.1.2 of DSR-2023)

Note: In case the cement content in the design mix is more than the minimum cement content, **the contractor shall bear the cost of extra cement. Nothing extra for cement shall be paid on this account.**

- b. CRS TMT bars of approved sizes and details should be provided according to the approved structural drawings.
- c. Centering and shuttering required for the work are within the scope of the contractor.

**10. Specification for Self-Compacting Concrete in RCC:**

- 10.1 The work involves providing and laying in position, machine batched, machine mixed, Self Compacting Cement Concrete (SCC) produced in fully automatic plant (2 nos. plants installed by Contractor having minimum Capacity 60 + 30 cum/ Hours) of M-40 grade or more as per approved design mix using Ordinary Portland cement with adding cementitious material fly ash, silica fume etc. as per IS 15388 and EN-197-1 having minimum content of silica fume @ 5% of cement. SCC shall be with a slump flow of 650-750 mm at pouring in site (3 hrs. from batching) with minimum density of 2350Kg/m3. Viscosity shall be 6 to 12 seconds measured in V Funnel and pass ability shall be  $\geq 0.9$  measured in an L Box (3 rebar) at mix design/ development in the laboratory for Fair Finished reinforced cement concrete work in super structure at all floor levels, including transportation of concrete through transit mixer to site of laying, finishing, curing, vibrating (if required) for all leads, all floor levels, all height, pumping of concrete to site of laying, including admixtures conforming to IS 9103 as per designed proportions to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge. The Mix design shall comply with IS 4926, IS 456 design parameters and IS 516 & BS EN 12350 testing parameters (for parameters mentioned) and shall be got approved by Engineer-in- Charge before execution of the item. The Self compacting concrete shall comply provisions as per CPWD Specifications.

**Applicable codes:**

- i. EFNARC Specification and Guidelines 2005 – Self Compacting Concrete.
- ii. ACI 237R-07 – Self Consolidating concrete.
- iii. IS:456-2000 – Plain and reinforced code for practice.
- iv. IS: 2386 (Part-III 1963) Methods of test for aggregates for concrete Specific gravity, density, voids absorption and bulking.

10.2 The RCC work shall be with design mixed Self Compacting Concrete/normal reinforced cement concrete of specified grade as directed by the Engineer-in-charge, produced at site in fully automatic computerized batch mix concrete (BMC) plant conforming to IS:4925 after approval of the Engineer-in-Charge. In the nomenclature of items wherever letter M has been indicated, the same shall imply for the Design Mix of Self Compacting Concrete. The mix design shall be carried out as per EFNARC Specifications and Guidelines for Self Compacting Concrete / European Guidelines for Self Compacting Concrete. For mix design, all three workability parameters (filling ability, passing ability and segregation resistance) need to be assessed to ensure that all aspects are fulfilled. In case, the contractor wants to use Design Mix of Self Compacting Concrete from outside RMC plant, the prior approval of Engineer-in- Charge will be obtained and nothing extra shall be payable in case of use of RMC instead of BMC. In the designation of a concrete mix, letter M refers to the mix and the number to the specified characteristic compressive strength of 15 cm Cube at 28 days expressed in N / mm<sup>2</sup>. Self-Compacting Concrete shall include all quantity of cement as per design mix. The consumption of any quantity of cement as per approved design mix shall be included in the scope of work and no extra payment shall be considered on this account.

#### 10.3 **Ingredients:**

The sources of coarse aggregate, fine aggregate, water, mineral admixture, chemical admixture and cement to be used in self compacting concrete work shall be identified by the contractor and he will satisfy himself regarding their conforming to the relevant specifications and their availability before getting the same approved from the Engineer in-Charge.

- (a) Coarse Aggregate              It shall conform to IS:383 Maximum size: Upto 20 mm  
content ranges from 750 kg/cum to 1000 kg/cum
- (b) Fine Aggregate              It shall conform to IS:383
- (c) Water              It shall conform to IS:456.
- (d) Cement              OPC 43 Grade conforming to IS:8112(Part-I)/PPC
- (e) Mineral Admixture              It shall conform to standards, as applicable
- (f) Chemical Admixture              High range water reducing admixture (PCE based)  
conforming to IS:9103 in appropriate dosage.
  - i. Super plasticizers shall comply with provisions of EN 934-2: 2000.
  - ii. Viscosity modifying admixture in appropriate dosage.
- (g) Powder / Fine              Preferably be in the range of 400 kg/cum to 600 (size less than kg/cum 0.125 mm)
- (h) Water to Powder              0.85 o 1.0 (by volume)

All the materials identified from the sources as above by the contractor shall conform to CPWD Specification and other relevant standards, as applicable. The contractor, before proposing any of these materials for approval of Engineer-in-charge, shall himself assure that the proposed materials conform to the relevant specifications and standards.

#### 10.4 **Fine Filler**

Ordinary Portland cement with adding cementitious material like fly ash, Alccofine, silica fume etc., However the Engineer – in – charge reserves right to revisit the cementitious content in the mix based on its test results. Alccofine and silica fume shall be as approved by Engineer- In-Charge.

**10.5 Mixed process:**

Workability tests shall be conducted on every load, until consistent and complaint results are obtained. Subsequently, every delivered batch shall be visually checked before transportation to site, and routine testing carried out to be frequency specified in EN206.

**10.6 Placing:**

For forms in excess of 3 m in depth, the full hydrostatic head shall be used.

**10.7 Placing distance:**

Following to be ensured during placing:

- Limit the vertical free fall distance to 5 m
- Limit the permissible distance of horizontal flow from point of discharge to 10m

**10.8 Curing**

SCC tends to dry faster than conventional concrete because there is little or no bleed water at the surface. Initial curing shall therefore be commenced as soon as practicable after placing in order to minimize the risk of shrinkage cracking. Curing compound shall be used as per suggestion of Engineer in charge.

**10.9 Quality Control:**

**10.9.1 Production control**

All SCC shall be subject to production control under the responsibility of the Contractor, and this shall be in accordance with the requirements of EN 206-1, clause-

**10.9.2 Testing**

List of test methods for workability properties of SCC for Initial Mix Design of SCC.

Sl. No.	Method	Property
1	Slump-flow by Abrams cone	Filling ability
2	T50cm slum flow	Filling ability
3	J-ring	Passing ability
4	V-funnel	Filling ability
5	V-funnel at T 5 minutes	Segregation resistance
6	L-Box	Passing ability
7	U-box	Passing ability
8	Fill-box	Passing ability
9	GTM screen stability test	Segregation resistance
10	Orimet	Filling ability

**10.9.3 Tests for site quality control:**

**Table-1: Workability properties of SCC:**

Property	Test methods Lab (mix design)	Field (QC)	Modification of test according to max. aggregate size
Filling ability	1 Slump flow 2 T50cm slump flow	1 Slump flow 2 T50cm slump flow	None
	4 V-funnel 10 Orimet	4 V-funnel 10 Orimet	Max20 mm
Passing ability	6L-box 7 U-box 8Fill-box	3J-ring	Different openings is L-box, U-box and J-ring

Segregation resistance	9 GTM test 5V-funnel at T5minutes	9 GTM test 5V-funnel at T5minutes	None
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#### 10.9.4 Typical acceptance criteria for Self-compacting Concrete:

**Table-2: Acceptance criteria for Self-compacting concrete:**

<b>Sl. No</b>	<b>Method</b>	<b>Unit</b>	<b>Typical range of values</b>	
			<b>Minimum</b>	<b>Maximum</b>
1	Slump-flow by Abramscone	Mm	650	750
2	T50cm slum flow	Sec	2	5
3	J-ring	Mm	0	10
4	V-funnel	Sec	6	12
5	V-funnel at T5minutes	Sec	0	+3
6	L-Box	h2/h1	0.8	1.0
7	U-box	(h2/h1)m m	0	30
8	Fill-box	%	90	100
9	GTM screen stability test	%	0	15
10	Orimet	Sec	0	5

#### 10.10 Mix composition:

The mix composition shall satisfy all performance criteria for the concrete in both the fresh and hardened states. For the fresh concrete, the requirements are set out in Table 1 & Table 2 above. In the hardened state, the requirement of EN 206 shall be fulfilled.

##### 10.10.1 Initial Mix Composition:

Indicative typical ranges of proportions and quantities in order to obtain self-compatibility are given below: Further modifications will be necessary to meeting strength and other performance requirements.

- Water / powder ratio by volume of 0.80 to 1.10.
- Total powder content -160 to 240 litres (400-600 kg.) per cubic meter.
- Coarse Aggregate content normally 28 to 35% by volume of the mix.
- Water: cement ratio is selected based on requirements in EN206. Water content shall not exceed 20 litre /m3.
- The sand content shall balance the volume of the other constituents.

##### 10.10.2 Adjustment of mix:

Laboratory trials shall be used to verify properties of the initial mix composition. If necessary, adjustments to the mix composition shall then be made. Once all requirements are fulfilled, the mix shall be tested at full scale at the concrete plant or at site. In the event that satisfactory performance cannot be obtained, then consideration shall be given to fundamental redesign of the mix. Depending on the apparent problem, the following

courses of action might be appropriate:

- Using additional or different types of filler, (if available).
- Modified the proportions of the sand or the coarse aggregate.
- Using a viscosity modifying agent, if not already included in the mix.
- Adjusting the dosage of the super-plasticizer and/ or the viscosity modifying agent.
  
- Using alternative types of super-plasticizer (and/or VMA), more compatible with local materials.
- Adjusting the dosage of admixture to modify the water content, and hence the water/ powder ratio.

The formwork shall be suitably designed for achieving the desired form finish of the exposed concrete. For further specifications and guidelines reference shall be made to the EFNARC document **“Specifications and Guidelines for Self Compacting Concrete”**.

### **10.11 Curing of Concrete**

Curing of concrete shall be complete and continuous using water that is free of harmful amounts of deleterious materials that may attack, stain or discolour the concrete.

Immediately after compaction and completion of any surface finishes, the concrete shall be protected from evaporation of moisture by means of polyethylene sheets, wet hessian or other material kept soaked by spraying. As soon as the concrete has attained a degree of hardening sufficient to withstand surface damage, moist curing shall be implemented and maintained for a period of at least 14 days after casting.

Method of curing and their duration shall be such that the concrete will have satisfactory durability and strength and members will suffer a minimum distortion, be free from excessive efflorescence and will not cause undue cracking in the works by its shrinkage.

The top surface of the slabs and other horizontal surfaces shall be cured by impounding water in cement mortar bunds. Steeply sloping and vertical formed surfaces shall be kept completely and continuously moist prior to and during the striking of formwork by applying water to the top surfaces and allowing it to pass down between the formwork and the concrete. After removal of form, moist curing to be done by wrapping hessian cloth, etc. and keeping it moist by suitable means.

Approved non-wax base curing compounds can be applied on vertical and inclined surfaces, if it is proved that by using curing compound the concrete shall not have less strength than concrete cured by water curing. It shall not leave any discolouration on the structural concrete.

### **10.12 Concreting of Narrow Members**

Wherever the concreting of narrow member as in case of walls piers/ column (as adjudged by Engineer-in-Charge) is required to be carried out within shutters of considerable depth, temporary openings in the sides of the shutters shall, if so desired by the Engineer-in-charge, be provided to facilitate the pouring and consolidating of concrete. Before any concreting is commenced, shutters and centering shall be carefully examined and the space

to be occupied by the concrete shall be thoroughly cleaned out. The concrete in such members shall be compacted with suitable shutter vibrators as appropriate.

#### **10.13 Protection of Concrete below ground level**

Concrete placed below the ground shall be protected from falling earth during and after placing. Concrete placed in ground containing deleterious substances shall be kept free from contact with such ground and with water draining there from during placing and for a period of seven days or as otherwise instructed thereafter. Approved means shall be taken to protect immature concrete from damage by debris, excessive loading, abrasion, vibrations, deleterious ground water, mixing with earth or other materials, and other influences that may impair the strength and durability of the concrete.

#### **10.14 Construction Joints**

Before the concrete is fully hardened, all latency shall be removed by scrubbing the wet surface with wire or bristle brushes. Care shall be taken to avoid dislodgement of particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. Particular attention shall be given to corners and close spots.

Construction joints in all concrete work shall be made as directed by the Engineer-in-Charge. Where vertical joints are required, these shall be shuttered as directed and not allowed to take the natural slope of the concrete. Before fresh concrete is placed against a vertical joint, the old concrete shall be chipped, cleaned and moistened.

When a horizontal construction joint is formed, provision shall be made for interlocking with the succeeding layer by the embedment of saturated wooden blocks or wooden strips bevelled on four sides to facilitate their removal. Prior to the next pour the wooden pieces shall be loosened and removed in such a manner as to avoid injury to the concrete. After about 8 to 12 hours of concreting, contact surface shall be hacked to expose the aggregate surface and remove laitance. Immediately thereafter clean the surface using compressed air to remove all the dirt. The surface shall then be compressed cleaned to remove all dirt. Before applying fresh concrete, the contact surface shall be wetted for at least 6 hours. After the surface has dried, a coat of cement slurry with application of Nito bond by brush application only to improve the property of the previous surface for compatibility with the fresh green concrete to achieve the bond strength and attain the homogeneous surface of the concrete, at the dosages of approved manufacturer shall be applied uniformly using a brush over the old concrete just before placing the fresh concrete. The fresh concrete shall be placed immediately after applying the cement coats. The fresh concrete shall be thoroughly vibrated near the construction joint so that the mortar from the new concrete flows between the large aggregate and develop proper bond with old concrete. The construction joint shall ensure proper bond and leak proof joint.

If use of metal, rubber or plastic water stops is specified, this shall be cast into joints. Measures shall be taken by the Contractor to ensure that no displacement or distortion of water stops takes place during placing of concrete. The construction joints shall ensure proper bond and leak proof joint.

#### **10.15 Defects in Concrete – Cracks**

If external cracks developed in concrete construction are more than 0.2 mm and in the opinion of the Engineer-in-Charge, these are detrimental to the strength of the construction,

the Contractor at his own expense will conduct ‘Loading Tests’ on the structure in the manner as decided by Engineer-In-Charge. If under such test loads the cracks develop further, the Contractor shall dismantle the construction, carry away the debris, replace the construction and carry out all consequential work thereto.

If any cracks develop in the concrete construction are not more than 0.2 mm or in the opinion of the Engineer-in-Charge, the cracks are not detrimental to the stability of the construction, the Contractor at his own expense shall grout the cracks with neat cement grout or with other composition as directed by Engineer-in-Charge and also at his own expense and risk shall make good to the satisfaction of the Engineer-in-Charge all other works such as plaster, moulding, surface finish, which in the opinion of the Engineer-in-Charge have suffered damage either in appearance or stability owing to such cracks. The Engineer-in-Charge's decision as to the extent of the liability of the Contractor in the above matter shall be final and binding. If desired by Engineer-in- charge, the contractor may have to make suitable arrangement of Grouting/Jacketing/Strengthening etc. for rectification for which the total cost will be borne by contractor.

#### **10.16 Preparation of mixes as per approved design mix and conducting confirmatory test at field lab**

- The contractor shall make the cubes of trial mixes as per approved mix design at site laboratory for all grades using sample of approved materials proposed to be used in the work prior to commencement of concreting and get them tested for 7 days and 28 days. Test cubes shall be taken from trial mixes as follows.
- For each mix, a set of six cubes shall be made from each of the three consecutive batches. Three cubes from each set of six shall be tested at age of 7 days and remaining three cubes at age of 28 days. The cubes shall be made, cured, transported and tested strictly in accordance with specifications. The average strength of nine cubes at age of 28 days shall exceed the specified target mean strength for which design mix has been approved, the evaluation of test results will be done as per IS:456.

#### **10.17 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. Additional samples shall be prepared, if required, as per direction of Engineer in charge for testing samples cured by accelerated method as described in IS: 9103.

- **Test Results of Sample**

The test results of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than +/- 15% of the average. If more, the test results of the sample are invalid. 80% of the total tests shall be done at the laboratory established at site by the Contractor and remaining 20% in the laboratory of Government Engineering colleges, or in any other approved laboratory as directed by the Engineer-in- charge.

- **Standard For Acceptance**

- Standard of acceptance shall be same as specified in clause 16 of IS 456-2000.

10.18 In order to keep the floor finish as per direction of Engineer-in-charge and as per Architectural drawings and to provide required thickness of the flooring as per Structural Drawings, the level of top surface of RCC shall be accordingly adjusted at the time of its centering, shuttering and casting which is included in the scope of the work.

#### 10.19 Tolerances

- Tolerances shall be as per CPWD specifications and relevant BIS code. In case of rejection of concrete on account of unacceptable compressive strength, governed by para ‘Standard of Acceptance’ as above, the work for which samples have failed shall be redone at the cost of contractors. However, the Engineer in charge may order for additional tests (like cutting cores, ultrasonic pulse velocity test, load test on structure or part of structure etc.) to be carried out at the cost of contractor to ascertain if the portion of structure wherein concrete represented by the sample has been used, can be retained on the basis of results of individual or combination of these tests.
  - The contractor shall take remedial measures necessary to retain the structure as approved by the Engineer in charge.
- 10.20 Cement arranged by the contractor will be OPC 43/53 Grade (in bags/bulkers) conforming to IS:8112(Part-I). However, in the event of change of type of cement, change of source of coarse/ fine aggregate, filler materials, chemical admixture, etc. to be used, fresh design mix shall be got done by the contractor from approved labs at his own cost and nothing extra shall be payable on this account. This shall be subject to the approval of design mix by the Engineer-in-charge.
- 10.21 The various ingredients for mix design and laboratory tests connected therewith shall be sent to the lab / test houses through the Engineer-in-Charge and the samples of such aggregates sent shall be preserved at site by the department. In the event, if all the above laboratories are unable to carry out the requisite design / testing connected therewith, the contractor may have it done from any other Govt. laboratory with prior approval of Engineer-in-Charge.
- 10.22 As per general engineering practice, level of floors in toilet / bath, balconies, shall be kept 12mm to 20mm or as required, lower than general floors, the shuttering should be adjusted accordingly. In toilets/wash, wet area/shower area shall be additionally down by 12 to 15mm from rest of toilet, the shuttering should be adjusted accordingly. The landing level of mumty/ staircase cabin shall be kept one riser level higher than adjoining slab level so as to accommodate water proofing treatment over terrace slab. In case of kitchen slab the portion of floor trap below kitchen platform shall be kept at lower level as per approved drawings.

For the execution of centering and shuttering, the contractor shall use Reebol chemical mold release agent as shuttering oil as approved by Engineer-in-charge.

#### 10.23 Charges for design mix:

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

### 11. FORM WORK:

### 11.1 General:

- a. RCC work in the 09 Nos. residential towers above ground/ stilt level may be done by using readymade aluminium formwork for monolithic RCC construction, if the contractor proposes such formwork. Components like shear walls, non-shear walls, lift walls, stairs, beams, columns and slabs etc. of residential building (09 nos. towers) shall be constructed by using the readymade aluminium form work, unless otherwise specified. The Contractor shall arrange minimum **Nine** sets of aluminium form works for monolithic concrete construction. (One set means four dwelling units including common area and staircase etc. for one block). The Aluminium form work should be minimum 4 mm thick with aluminium of 6061 T6 Grade. **The formwork should be certified by the Firm every month for fitness and usability and execute further work with the approval of Engineer-in-charge.**
- b. For RCC framed construction – RD Bungalow, Club House and other buildings like public toilet, guard room, boundary wall, etc. will be RCC framed structure and can be cast with properly designed shuttering system as per CPWD specifications and OM No. 17/SE(TAS)/BMTPC/2024/195 (H) dated 14.06.2024. Use of Steel plate/ plywood/ Marine ply may be allowed subjected to approval by Engineer-in-charge. The Contractor shall ensure that there shall be no leakage at formwork joints and there shall be no movement at joints or bending of the formwork under pressure of the concrete. The entire responsibility of planning, design, erection and safety of formwork shall lie with the Contractor.

All shuttering shall be designed by contractor and submitted to Engineer in charge along with design calculations for approval. Shuttering shall be executed as per approved shop drawing and design calculation.

### 11.2 Form work design shall consider the following:

- a) Dimensional tolerance.
- b) Demountable without shock, disturbance or damage to concrete.
- c) All construction joints in beams and slabs shall be provided as shown in drawings.
- d) Ties shall be provided where required.
- e) Cambers shall be provided where shown.
- f) Props / supports of extra ceiling height shall be specially designed.

### 11.3 Formwork placement and removal:- **Form work shall be placed and removed as per time line provided in CPWD-specifications or as decided by engineer-in-charge in accordance with QA plan or sound engineering practice.**

## 12. Expansion Joint

### 12.1 Extruded Aluminum Modular type expansion joint systems shall be provided at all Floor-to-Floor joints, Wall to Wall joints, Roof to Roof Joints, Ceiling to Ceiling joints and Terrace joints. Expansion joint treatment to be done as approved by Engineer in Charge as per design requirement.

Seismic/ expansion joint of appropriate width for horizontal and vertical portion of the structural members (modular) expansion joint system shall be related with all locations as per drawings. The joints system will be of extruded aluminum base members, self-aligning/self-centering arrangement and support plates etc. as per ASTM B221-02 in

accordance with CPWD DSR-2023 relevant item amended upto the last date of submission of bid as required. The system shall be such that it provides floor to floor /floor to wall expansion control system for various vertical locations in load application areas that accommodates multi directional seismic movement without stress to its components.

- 12.2 System shall consist of metal profiles with a universal aluminum base member designed to accommodate various project conditions and finish floor/wall/ceiling/roof treatments. The cover plate shall be designed of width and thickness required to satisfy projects movement and loading requirements and secured to base members by utilizing manufacturer's pre-engineered self-centering arrangement that freely rotates/moves in all directions. The Self - centering arrangement shall exhibit circular sphere ends that lock and slide inside the corresponding aluminum extrusion cavity to allow freedom of movement and flexure in all directions including vertical displacement. Provision of moisture barrier made of vinyl EPDM is mandatory requirement in the joint system to have water tight joint. (Material shall conform to ASTM 6063). Sealant shall be a one-part Polysulphide base synthetic rubber / Silicon sealant as per Manufacturer Specifications and approved by Engineer-in-charge.
- 12.3 Application procedure expansion joint shall be provided as per approved drawing and as per direction of Engineer-in-Charge. All joints shall be cleaned and free from loose aggregates; the edges shall be in proper line. The joint shall be of the appropriate width as per the drawings. Provide continuous frame on each side of the joint, designed to support EPDM gasket and center plate where required. After installing the frames at both sides, place the centre plate in between the two frames and finally flush the gasket on the top of the frames. Fixing of the joint after proper assembly of the components shall be through the proper stainless-steel counter skunked screws, which shall be drilled to the base concrete slab beams with a bonding agent.
- 12.4 The specifications and method statement shall be submitted by the agency well in advance before the start of execution. The execution shall be allowed only after due approval of Engineer-in-Charge.

#### **12.5 Guarantee for the Expansion Joint Work**

The contractor shall be fully responsible and shall guarantee proper performance of the entire expansion joint treatment work inclusive of all elements in the expansion joint. Ten years Guarantee bond in prescribed Proforma as per the CPWD format shall be submitted by the contractor which shall also be signed by both the specialized agencies and the contractor to meet their liability / liabilities under the guarantee bond. However, the sole responsibility about efficiency of expansion joint work shall rest with the contractor. If any defect is noticed during the guarantee period, the contractor shall rectify it within 7 days of receipt of intimation of defects in the work. If the defects pointed out are not attended to within the specified period, the same will be got done from another agency at the risk and cost of contractor.

#### **12.6 Armour Board for Expansion Joint:**

Armour board of approved colour shall be provided between expansion joints, thickness built up using 10mm specifically extruded high performance sheet minimum density 28 kg per cum and compression strength 0.21 kg/sqm when tested as per ASTM D-3575 including using double sided adhesive tape of 25x25x2 mm at four places per sqm to the casted surface to form the expansion joint and will become one side of the shuttering while

the expansion joint is being created, including cost of all materials, transportation, cutting and placing to the required size, labour charges, sundries, wastage etc. at all levels complete as per drawings and as per direction of Engineer-in-Charge.

#### 12.7 Technical Specification of Armour Board Laying Procedure

While creating expansion joint the armour board will become one side of shuttering. To hold two free sides of shuttering a MS bolt of 12mm dia with both sides threaded will be used at every 1 Mt interval with matching nuts with concrete sleeve 50mm x 50 mm. This bolt shall be taken out & hole of sleeve be grouted afterwards with cement mortar.

When forming expansion joint with armour board in in-situ concrete, joint-sealing slots shall be formed in the following manner.

The armour board is to become one side of shuttering. Cut off a strip of armour board equal to D. Further, cut the strip along the joint length into two.

The depth of top strip shall be =  $(1.25 W \text{ or } W + 5\text{mm whichever is less}) + (W/2 \text{ or } 15\text{mm whichever is less})$  and the bottom strip = (D-top strip), where D = slot depth in MM & W = slot width in MM

Pin the top strip back on to the bottom strip using nails at two-inch intervals. Ensure that the slot is clean and dry Install a strip of filler material on top of armour board flush with finished surface using either a separation Tape/synthetic rubber-based adhesive.

Just prior to sealing pull off the top strip to create uncontaminated sealing slots ready for preparation & sealing Masonry Works:

**12.8 Autoclaved Aerated Concrete Blocks (AAC):** AAC of Grade -I, Density (in oven dry condition)- 651 – 750 Kg/m<sup>2</sup> shall be provided for all types of Masonry Walls as per BIS code 2185 (part 3) 1984. Compressive strength of AAC blocks shall be minimum 5 N/mm<sup>2</sup>, conforming to IS 2185/1984. The Blocks wherever used shall be of minimum 250 mm thickness except partition walls and in wet areas including toilets/bathrooms walls required as per drawings 150mm thickness may be allowed. Polymer modified adhesive mortar/ cement mortar shall be used for construction of masonry walls as per the approval of Engineer in Charge and manufacturer's specifications. Adequate mesh mechanism of membrane fabric as per manufacturer specification will be necessary to avoid ingress / transgress of thermal cracks in the joints of the masonry.

**12.9** For Low height Masonry Walls, RCC Coping shall be provided of required sizes as per drawing and direction of Engineer in charge. **The blocks shall not be soaked in water and instead they shall be dipped in water and taken out immediately to have only moist surface.**

**12.10** Bed joint 2 Nos. 6mm dia reinforcement bars may be placed in the joints after every 3rdcourse to have good lateral stability.

**12.11** It shall be ensured that the lintels rest at either end of window opening only on full block and not on half or part blocks. Reinforcement shall be placed in the sill course of windows openings in two successive horizontal joints and extend the same at least to 600mm on either side of the jamb surface.

**12.12** At a RCC column interface an MS anchor ("L" shape), of size 50x4 mm, 300 mm long out of which 100 mm length of L fixed on column using minimum two SS screws with PVC sleeves and 200 mm side of L embedded in masonry, be placed and fixed with screws at every 4th course so as to anchor the wall with RCC column for better lateral

- stability. Curing of the masonry shall be done only by spraying/fogging water with water spray machine and no flooding shall be done by water jets / buckets.
- 12.13 Preferably Pre-Cast Concrete Solid Block M10 as per CPWD Specifications will be used in the wet areas like toilet kitchen, shaft balcony, etc. and in toe wall and other masonry work below plinth/ foundation. These Blocks shall be manufactured from C&D materials from the approved manufacturers. Wherever required and considered by Engineer-in-charge necessary to use clay FPS bricks, the same shall be used in the work with mortar as per CPWD specification.
- 12.14 These shall also in the scope of work and tendered amount.

### **13. Door Frames:**

#### **13.1 Wood Polymer Composite Door Frame**

Providing and fixing factory made single extruded WPC (Wood Polymer Composite) solid door/ window/ Ceosetory windows & other Frames/ Chowkhat of minimum size Frame size 50 x 100 mm, comprising of virgin PVC polymer of K value 58-60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/ wheat husk) and non-toxic additives (maximum toxicity index of 12 for 100 gms) fabricated with miter joints after applying PVC solvent cement and screwed with full body threaded star headed SS screws having minimum frame density of 750 kg/cum, screw withdrawal strength of 2200 N (Face) & 1100 N (Edge), minimum compressive strength of 58 N/mm<sup>2</sup>, modulus of elasticity 900 N/mm<sup>2</sup> and resistance to spread of flame of Class A category with property of being termite/ borer proof, water/ moisture proof and fire retardant and fixed in position with SS dash fasteners of required dia and length complete as per direction of Engineer-In- Charge.

#### **13.2 Teak Wood Door Frame:**

The factory-made door frames shall be chemically treated, kiln seasoned 2nd class teak wood, minimum 120x60mm size with teak ply veneering minimum 3mm thick manufactured in approved factory. Door frames shall be fixed in position with hold fast lugs or with dash fasteners of required dia & length as per scale of amenities given in this document to be provided as per relevant CPWD specifications 2019 with upto date correction slips. The door frames shall be finished with minimum 2 coats of melamine polish as specified in this NIT. The agency shall submit the list of at least three reputed and well- equipped factories with their credentials to Engineer-in-Charge for approval before placing order. Door frames shall have provisions of mortar guards, lock strike plate and shock absorbers, etc. the anchor fastner of approved size and make shall not be less than 8 Nos. in each door frame upto opening 1100 mm and more than 1100mm shall not be less than 10 Nos. or if required more as per design is also in the scope of work as per direction of Engineer-in-charge.

- 13.3 **Architrave** – all wooden doors shall be architrave of II<sup>nd</sup> class teak wood beading of minimum size 50x20 mm with edge moulding or approved section, design and finished with melamine polish matching with door frame shall be provided outside along the door frame with the wall as per directions of Engineer-in-Charge.

### **14. Door Shutter:**

#### **14.1 Wood Polymer Composite:**

Providing and fixing factory made 35 mm thick single extruded WPC (Wood Polymer Composite) solid decorative type flush door shutter of required size comprising of virgin polymer of K value 58-60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/wheat husk) and non-toxic additives (maximum toxicity index of 12 for 100 gms) having minimum density of 650 kg/cum and screw withdrawal strength of 1800 N (Face) & 900 N (Edge), minimum compressive strength 50 N/mm<sup>2</sup>, modulus of elasticity 850 N/mm<sup>2</sup> and resistance to spread of flame of Class A category with property of being termite/borer proof, water/moisture proof and fire retardant. WPC to be laminated with PVC foil of minimum 14 microns thick of approved design pasted with hot melt adhesive on both faces of shutter and fixing with stainless steel butt hinges of required size with necessary full body threaded star headed counter sunk S.S screws, all as per direction of Engineer-In- Charge.

#### **14.2 Flush door shutters:**

Providing and fixing ISI marked flush door shutters conforming to IS : 2202 (Part I) The flush doors shutters shall be factory-made 40/38 mm and other thickness as per mentioned in Drawing 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 with 1.5mm thick 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 and 6mm thick external teak wood lipping on all edges of the shutter and finished with melamine polished to matched with the color shade of door as approved by the engineer-in-charge. The main flush door shall be provided with 4 equal grooves of 5- 8mm wide and 2mm deep with Aluminium/SS 304 T Profile Strip of 1mm thickness inserted in it (PVD Coated in approved colour) on both sides) fixed in pattern on both sides as approved by engineer-in-charge. The internal room flush door shall be provided with groove pattern on both sides as approved by engineer-in-charge. The shutter shall be factory made in complete shape as described above. The shutter shall be immune to termites and borers, bonded with phenol formaldehyde resin. The door shall be fixed to door frame with SS butt hinges of minimum 3mm thick & required size with necessary screws (304 grade stainless steel) as per relevant CPWD specifications 2019 with upto date correction slips, all complete as per directions of Engineer-in-Charge.

Hydraulic door closer of approved make and specification shall be provided in all SS door at main entrance of every unit.

All external doors (main entrance door & balcony door) shall be provided with rubberized door flashing, of approved make, quality and specification, at the bottom rails for protection from insects and rainwater, etc. as approved by Engineer-in- charge.

#### **14.3 Hardware for Door:**

- The stainless-steel fittings and fixtures (Premium range) shall be in SS Grade 316, machine made and free of fabrication marks, residual effects of welding /riveting etc. Tower bolts in side the main doors at top edge shall be two nos of minimum length 450mm as approved by engineer-in-charge.
- The fittings shall be finished in a satin finish (brushed finish-satin's commercial

purpose) except wherever specified otherwise. The brush effect shall be uniform and without any variations.

- Irrespective of the stipulations contained above, the agency shall produce samples for all the fittings well in advance and a written approval for the chosen sample shall be obtained from the Engineer-in-Charge. The decision of the Engineer-in-Charge in respect of the specifications, quality and make of fittings to be used at site shall be final and binding on the agency. Nothing extra shall be payable on this account.
- All the fittings shall provide with all such accessories as are required to complete the item in working condition whether specifically mentioned or not in the bill of quantities, specifications& elsewhere in this tender document. The quoted rates shall be deemed to be all inclusive for a complete item fit for use including all material, labour, T & P, specials, fixing arrangements, nuts, bolts, screws, bushes, all required connection pieces etc. as well as making good the surface wherever required.
- All the accessories including brackets, nuts, bolts, screws, bushes etc. shall be of SS grade 316 with the quality and make as approved by Engineer-in-charge.
- All the fittings shall be got fixed through the authorized “fixing agency” on the approved list of manufacturers of fittings. The said fixing agency shall be got approved from the Engineer-in Charge well in advance before start of fixing at site.
- All the fittings including accessories shall be accompanied with certificate of origin and representative test certificate of conformance with relevant code form the manufacturer with each lot of supply. The test certificate shall clearly indicate the lot number of the supplied fittings.
- The specifications and method statement shall be submitted by the agency well in advance before the start of execution. The execution shall be allowed only after due approval of Engineer-in-Charge.

## **15. Melamine Polish**

Applying three or more coats of melamine polish of approved quality and shade to have desired finish to teak wood members, veneering, beadings, architraves, etc. including preparing of surface by sand papering, applying putty, etc. complete with following process in the sequence as detailed below:

1. The surface to be polished is rubbed with sand paper 80/120 no. and then with sand paper of 160/180 nos.
2. Applying two coats of sealer with spray gun and allowing sufficient drying time for 1st coat and 2nd coat is allowed to dry for 8 to 12 hrs.
3. On drying of sealer coat, wet rubbing with emery cloth of finer grading with ample water to remove excess sealer layer and make the surface further smooth after this wet rubbing, then surface is applied with special grade melamine fillers to fill all the small and big holes/grooves etc. Filler coat to be allowed to dry for 4 to 6 hrs on which again a light wet rubbing is done this surface is further allowed to dry for 12 hrs.
4. On this, 1st coat of melamine polish is applied with spray gun using melamine clear polish and melamine thinner in required proportion. This 1st coat is allowed to dry for 24 hrs then this dry surface is again fine wet rubbed smooth, which is further allowed to dry for 12 hrs. The final melamine polish is applied with compressor pressure spray gun using melamine clear polish and melamine thinner mixed in required proportion complete as per direction of Engineer-in-Charge. (Final coat to

be done in 1 or 2 layers without gap of time.)

#### 15.1 Preparation of surface

The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Surface must be dry, free from dust, oil, wax, greases etc.

#### 15.2 Application

Mix melamine (matt or gloss) base with the catalyst in the specified ratio as per manufacturers specification. Add melamine thinner upto 30% (as specified by the manufacturer) by volume of mixture. Stir it and allow it to mature for 2-3 minutes. The melamine is sprayed, using spray gun pressure of 45-55 psi, from a distance of 7"-10" from substrate.

### 16. uPVC Door, Windows, Door-Windows, Ventilators etc. specifications

**Extent and Intent:** - All uPVC elements shall be manufactured in factory and shall be installed at site through an approved specialized agency, who shall furnish all material, labour, accessories, equipment, tool and plants and incidentals required for providing and installing uPVC windows, louvers and other items as called for on the drawings / shop drawings or as directed by the Engineer-in-charge. The drawings and specifications cover the major requirements only. The supplying of additional fastenings, accessories, fixtures and other items not mentioned specifically herein, but which are necessary to make a complete installation shall be a part of this contract. Hinges for casement uPVC window shall be stainless steel Friction stays of Grade AISI 304 of approved make. uPVC doors, window, ventilators etc approvals design, D-type handle, other fittings, single and multi-point locking system for windows and doors respectively shall be as per CPWD specification with upto date correction slip till last date of bidding and also CPWD specification correction slip no 17 dated 06.05.2022.

16.1 **General:** -uPVC door, windows etc. shall be of sizes, section details as shown on the drawings. The details shown on the drawings indicate generally the sizes of the component parts and general standards. Before proceeding with any manufacturing, the contractor shall prepare and submit complete manufacturing and installation drawings for approval of the Engineer-in-Charge and no work shall be performed until the approval of these drawings is obtained.

16.2 **Samples:** - Samples of windows, door, door-windows, ventilators etc. shall be fabricated, assembled in the factory and submitted to Engineer-in-Charge for his approval. They shall be of sizes, types etc. as decided by Engineer-in-Charge.

16.3 **Sections:** - All uPVC elements shall be fabricated as per detailed drawings. The sections shall be extruded by the manufacturers approved by the Engineer-in-Charge. Similar design, size and thickness uPVC profiles and reinforcements to be followed from top floor to ground floor as per the structural design requirements at top floor.

16.4 **Handling and Stacking:** -Fabricated materials shall be carried in an approved manner to protect the material against any damage during transportation. The loading and unloading shall be carried out with utmost care. On receipt of material at site, it shall be carefully examined to detect any damaged pieces. Arrangements shall be made for

expeditious replacement of damaged pieces/ parts. Materials found to be acceptable on inspections shall be repacked in crates and stored safely.

#### 16.5 Fabrication:

- (i) The structural design and drawing proof checked from approved IIT/NIT/Engineering Institute shall be provided by uPVC window/door manufacture and submitted through the contractor to the Engineer-in-charge for approving good for fabrication. Charge of proof checking shall be born by contractor.
- (ii) According to the drawing, the required dimension and length of uPVC frame, sash and mullion profiles shall be mitered cut and reinforced with galvanized iron section of required length and thickness.

#### 16.6 Specification for Casement type UPVC doors & windows:

- 16.6.1 Providing and fixing of approved colour and make UPVC doors and windows. All windows/doors Glass & hardware must be as per approved make, sizes & pattern of windows shall be as per approved architectural drawings.
- 16.6.2 Profile frame of high impact modified grade uPVC of minimum sizes as per following - 67mmx64mm (outer frame Casement window type) and Sash of 67mmx 110mm (casement window type) & 67mm x 80mm (outer frame Casement door type) and Sash of 67mmx 110mm (casement door type) wall thickness of profile must be  $2.3 \pm 0.2$ mm for windows &  $2.3 \pm 0.2$ mm for doors. Profile must be colorfast and conform to standard EN12608. The profile sections should have multi (min 2 to 3 chambers) chamber frames, sash & mullion (wherever required) extruded profile duly reinforced with GI mild steel section made from roll forming process fitted in continuous length, in closed chamber. The thickness of GI should be selected to meet the wind load requirement as per IS 875- Part III on sash/mullion. Sash shall be additionally reinforced with minimum  $2.2 \pm 0.2$  mm thick galvanized steel box reinforcement at every interlocking junction. Contractor shall submit wind load calculations complying with IS-875-III and shall be got vetted from approved institutions i.e. IIT/NIT/Engineering Institute before materials brought at site. Minimum steel reinforcement thickness shall be of  $2.2 \pm 0.2$ mm. UPVC Windows & Doors must be fabricated with fusion welded corners & must conform to the strength requirements based on wind load as per IS 875-Part III. All hardware fitted must be of SS 316 grade except handles to be of zinc/Aluminium alloy casted with powder coated and friction stay 304 grade. Glass to be fitted in windows shall be as per latest ECBC requirements for U-value and shall be as per approved makes with weather seal EPDM gasket. All sliding uPVC door shall be fixed with low threshold Aluminium channel for roller track. **There would be manufacturers' warranty of 10 years on Profile frames & one year on hardware from the date of completion of the work. UPVC windows & doors must be installed by profile manufacturer only.**

**Note:** For UPVC frames, sash and mullion extruded profile frames, minus 5% tolerance in dimension i.e. in depth & width of profile shall be acceptable.

#### 16.7 Specification for Sliding type UPVC doors & windows:

- 16.7.1 Providing and fixing of approved colour& make uPVC doors & windows. All

windows/doors Glass & hardware must be as per approved makes, sizes & pattern of windows shall be as per approved architectural drawings

- 16.7.2 uPVC sliding Door Profile of high impact modified grade uPVC of sizes as per following-frame of minimum size 135mmx50mm and sash of minimum size 50mmx82mm and both shall have wall thickness of profile  $2.3\pm0.2$ mm. And sliding Windows Profile of high impact modified grade uPVC of minimum sizes as per following- frame of minimum size 116 x 45 mm & sash size 46 x 62 mm and both shall have wall thickness of profile  $2.3\pm0.2$ mm. Profile must be colourfast and conform to standard EN12608. The profile sections should have multi (min 2 to 3 chambers) chamber frames, sash & mullion (wherever required) extruded profile duly reinforced with GI mild steel section made from roll forming process fitted in continuous length, in closed chamber. The thickness of GI should be selected to meet the wind load requirement as per IS 875- Part III on sash/mullion. Sash shall be additionally reinforced with minimum  $2.2 \pm 0.2$  mm thick galvanized steel box reinforcement at every interlocking junction. Contractor shall submit wind load calculations complying with IS-875-III and shall be got vetted from approved institutions i.e. IIT/NIT before materials brought at site. Minimum steel reinforcement thickness shall be of  $2.2 \pm 0.2$  mm. UPVC Windows & Doors must be fabricated with fusion welded corners & must conform to the strength requirements based on wind load as per IS 875-Part III. Glass to be fitted in windows shall be as per specifications of DGU and shall be as per approved makes and fixed with uPVC extruded glazing beads of appropriate dimension with weather seal EPDM gasket, wool pile & rollers (each having bearing capacity of 120 Kg). All sliding uPVC door shall be fixed with low threshold Aluminium channel of 3 tracks & 24mm depth for roller track. The aluminium channel shall have strength to carry load of complete door units and other applicable loads. **There would be manufacturers' warranty of 10 years on Profile frames & one year on hardware from the date of completion of the work. UPVC windows & doors must be installed by profile manufacturer/authorised vendor only.**

Note: For uPVC frames, sash and mullion extruded profile frames, minus 5% tolerance in dimension i.e. in depth & width of profile shall be acceptable.

#### 16.8 Specification for Fixed type windows/ ventilators:

- 16.8.1 Providing and fixing of approved colour & make uPVC windows/ventilators. All windows/ventilators Glass & hardware must be as per approved makes, sizes & pattern of windows shall be as per approved architectural drawings.
- 16.8.2 uPVC fixed windows/ventilator Profile of high impact modified grade uPVC of sizes as per following- frame of minimum size 67 x 60 mm, sash 67 x 80 mm & mullion 67 x 80 mm and all having wall thickness of profile  $2.3\pm0.2$ mm. Profile must be colourfast and conform to standard EN12608. The profile sections should have multi (min 2 to 3 chambers) chamber frames, sash & mullion (wherever required) extruded profile duly reinforced with GI mild steel section made from roll forming process fitted in continuous length, in closed chamber. The thickness of GI should be selected to meet the wind load requirement as per IS 875- Part III on sash/mullion. Sash shall be additionally reinforced with minimum  $2.2 \pm 0.2$  mm thick galvanized steel box reinforcement at every interlocking junction. Contractor shall submit wind load calculations complying with IS-875-III and shall be got vetted from approved institutions i.e. IIT/NIT before materials

brought at site. Minimum steel reinforcement thickness shall be of  $2.2 \pm 0.2$  mm. UPVC Windows/ ventilators must be fabricated with fusion welded corners & must conform to the strength requirements based on wind load as per IS 875-Part III. Glass to be fitted in windows shall be as per specifications of DGU and shall be as per approved makes and fixed with uPVC extruded glazing beads of appropriate dimension with weather seal EPDM gasket, wool pile & rollers (each having bearing capacity of 120 Kg). **There would be manufacturers' warranty of 10 years on Profile frames & one year on hardware from the date of completion of the work. UPVC windows & ventilators must be installed by profile manufacturer/authorised vendor only.**

Note: For uPVC frames, sash and mullion extruded profile frames, minus 5% tolerance in dimension i.e. in depth & width of profile shall be acceptable

#### **16.9 Standards & Tests (Certificates must be submitted)**

Follow the British Standard (BS EN 12608, UK)/ IS: 17953, CEPT Ahmedabad, tested by Central Building Research Institute, Roorkee & Shriram Institute of Industrial Research, New Delhi.

All uPVC work shall be executed as per CPWD specification Vol-I as amended upto last date of submission of the bid. Minimum percentage of titanium dioxide content in uPVC profiles shall not be less than 7.00 percent and calcium carbonate content shall not be more than 10.00 percent.

#### **16.10 Installation :-**

- 16.10.1 The window, door, door-windows, ventilators etc. must be aligned in plumb and water level and installed using high-quality stainless-steel fasteners. The outer frame of door/ window and sill/soffit/jambs must be sealed with silicone-based sealants from outside and acrylic paintable sealant from inside. Installation shall be done by manufacturer.
- 16.10.2 The gap between uPVC window / door and adjacent RCC/Masonry/Stone cladding work shall be filled with weatherproof silicon sealant of approved make to maximum 5mm depth and 5mm width to allow expansion/contraction of uPVC profiles. Silicon sealant of matching colour of uPVC profile shall be applied over backer rod.
- 16.10.3 The fasteners to be used for fixing window/door units to the opening shall be Stainless Steel grade 316 of minimum 10mm Dia. & required length so as to have minimum penetration of 75mm into the structural members i.e. side jamb, sill & soffits (excluding the thickness of cladding/stone/finishing).
- 16.10.4 The fastener shall be sufficiently distanced from the edge of the frame and at maximum interval of 450mm c/c.
- 16.10.5 TPV/Neoprene gaskets: The contractor shall provide and install TPV/Neoprene gaskets of approved size, profile & make at all locations as shown and as called for to render the windows absolutely air tight and weather tight. The contractor shall produce samples of the gaskets for approval and shall procure the same after approval only.
- 16.10.6 Fittings: Hinges, stays, D-type handles, tower bolts, locks and other fittings shall be of quality and manufacturer as approved by the Engineer-in-Charge. All the fittings of window, door, door-windows, ventilators etc. are included within the scope of work and the contractor shall clearly indicate these in the shop drawings. Samples of all the fittings shall be submitted by the contractor for obtaining approval of the Engineer-in-charge before placing any bulk orders.

- 16.10.7 Manufacturer's Attendance: It shall be responsibility of the contractor that the approved manufacturer immediately prior to the commencement of glazing shall adjust and set all windows and doors and accept responsibility for the satisfactory working of the opening frames.
- 16.10.8 Silicon sealant: The gaps between frames and supports and also any gaps in the windows sections shall be raked out as directed and filled with silicon sealant of approved colour and make to ensure complete water tightness. The silicon sealant shall be of such colour and composition that it would not stain the masonry/concrete work, shall receive paint without bleeding, will not sag or run and shall not set hard or dry out under any conditions of weather. The sample of silicon sealant to be used for this purpose shall be got approved from the Engineer-in-Charge before its actual use.

#### **16.11 Glazing gasket & Weather pile strip/ Wool pile**

Material for glazing gaskets shall be of EPDM (Ethylene propylene diene monomer) and shall be used on both side of glass panes in uPVC sash and glazing bead profiles.

<b>Sl. No</b>	<b>Characteristic</b>	<b>Test Method</b>	<b>Requirement</b>
1	IRHD/Shore hardness A	IS 3400 (Part 2) / IS 3400 (Part 23)	Range shall be from 60to 80 Shore A.
2	Compression set % High- at 100 °C for (24hrs) Low- at -25 °C for (24hrs)	IS 3400 (Part 10)	≤ 35 % ≤ 85 %
3	Ozone resistance (50 pphm for 96 hrs @ 40 °C)	IS 3400 (Part 20)	No visible cracks
4	Ageing test (for 168 hours at 100 °C) Co-efficient of deterioration of Hardness change max. (Shore A) Tensile strength changes max. Elongation at break change max.	IS 3400 (Part 4)	+15 / -5 -25% of initial value -50% of initial value
5	Minimum tensile strength	IS 3400 (Part1)	7.5MPa
6	Minimum Elongation	IS 3400 (Part1)	200%

Weather pile strip / Wool pile shall be used in uPVC sliding door and window to reduce air filtration and water penetration.

#### **16.12 Window / Door Hardware and Fittings Materials:**

For all hardware except for fixing shall have at least the equivalent corrosion resistance of EN 1670-1988 grade 4 (240 hrs) when subjected to natural salt spray testing in accordance with IS 9844 or equivalent. Testing shall be carried out on complete hardware items and also duly approved by the Engineer -in-charge before use at the site of work. Hardware like hinges, rollers and locking devices shall have been for at least 15000 operating cycles for windows and shall be minimum 25000 operating cycles for

doors (i.e. opening and closing) without deterioration, failure or excessive wear. Hardware / fittings such as handle, roller, touch lock, multipoint locking, 3D hinges, friction hinges etc. shall be directly screwed not pre-drilled or hammered.

- a. For Casement windows/ ventilator - Approved quality stainless steel friction hinges (SS 304 grade) with SS screws shall be provided as per approval of Engineer-in-charge and length of friction hinges should cover more than 80 percent width of the shutter and minimum two number friction hinges required for each shutter one at top and one at bottom.
- b. For Casement doors - Minimum four numbers of approved quality 3D hinges with necessary SS screws shall be provided in the casement door shutter.
- c. For sliding windows/doors:

All sliding door/windows shall be provided with zinc alloy (powder coated) handles with key on one side of extreme panels along with zinc plated stainless steel multi point locking having transmission gear, cylinder with keeps & one side key, zinc alloy (powder coated) crescent lock (if required), each shutter of sliding door and windows shall have one pair of stainless steel (SS 304 grade) body with adjustable double nylon rollers (minimum weight bearing capacity to be 120 kg).

- d. The Casement/ Casement/ ventilator cum fixed glazed door/ window/ ventilator:  
Each shutter/leaf shall be provided with zinc alloy (powder coated) minimum two nos. S.S. 304 grade friction hinges and one handle along with powder coated zinc alloy suitable multipoint locking arrangement.

**16.13 Guarantee Bond:** Ten (10) years guarantee bond in prescribed proforma shall be submitted by the contractor which shall also be signed by both the specialized agency and the contractor to meet their liabilities under the guarantee bond. However, the sole responsibility about efficiency of uPVC work shall rest with the building contractor. If any defect is noticed during the guarantee period, it shall be rectified by the contractor within seven days of receipt of intimation of defects in the work. If the defects pointed out are not attended within the specified period, the same will be got done from other agency at the risk and cost of contractor.

#### **17. Fly/Mosquito proof Stainless Steel Wire Mesh:**

Fly/ mosquito proof wire mesh of stainless-steel grade 304 shall be fixed to all openable/sliding uPVC doors, windows, ventilator and clerestory windows using wire gauge with average width of aperture 1.4 mm in both directions with wire of dia 0.50 mm all complete as per approved make, quality and pattern after fitting gaskets of approved quality and make all as per approval of Engineer-in-charge.

#### **18. Double Glass Units (DGUs):**

Providing, assembling and supplying Double glazed units (DGUs) comprising of hermetically-sealed 6-12-6 mm insulated glass (double glazed) panel units of size and shape as required and specified, comprising of an outer High performance coloured tinted toughened glass 6mm thick substrate with reflective soft coating on outer face, + 12mm Airgap + 6mm Heat Strengthened clear Glass having properties as Visible Light transmittance (VLT) of 50-55% , Light reflection internal 10 to 15%, light reflection external 10 to 20 %, SHGC –0.34 (Max.) and U value of less than 3 W/m<sup>2</sup> degree K 1.8 W/m<sup>2</sup> degree K etc., 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 DGUs shall be assembled in the factory/ workshop of the glass processor. The glass in all the uPVC doors and uPVC windows shall be Double glazed unit as per CPWD Specifications 2019 and CPWD Delhi Schedule of Rates-2023 with upto date & correction slips -5 dated: 19-12-2024 with low e-value and high- performance glass.

Note: The contractor shall submit credentials and details of works experience of three glass processor vendor for making DGU/Toughening to engineer-in-charge and he shall approve the same. The Engineer-In-Charge may reject all the three with reasons and in such last case, the contractor shall submit a fresh panel of three glass processor.

Note:- The department reserves the right to approve the higher specifications in order to comply with the requirement of Eco Niwas Samhita as per the NIT without any extra cost.

## **19. Stainless Steel Railing (Modular type):**

Any kind of welding or fabrication for railing shall not be allowed at site. Sample shall be approved before execution. Contractor shall submit the shop drawing base on concept drawing. As per approved shop drawing, contractor shall arrange mock-up of railing system (2 or 3 no) in required length as directed by Engineer in charge. Contractor shall protect railing system up till handling over the project. The cost of soild section i/c all sections, accessories if required in railing shall be included in this item.

### **19.1 Staircase and ramps railing-**

(a) **Ramp railing**-Factory made (Modular) passivated Stainless Steel Railing SS 316 Grade in Satin Finish to be used. Balusters and Handrail having Dia-50mm and wall thickness 2mm, SS Base plate -8mm thick as per drawing with SS cover plate. Baluster to baluster distance shall be as per drawings. Top mounted baluster shall be fixed to the RCC/CC/masonry with SS 316 grade dash fasteners/anchor fastener of required dia and length to the RCC/masonry as per approved design. Minimum 4 nos. of Infill tubes (Parallel to top member) Dia minimum -19x1.5 mm thick in the ramp to be provided all complete with all modular accessories using flexible bends & modular system or expansion & ball socket system, bends and termination including all required hardware complete in all respects as per approved architectural drawing

(b) **Staircase railing** –Factory made (Modular) passivated Stainless Steel Railing SS 316 Grade in Satin Finish to be used. Balusters and Handrail having Dia-50mm and minimum wall thickness 2mm, SS Base plate -10 mm thick minimum as per drawing with SS cover plate. Baluster to baluster distance shall be as per drawings. side mounted baluster shall be fixed to the RCC/CC/masonry with SS 316 grade dash fasteners/anchor fastener of required dia. and length to the RCC/masonry as per approved design.

Minimum 5 nos. of Infill SS plate (Parallel to top member) size minimum -50X10 mm thick in the staircase railing to be provided all complete with all modular

accessories using flexible bends & modular system or expansion & ball socket system, bends and termination including all required hardware complete in all respects as per approved architectural drawing. And Hand rail side mounted on wall as per drawing and approved by the Engineer-in-charge.

- 19.2 **Balcony railing** –Railing shall be design as per the tender drawings and shall be Factory made (Modular) passivated “weld free” Stainless Steel Railing SS 316 Grade in Satin Finish to be used. Balusters having size 50mmx50mm and top main Handrail having size 75mmx50mm and both have wall thickness 2mm, SS Base plate dia - 100x8mm thick with SS cover plate. One no. each horizontal tube of size 40mmx40mm of 2mm wall thickness shall be provided at bottom and top of railing. Baluster to baluster distance shall as shown in the tender drawings. The 20mm granite stone of colour jetblack/tan brown/stealgrey as per DSR item with SS 316 grade dash fastner/anchor fastner shall be used as per the design and bid documents. Baluster shall be fixed to the RCC/CC/masonry/stone with SS 316 grade dash fasteners/anchor fastener of required dia. and length to the RCC/masonry as per approved design. Railing shall be fixed as per design. Required numbers of vertical Infill (parallel to baluster) tubes of size-20x20x2 mm thick at clear spacing not more than 80 mm shall be provided with necessary modular accessories using flexible bends & modular system or expansion & ball socket system, bends and termination including all required hardware complete in all respects as per architectural drawing and as directed by the Engineer-in-charge. Stainless Steel railing shall have fittings/accessories made by Investment Casting Process.
- 19.3 SS 316 GRADE Railing around Open to Sky/core area at all floors and at Parapets as per drawing. Factory made (Modular) passivated Stainless Steel Railing in Satin Finish to be used. Balusters and Handrail having minimum Dia - 32mm and wall thickness 2mm @150mm C/C, SS Base plate - 8mm as per drawing with SS cover plate. One no horizontal tube of 50mm dia and 2mm wall thickness shall be provided at top of railing. Baluster to baluster distance shall not be more than 900mm. Baluster shall be fixed to the RCC/CC/masonry with SS 316 grade dash fasteners/anchor fastener of required dia. and length to the RCC/masonry as per approved design. Railing shall be fixed as per approved design. Required numbers of vertical Infill (parallel to baluster) tubes of Dia-25x1.5 mm thick at clear spacing not more than 80 mm shall be provided with necessary modular accessories using flexible bends & modular system or expansion & ball socket system, bends and termination including all required hardware complete in all respects as per architectural drawing and as directed by the Engineer-in-charge.

## 20. SS Grill

Factory made stainless steel grill of grade 316 with approved stainless steel hardware, accessories, fasteners etc including fixing as per approved drawings shall be provided in all Main Door with SS Wiremesh.

## 21. Sill, balconies, parapet, soffit & jambs:-

### 21.1 Window sill, balconies, parapet, soffit & jambs:

18mm thick mirror polished, premoulded Granite stone at window sill, balconies, parapet, soffit & jambs of required widths shall be of approved premium quality as mentioned in the finishing schedule. Granite Stone of approved shade and colour shall be minimum 18mm thick and the exposed edges of stone shall be chamfered (except for door sill), half or full bull nosing with mirror polishing should be factory finished and brought to site. Granite stone for windows sill, balconies, parapet, soffit, jambs, etc. shall be in

single piece. The width of the stone for sill, soffit & jambs shall be equal to the width of the wall. All polishing work and laying details for stonework shall be as per CPWD specifications 2019, drawings and as directed by Engineer-in-Charge.

## **21.2 Door sill**

Granite stone Tile at door sill of required widths shall be of approved premium quality as mentioned in the finishing schedule. Granite Stone of approved shade and colour should be factory finished and brought to site. Granite stone tile for door sill shall be in single piece. All polishing work and laying details for stonework shall be as per CPWD specifications 2019, drawings and as directed by Engineer-in-Charge.

## **22. FIRE CHECK DOORS: Fire Doors/Windows**

As per NBC norms & CPWD Specification with upto date correction slip and Specification of OM CSQ office vide No. 136/ अधि. अभि/टास/ विनिर्देश /2024/308- हि dt. 01 /10/2024.

The contractor shall provide and fix fire rated doors as per IS 3614: 2021, for 120 min integrity & 30 min insulation for partially insulated fire door. Recommended fire door shall be tested as per IS from National Test House or any other lab as per Assam Fire Department norms with approval by Engineer-in-Charge. Labeled fire doors shall be with fire rated hardware and vision panel all as a complete assembly. Proper label confirming the type of door and the hourly rating is mandatory.

### **22.1 Metallic Fire Door Sets**

- This specification covers metallic fire rated partially insulated and un-insulated door set consisting of frame, shutter / door leaf (hollow metal door or sandwich panel door), its hardware and vision panel as complete assembly along with its sizes, design, materials, general construction requirements, finishing and performance criterion. It is intended to define standard items not subject to variation.
- The door set defined herein should have demonstrated successful test performance to establish the minimum fire rating of 120 min. Metallic Fire Door frame and shutter shall conform to IS 3614: 2021. This specification does not cover the Stainless steel or laminated steel or Wooden Composite, Metallic Sliding or Metallic Rolling fire doors. Single skin door shutter shall not be used as fire door and door tested with single skin shall not be the part of this specification.
- The space between the wall and frame shall be filled with fire rated puff and joineries to be closed with fire rated silicon sealant as per direction of the engineer in charge.
- The door set (both frame and shutter leaf/leafs) shall be factory finished with minimum 30 micron polyester powder coating in desired shade as per Engineer in-Charge.

#### **22.1.1 Material**

##### **(I) Fire Door Frames and Door Leaf**

- (a) The alloy type Zinc coated steel sheet shall be used for frame and door leaf conforming to IS 277. The coating weight shall meet the minimum requirement of 120 gm/m<sup>2</sup> for both sides of sheet. The sheet material with embossed design, grained steel design can be used for fire doors for better aesthetics and interior surface finishes of the doors if any and it shall not compromise the construction integrity of the doors. The surface of the door frame shall be pretreated with phosphate by chemical means conforming to IS: 1477 Part-1. No pickling is required for galvanized surface.

- (b) The steel sheet thickness of 1.2 mm (18 gauge) minimum shall be used for a frame having depth upto 150 mm. Any addition in depth from 150 mm shall require higher sheet thickness of at least 1.6 mm (16 gauge). The maximum depth of frame shall not be more than 350mm. The tolerance of + 1 mm for all dimension of profile will be admissible.
- (c) For door leaf of 120 min fire rating of un-insulated and partially insulated door, the minimum sheet thickness shall be 1.2 mm (18 gauge).
- (d) Electrolytic alloy deposited zinc coated steel shall be provided for anchors and accessories and should meet the minimum requirements for coatings of 120 gm/m<sup>2</sup>.
- (e) The door frame and shutter shall be finished with polyester powder coating of minimum thickness of 30 micron confirming to IS: 13871 in desired shade as per the direction of Engineer in-Charge.
- (f) The minimum frame size shall be as per approves drawing or as per IS: 4351 and provided with cover plate of required size as per manufacture's specifications inside the frame at the places where hinges are to be fixed and threaded to take the required size of machine screw. Frame design and construction shall be as per tested specimen in butt, mitered or welded assembly with proper reinforcement and protection for taking required hinges, locks, strike plate including door closers. The door frame shall have provision for housing EPDM smoke seal.
- (g) The infill material used in door leaf shall be Resin bonded materials like honeycomb paper core, mineral wool of minimum density 96 to 120 kg /cum, ceramic wool and any proprietary material provided they satisfy the requirement of fire door rating of un-insulated and partially insulated door. Polyurethane foam (PUF) as an infill material for fire doors shall not be permitted.
- (h) An intumescent seal of minimum size 15 mm wide and 1.5 mm thick shall be provided with insulated doors which is chemically designed to expand when exposed to heat. It is of two types i.e. Rigid and flexible type and both react differently, therefore it should be tested with the door. The intumescent seal provided in the door brought at site should be of the same formulation, dimensions and configuration as mentioned in the door manufacturer's fire test report.
- (i) Smoke seal shall be fixed either in the grooved frame profile or stuck with adhesive on the entire perimeter of the frame to stop smoke passing through the gaps. It is independent of intumescent seal provided on the door leaf. The smoke seal material shall be of EPDM or any other material tested in accordance with ASTM E-84/BS 476 (Part-22) Standard Method of Testing for Surface Burning Characteristics of Building Materials and Assemblies and should have a flame-spread classification of 25 or less.

• **Fire Rated Hardware**

- (a) Stainless steel (grade SS 304 and above) ball bearing hinges as per EN 1935:2002 or butt hinges (as per IS 12817:2020) of minimum size 100 mm x 75 mm x 3 mm.
- (b) Fire rated Stainless Steel Mortise dead lock 55/60/65/70/80mm Back Set size (as per test of door), Square for end of 20/22/24 mm size (as per test of door) including Escutcheon (key hole flap) and 65 mm dia cylinder with both side key as per IS:3564/EN:12209.
- (c) D type Pull handle (SS 304) of 22/25 mm dia, centre to centre distance -300 mm, back to back fixing with spindle.

- (d) Panic devices of 120 minutes fire rating, single point panic push bar (carry bar) suitable for single leaf door as per EN:1125 with appropriate classification code.
- (e) Panic devices of 120 minutes fire rating, two point panic push bar (carry bar) with vertical bolt for active leaf in case of single leaf door and on Inactive leaf in case of double leaf door as per EN:1 125 with appropriate classification code.
- (f) External lever handle with euro profile half cylinder as per EN: 1125 with appropriate classification code.
- (g) Shaft lock of 120 minutes fire rating, 70mm back set square for end, with alien key and dead strike plate as approved by Engineer in-Charge.
- (h) Stainless steel (SS 304 or more) recessed flush pull handle of minimum size 40mm x120mm as approved by Engineer in-Charge.
- (i) Concealed flush bolt (Dye-cast stainless steel finish) of length 300 mm for door height of 2100 mm shall be provided and for more than 2100 mm door height, the length of concealed flush bolt will be door height minus 1800 mm.
- (j) Dust proof socket of 300 mm length for bottom concealed flush bolts.
- (k) CSK headed fastener of minimum size 8 mm dia & 80 mm long hot dip galvanized with 8 mm dia polyamide sleeves.
  
- (l) 120 min fire rating heavy duty door closer of spring size 3-5 for partially insulated door and for un-insulated door spring size 2-4 with standard arm as per IS:3564 with appropriate classification code.
- (m) Surface integral door coordinator with telescopic shock absorber to be provided for use on fire doors for sequencing the closing of active and inactive leaf of the panic device in double door as approved by Engineer in-Charge.
- (n) Hardware such as tower bolts, a drops, sliding bolts, chains with pad locks shall not be used on fire doors.
- (o) All the hardware to be used on fire doors shall be type tested for 2 hrs fire rating. All other hardware mentioned which is not tested as part of the door assembly, proper fire test certificates for compliance for recommended fire rating to be provided.

• **Fire Rated Vision Panel**

- (a) The glass of fire rating of 120 minutes integrity shall be used for vision panel minimum 300x400 mm & 6mm thick. The annealed or tempered glass or tempered wired glass or inter layer glass or laminated gel glass which become opaque and affect visibility shall not be used. The glass should have inedible mark on all the panels showing the name of manufacturer and name of product.
- (b) Whenever larger vision pane is required the overall glass area can be increase by upto 15% of the door leaf size provided the door has been tested with a larger glass. Such increase is not applicable for any insulated door.
- (c) Ceramic tape of minimum size 13x2 mm or size as per manufacturer's specification.

**(II) FD 120 P1 fire rated partially insulated hinged Door set**

- (a) Partially insulated metallic hinged fire door set shall have 120 minutes integrity and 30 minutes insulation along with complete assembly tested in latch condition. It shall comprise of single rebate door frame and double skinned sandwich door shutter along with necessary hardware and vision panel.
- (b) All double leaf fire door assembly shall be provided and tested with astragals to ensure compatibility with actual fire performance.
- (c) The performance of partially insulated fire rated doors (single / double leaf) depend on the quality of infill material. The infill material shall be resin bonded mineral wool, ceramic wool and of any proprietary material provided it satisfies the requirement of insulation fire door rating. The overall thickness of double skinned single or double leaf fire rated insulated door shall be **minimum 50 mm thick** or as per test evidence furnished by the respective manufacturer in compliance of its fire rating as FD 120 PI. The performance of the fire door varies based on infill material, hence changing the infill material in fire door supplied at site shall not be allowed other than the tested with infill material.
- (d) The intumescent seal shall be provided in the groove/on the surface on the three sides of door leaf (i.e. on top, hanging and meeting edges of door leaves). The formulation, material, dimensions and configuration of intumescent seal provided in the door shall be of the same material or of which the test report is produced by the manufacturer.
- (e) The smoke seal of appropriate size shall be provided on three sides of door frame (i.e. on top and sides). The formulation material dimensions and configuration of EPDM/self-adhesive smoke seal shall be the same with which the test report are produced by the manufacturer.
- (f) Each of the door leaf shall be provided with vision panel of size not more than 0.06 sqm in size (minimum width 300 mm and minimum height 400mm) with fire rated clear glass having at least 13 mm wide and 2 mm thick ceramic tape on the perimeter of glass on both faces.
- (g) Minimum 4 no. of hinges shall be fixed with machine screws of M6 x 25 CSK (conforming to IS:1365) per door leaf upto 2100 mm height and 5 hinges for door leaf height above 2100 mm or as per test evidence.
- (h) The **fire rated door set** (frame & shutter leaf together) shall be provided as a complete system along with following necessary hardware.

**(A) For single leaf door**

1. The maximum size of single leaf door shall be 1250 mm x 3000 mm
2. One number Panic device shall be provided on the push side of the single leaf door.
3. One number External trim shall be provided on pull side of the door.
4. One number Surface mounted heavy-duty door closer of spring size 3 to 5 shall be provided as per width and weight of the door leaf on pull side of the door.

**(B) For Double leaf door**

1. The maximum size of double leaf door shall be 2400 mm x 3000 mm
2. One number Panic device shall be provided on the push side of the active leaf

and one number vertical bolt shall be provided on the push side of Inactive leaf.

3. One number External trim shall be provided on pull side of the door.
4. In case of double leaf doors with inactive leaf width less than 450 mm, single point panic device for active leaf and additional fire rated auto flush bolt on both top and bottom of the inactive leaf shall be provided.
5. One number Surface mounted heavy-duty door closer of spring size 3 to 5 shall be provided on each door leaf as per width and weight of the door leaf on pull side of the door.
6. One number integral surface door coordinator with telescopic shock absorber shall be, provided for sequencing the closing of active and inactive leaf of the panic device in double door.

### **(III) Un-insulated hinged fire door set FD 120.**

- (a) Un-insulated metallic hinged fire door set shall have 120 minutes integrity along with complete assembly tested in unlatch condition. It shall comprise of single rebate door frame and double skinned sandwich door shutter along with necessary hardware and vision panel.
- (b) All double leaf fire door assembly shall be provided and tested with astragals to ensure compatibility with actual fire performance.
- (c) The performance of un-insulated fire rated doors (single / double leaf) depend on the quality of infill material. The infill material shall be resin bonded honey comb paper core and it should satisfy the requirement of un-insulated fire door rating. The overall thickness of double skinned single or double leaf fire rated un-insulated door shall be minimum 46 mm thick or as per test evidence furnished by the respective manufacturer in compliance of its fire rating as FD 120. The performance of the fire door varies based on infill material, hence changing the infill material in fire door supplied at site shall not be allowed other than the tested with infill material.
- (d) The maximum door leaf width for single leaf shall be 1250 mm, and for double leaf 2400 mm. The performance of un-insulated fire rated doors (single / double leaf) depends on the quality of infill material. The infill material shall be resin bonded honey comb paper core provided it satisfies the requirement of fire door rating. The overall thickness of double skinned single or double leaf fire rated un-insulated door shall be minimum 46 mm thick or as per test evidence furnished by the respective manufacturer in compliance of its fire rating as FD 120. The performance of the door varies based on infill material, hence changing the infill material in fire door supplied at site shall not be allowed other than the tested with infill material.
- (e) The smoke seal of appropriate size shall be provided on three sides of door frame (i.e. on top and sides). The formulation material dimensions and configuration of EPDM/ self-adhesive smoke seal shall be the same with which the test report are produced by the manufacturer.
- (f) Each of the door leaf shall be provided with vision panel of size not more than 0.12 sqm in size (maximum width 400 mm and maximum height 800mm) with fire rated clear glass having at least 13 mm wide and 2 mm thick ceramic tape on the perimeter of glass on both faces.
- (g) Minimum 4 no. of hinges shall be fixed with machine screws of M6 x 25 CSK (conforming to IS:1365) per door leaf upto 2100 mm height and 5 hinges for door leaf height above 2100 mm or as per test evidence whichever is higher.

- (h) The fire rated door set (frame & shutter leaf together) shall be provided as a complete system along with following necessary hardware.

**(A) For single leaf door**

The maximum size of single leaf door shall be 1250 mm x 3000 mm

**Egress doors for AHU, store room, electrical room locations**

1. One number Mortise dead lock shall be provided on the single leaf door.
2. One pair Pull handle D type shall be provided on pull side of the door.
3. One number Surface mounted heavy duty door closer of spring size 2 to 4 shall be provided as per width and weight of the door leaf on pull side of the door.

**Non Egress doors for all type of shaft locations**

1. One number Mortise Shaft locks shall be provided.
2. One number flush pull handle shall be provided on pull side of the door.

**(B) For Double leaf door**

The maximum size of double leaf door shall be 2400 mm x 3000mm

**Egress doors for AHU, store room, electrical room locations**

1. One number Mortise dead lock shall be provided on the single leaf door.
2. Two pair Pull handle D type shall be provided on the door.
3. One number 300 mm long concealed flush bolt on inactive leaf at bottom along with dust proof socket.
4. One number concealed flush bolt on inactive leaf at top of the leaf (Height of the CFB = door height — 1800 mm).
5. Two number Surface mounted heavy-duty door closer of spring size 2 to 4 shall be provided as per width of the door leaf and weight of the door leaf on pull side of the door.

**Non Egress doors for all type of shaft locations**

1. One number Mortise Shaft locks shall be provided on the single leaf door.
2. One number flush pull handle shall be provided on the door per leaf.
3. One number 300 mm long concealed flush bolt on inactive leaf at bottom along with Dust proof socket.
4. One number concealed flush bolt on inactive leaf at top of the leaf (Height of the CFB = door height — 1800 mm).
  - The door frames shall be fixed to the opening with minimum 10 Nos. (4 numbers on each vertical side up to 2100 mm height and 2 numbers on top) of fasteners and 12 numbers of fasteners for height 2400 mm (5 Nos. on each vertical side and 2 Nos. on top) with minimum M8 size, 80mm long hot dipped galvanized fasteners with polyamide sleeves inserted in pre marked & machine drilled holes for single/double leaf doors.
  - The door set (both frame and shutter leaf/leaves) shall be factory finished with minimum 30 micron polyester powder coating in desired shade as per Engineer in- Charge
  - Metal Fire Check Door with required Fire rated hardware shall be provided in

allbasement level fire staircases, all exit passageways and at other locations as required (except central core area of residential towers. lift loby or insulated glass doors mentioned in the tender drawings) by Delhi fire department and decided by Engineer-in-charge.

- Un-Insulated Metal Fire Check Door with required Fire rated hardware shall be provided in Electrical shaft, Low & Medium Voltage Shaft, Electric room, AHU/FAN rooms, DG set room, UPS/Battery room, IT server room, etc. and other doors as decided by Engineer-in-charge as per above specifications.

## **22.2 Partially Insulated FULLY GLAZED FIRE DOOR/ WINDOW:**

As per NBC Norms, fully glazed fire doors in lift lobby entrance door at Stilt shall be provided. The windows in the fire tower staircase and public staircase lift lobby etc. shall be fixed fully glazed.

The contractor shall provide and fix fully glazed fire door as per, NBC 2016 guide line of isulated doors and IS for stability, integrity (E/EW 120) & Insulation (EI 30). With frames Pressed galvanized steel confirming to IS 277 with the following specification. Glazed door shall be tested for integrity & insulation (E/EW 120). Glazed door shall be tested from CBRI/ TBW / CERTIFIER for maximum rating of 120mins with 30mins Insulation. Test certificates should be made available for door sizes tested as a complete assembly.

**Door frame:** Door frames shall be single rebate frame profile of size 50 x 60 mm on horizontal side and 35x60 mm on vertical side or higher size as approved by engineer in charge made out of 1.6mm (16gauge) minimum thick galvanized steel sheet. Frames shall be butted/mitered and with mandatory provision for smoke seal and field assembled with self tabs. All transom profiles and side panels shall be from similar profile and should be as per the tested specimen. For partitions, Glass should be held in its place with 1.2 mm GI clip-on beading 19mm height. Screws shall be 8 x 19mm steel screws, self-tapping and concealed inside the beading at every 250 m c/c and a ceramic tape of the cross section of 4 mm x 13mm as per the test evidence. Door frames shall be with back plate bracket and anchor fasteners for installation on a finished plastered masonry wall opening. The top support for mounting shall be included as per design requirement. Once frame installed should be filled with PUF/mineral wool insulation ( 96 kg/cum) as approved by the engineer in charge.

**Glazed Door Leaf:** Providing and fixing 60 mm thick glazed fire resistant door shutters of 120 min Fire Rating confirming to IS:3614 (Part II) or EN1634 - 1:1999, tested and certified by CBRI, with suitable mounting on door frame, consisting of vertical styles, top rail & side rail 60 mm x 60 mm wide and bottom rail of 110 mm x 60 mm made out of 1.6 mm thick G.I. sheet (zinc coating not less than 120gm/m<sup>2</sup>) duly filled mineral wool insulation having density minimum 96 kg/m<sup>3</sup> and fixing with necessary stainless steel ball bearing hinges of size 100x89x3mm of approved make, including applying a coat of approved fire resistant primer or powder coating not less than 30 micron etc. all complete as per direction of Engineer-in-charge. (Panelling to be paid for separately). Note: The above-mentioned sizes of door leaf are minimum required subject to compliance for integrity & radiation control (EW120) and minimum 30 minutes of insulation (EI30).

**Glass:** Providing and fixing glazing in fire resistant door shutters etc., with G.I. beading

made out of 1.6 mm thick G.I. sheet (zinc coating not less than 120 gm/m<sup>2</sup>) 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 microns 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 120 minutes of fire resistance both integrity & radiation control (EW120) and minimum 30 minutes of insulation (EI30). The manufacturer has 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 for 5000 hours of UV resistance as per EN ISO 12543-4. The glass shall be EPD (Environmental Production Declaration) verified in accordance to EN 15804, ISI Marked & Make IN India 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.

Partially Insulated fully glazed fire check door with required fire rated hardware shall be provided in lift lobby at, stilt, all podium levels, Staircase etc.

### 22.3 Fire Check Door hardware:

All fire check door shall be provided with the following fire check hardware compliant to minimum fire rating/insulation required as a complete unit, compliant to relevant IS Code with prior approval of Engineer-in-charge. HINGES: Stainless steel (grade SS 304 and above) two ball bearing hinges minimum size 100mmx 89mmx3mm or as approved by Engineer-in-charge as fixed flushed to the frame and shutter

- a) LOCK: Fire rated Stainless steel Mortise sash lock with internal thumb turns and external keys operation with lever handle.
- b) FLUSH BOLTS: (DOUBLE DOOR) (If required) 300mm concealed extended lever action flush bolt satin finish, fixed to top and bottom of the inactive blade.
- c) Panic Bar with External Trim Lock: (Fire rated) Panicbar with 304 stainless steel body hardware for easy access from fire staircase with panic hardware mounted on the fire doors.
- d) Electro Magnetic Device: Door hold on electromagnetic device with suitable arrangements to be connected to active fire alarm systems.
- e) Door Coordinates: (Fire rated) Mechanical Door coordinates for coordination proportionally of double doors.
- f) Smoke Seals: (30-minute fire rated)- PEMKO/ZERO/ATHMER make heavy duty smoke seal for smoke check door.
- g) Door closer: Door closer of spring size EN 3-5 for door with standard arm as per EN 1154 with appropriate classification code of Dormakaba/ Geze/ Assabloy/Hormann or equivalent with extruded aluminium body heavy duty 2 hours fire rated door closer with stainless steel full body cover.
- h) Offset D-type Pull Handles Stainless steel 304 grade of 300mm x 25mm dia (minimum), back to back fixing with spindle of approved design with necessary

accessories and screws etc. all complete.

- i) Dead lock Two Hrs. fire rated Narrow Style dead lock with 80mm double cylinder one side key and other side knob complete as per approved design.
- j) Flush Bolt: Minimum 300mm long, Stainless Steel 304 grade with necessary screws, etc. Complete in all respect as directed by the Engineer-in-charge.

#### **22.4 CODES & ACCEPTANCE CRITERION**

The complete assembly of the doors i.e. frame, shutter, vision glass and hardware shall conform to following codes:

IS 3614: 2021	Specification for fire doors and door set
IS 4351:2003	Steel door frames-Specifications Standard specification for
IS 277-2003	steel sheet zinc coated (Galvanized)
IS 8183-1993	Bonded mineral wool
IS 16231 (Part 3)-2019	Use of Glass in Buildings — Code of Practice Part 3 Fire and Loading
ISO 834-1 : 1999	Fire-resistance tests — Elements of building construction
IS/ISO-834 Part- 8	Fire-resistance tests — Elements of building construction — Part 8: Specific requirements for non-loadbearing vertical separating elements
IS 17518 Part-I	Fire resistance tests Door and shutter assemblies
EN 1125	Building Hardware
EN 1154 / IS 3564	Door closer / Door coordinators for 2 hrs fire rating
EN 12209 / IS 3564	Mechanically operated locks, latches and locking plates for 2 hrs fire
IS 16074	Steel Flush door shutters-Specifications
EN 1906	Lever handles and knob furniture for 2 hrs fire rating
IS 13871	Power Coatings— Specification

Necessary documentation/ test certificates obtained from the manufacturer by contractor/ agency shall be furnished to Engineer-in-charge for approval before actual supply for installation. All hardware of fire door shall be subjected to approval by Engineer-In-Charge. Each Door set shall be provided with BIS certificate and a Label (metal plate) on the frame and shutter indicating fire rating, name of the manufacturer, certification details, Partially Insulated or Un-insulated, S. No. of the door, and year of manufacture all as per IS 3614: 2021.

Fire door set shall be tested for both latched and un-latched condition and shall satisfy the requirement of the application and site condition. All doors with dead bolt are considered to be unlatched and the door manufacturer shall have separate test certificate for doors tested in latched and un-latched condition. All hardware & glazing, shall be 120 mm fire rated and compliant to IS standards /EN standards with appropriate classification code.

#### **22.5 INSTALLATION**

Fire door set installation shall be as per manufacturer's specifications for which contractor shall submit the shop drawing to the Engineer-in Charge. Shop drawings shall include all details of construction, anchoring, connections, fastener etc.

The installation of doors sets shall be carried out by the manufacturer or installers trained by the manufacturer.

**a. Door Frame Installations**

All frame shall be fastened to the adjacent structure to retain their position and stability. The maximum allowable gap between the frame and structure should not be more than 5mm and sealed with proper sealant once the frame is installed. Installations of frame shall be as per manufacturer's recommendation and should be suitable for various type of wall construction.

**b. Door leaf Installation:**

Doors shall be installed and fasteners to maintain alignment with frame to achieve a perimeter clearance of maximum 3-4 mm unless otherwise more clearance is requested due to smoke seal which require a larger gap but the gap should be within the tested tolerances.

**c. Hardware Installation:**

The hardware item shall be installed in accordance with good practices and hardware manufacturer's recommendation/templates. The hardware to be installed shall be approved by the Engineer-in-charge before installation in view of intended use, corrosion condition, door mass, durability etc. The hardware shall be fixed with door, frame and shutter with screws and fasteners as suggested by hardware manufacturer. The self-adhesive seals shall be fitted into the groove / surface when it is dry and free from dust to ensure good bond. In areas where temperature falls below 10degree centigrade, self-adhesive seals shall also be fixed mechanically.

**d. Fire Stop Seal—**

For Shaft (As per NBC norms):30 minutes fire resistance fire stop seal (for Shaft) with lightweight Mortar specially formulated cement composition supplied as a pre-mixed dry powder for on-site addition of water to seal the opening in floors (as per NBC 2016) through which services are passing from one compartment to another in accordance with the criteria of BS 476: Part 20: 1987 and EN 1366-3, and fire classification to EN13501 – 2. For 30 min fire resistance the Firemen mortar, 3M, Promac is mixed with suitable amount of water and the mixture is cast uniformly, 100mm thick over mineral wool of minimum of 50mm x 96 kg/m<sup>3</sup> when supported with metal shuttering of all around angle frame of minimum 25mm x 25mm x 3mm with intermediate angles at every 300mm complete in all respect for sealing of the shaft for 2 hrs. fire rating complete in all respect as specified and as directed by the Engineer-in-charge.

## 22.6 TESTING AND CERTIFICATION

The Door set shall be tested from CBRI, Roorkee or any of the lab as approved by Engineer-in-charge for the complete assembly i.e. frame, shutter, vision panel and hardware. Any certificate from any manufacturer shall not be acceptable to the effect that **all parts** of the assembly are covered. All doors shall be tested in accordance to the Indian standard IS 17518 (Part-I) and shall satisfy the criteria mentioned in the standard for integrity and insulation as per applicable category of doorset. Test certificates submitted shall be valid at the time of supply of doorset and its validity period shall be 5 years from the date of issue of the test report by the lab. Cost of the complete door set for testing and testing charges shall be borne by the contractor

- (i) Fire door test certificate within its validity period shall not be required any additional test except as mentioned below:
  - a. Change in design, material and construction of door including infill material.
  - b. Overall perimeter of the door, width and height or total area is more than the tested specimen. This is applicable for both, doors with or without vision panel.

- c. Change in size of the vision glass or vision panel.
  - d. For doors with continuous partitions as a part of an assembly or fixed glazed partitions, it is necessary to provide assessment report from approved laboratory based on one or more combination of test reports. These reports shall be validated for integrity or integrity along with insulation.
- (ii) Manufacturers Test Certificate shall be submitted for material and sheet thickness of doors and frames. The Engineer-in-Charge or his authorized representative shall inspect the manufacturer before supply to the site of work for checking sheet thickness, infill material, construction process and weight of the doorset, facility hardware etc. Additionally, if required, site engineer shall cut any fire door, single or double leaf as per his discretion and evaluate material for sheet thickness, reinforcement, construction, infill material etc.
- (iii) The following test shall be conducted on site on the door shutter in accordance with IS: 4020 at site.

**(a) Dimension and Squareness Test**

The following tolerance on size of door shutters shall apply:

<b>Dimension</b>	<b>Tolerance (mm)</b>
Width	+0/-2
Height	+0/-4
Thickness	±1.5

The door shutter shall not deviate by more than 1.00 mm on a length of 500 mm. The thickness of the door shutters shall be uniform throughout with the permissible variation of not more than 0.8 mm between any two points

**(b) General Flatness Test**

Tested in accordance with IS 4020 (Part 3), the twist, cupping and warping in door shutter shall not exceed 5 mm.

**(c) Local Planeness Test**

When tested in accordance with IS 4020 (Part 4), the depth of deviation measured at any point of the door shutter shall not be more than 0.5 mm.

## 22.7 SUBMITTALS BY THE CONTRACTOR

Following documentation / drawings shall be furnished.

- 1) Specimen Test Certificate of the doorset as a complete assembly
- 2) Specification/ Manufacturer's literature, Test certificates and other documents of related items intended to be used.
- 3) Glass and hardware manufacturer literature along with their individual test certificate.
- 4) The letter of compliance for supply and installation of fire rated doors as mentioned in ANNEX-C page No. 21 of IS 3614: 2021
- 5) There shall be a warranty of 5 years from the manufacturer side for all parts and components of the fire rated doorset system except counterbalance spring and finish.

## 22.8 Mock-up: Before proceeding for mass production of all units, the agency shall fix typical mock-up units of each type to verify selections made under sample submittals and to

demonstrate aesthetic effects and set quality standards for materials and execution. The agency shall proceed for mass production only after approval of mock-ups by Engineer-in-Charge or his authorized representative. The Item should be executed as approved by the Engineer-in charge. Necessary shop drawings for the doors shall be prepared by the specialized vendor and submitted to Engineer-in-Charge for approval.

The specifications and method statement shall be submitted by the agency well in advance before the start of execution. The execution shall be allowed only after due approval of Engineer-in-Charge.

**23. Mirror In toilets: -**

Providing mirror of superior glass of approved make, quality and minimum thickness of 5mmwith beveled edges including fixing the same with Stainless Steel frameless clamps, screws, etc. with 6 mm thick PVC board backing or fixing with 25mm dia SS Studs in rectangular shape of minimum size 600x900 mm or area 0.54 sqm per washbasin area as required of shape as decided by Engineer-in-charge.

**24. Staircase and Entrance Steps & Risers, Handicap Ramp at Entrance:**

Stone for staircase and entrance treads / steps and risers shall be in one single piece in approved premium quality as mentioned in schedule of finishes. All exposed edges of treads shall be chamfered, half or full bull nosing with mirror polishing and factory finished brought to site. All polishing work and laying details for stone work shall be as per CPWD 2019 specifications amended upto the last date of submission of bids and as directed by Engineer in charge. Minimum thickness for any type of stone shall be 18 mm both for riser and treads. Continuous single line skirting of 100 mm high from each riser and mid landing shall be done using 18 mm thick granite having with same material as laid in staircase floor with adhesive (Zig zag skirting not allowed).

**25. Floor Tiles/ Wall Tiles, Granite, etc.**

**25.1 Granite work:**

This shall be applicable for Flooring / Dado / Cladding/coping works. Machine cut granite stone slabs shall be of thickness not less than 18mm for flooring and 30/35 mm for Cladding. Colour of granite shall be uniform and the slabs free from all defects and impurities. The slabs shall be made from selected stock, which are hard, sound, homogeneous and dense in texture and free from flaws, angles and edges shall be true, square, and free from chipping and surface shall be plane. The slabs be cut to required dimensions in factory. In machine-cut tiles, edges shall be protected from any damage in transit. Broken pieces will not be permitted for use. All edges shall be sharp, perfectly rectangular. Edges shall be pencil-rounded and polished for exposed corners and faces. Uniformity of size shall generally be maintained for the slabs used in any one area. The stone slab shall be without any soft veins cracks or flaws and shall have a uniform colour. They shall have even natural surfaces free from broken flakes on top and shall be true and square to ensure uniform width of joint. Samples of stone slabs to be used shall be got approved by the Engineer-in-charge and the slabs to be used shall conform to the approved sample. The slabs would be cut by Gang saw and the lubricant for cutting will be water only. Quantities/lots have to checked based on the following parameters:

- a) Colour Consistency
- b) Tonal Range
- c) Cutting direction (it should be along the length)

Test for stone slabs shall be conducted in accordance of relevant BIS codes / CPWD specifications for stone properties. Laying and cladding of stone work shall be carried out as per CPWD specifications.

**Note:- The granite stone for all granite work shall be rubby red, cat eye, Jet black, Telephonic Black, Mountain Blue, Sapphire blue, Icon Brown, Mint Perl, Shiva Gold, Silver dyna, Lavender Blue, Steel Grey, Raw Silk, Copper Silk, Lacquer Red as approved by engineer-in-charge.**

- 25.2 Granite at Door Sill:** Granite stone tile in single piece to be fixed with adhesive at the door sills in the Granite flooring of approved colour with premium quality, in places as decided by Engineer-in-charge.
- 25.3 Granite at Window & Ventilator Sill, Jambs & Soffit:** Granite stone full width of walls for window& ventilator, glazing sill, jambs, soffit should be of approved premium quality. Stone should be mirror polished, minimum 18mm thick granite stone and all exposed edges of sills shall be with full nosing on inner side & half nosing on outer side. Fixing with adhesive and polishing work details for stone work shall be as per CPWD specifications and as directed by Engineer in charge.
- 25.4 Kitchen counter/ Vanity Counter in Bathrooms:-** Providing and fixing 18 mm thick gang saw cut, mirror polished, premoulded and pre polished, machine cut granite stone for kitchen platforms (over RCC base as mentioned in drawing), vanity counters for washbasins in single piece upto a length as mentioned in Drawings (except for closing piece) and width shall be as per drawing including projection upto 15mm, of required size, approved shade, colour and texture etc. including rubbing, moulding and polishing to edges to give high gloss finish etc. complete at all levels. Granite colour shall be as approved by Engineer in charge. Kitchen Carcass with suitable fixing and support arrangement etc. complete shall be provided. Granite counter top to have built-in Stainless-Steel Kitchen sink with drain board and fittings (2.4m long granite stone may be used except for closing pieces and hob and sink to be fixed by cutting openings in the granite slab). Washbasin Granite top shall be single piece with suitable fixing and support arrangement etc. complete and Washbasin to be fixed by cutting openings as per washbasin fit to size in the granite slab etc. complete.
- 25.5 Staircase Tread & Risers, Entrance Steps:**  
Polished Granite stone flooring as per approved premium quality, colour with minimum 18 mm thickness in single piece laid over 20 mm (average) thick base of cement mortar 1:4 (1cement: 4 coarse sand) and all exposed edges of treads shall be chamfered, half or full bull nosing with mirror polishing and factory finished brought to site and flaming/Honed finish of tread in 3 strips on full length of tread for antiskid purpose. Riser granite in single piece with minimum 18 mm thickness in single piece over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand) and cement slurry @ 3.3 kg/sqm including pointing in white cement mixed with matching pigment, epoxy touch ups etc. complete. Riser as per approved drawing and direction of Engineer-In-Charge.

**25.6 Granite Flooring:**

Polished Granite stone flooring as per approved premium quality, of approved colour and pattern as mentioned in flooring layouts/schedules, Indicative Specifications in linear as well as curvilinear portions of the building all complete as per the approved 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 including grouting the joints with white cement mixed with matching pigment, epoxy touch ups etc. complete as per direction of Engineer-in-Charge.

**25.7 Granite stone on dado/wall cladding:**

30 mm thick Polished Granite stone as per approved premium quality, of approved colour and pattern on dado (machine cut edges) for wall dado etc. backing filled with dry cladding with an admixture of pigment matching the granite stone shade with necessary anchoring to be used in the lift lobbies, reception areas and corridors etc. 15mm thick big size full body homogenous tiles in combination with granite may be used on lift façade if desired by Engineer-in-Charge.

**25.8 Barrier Free Ramp:**

Ramp to be constructed as per barrier free guidelines issued by CPWD and Govt. of India with approved pattern of granite strip flooring slab over 20mm (average) thick base of cement mortar 1:4 (1 cement: 4 coarse sand) laid including grouting the joints with white cement mixed with matching pigment, epoxy touch-ups etc. complete as per approved in design pattern and drawing with specified gradient. Tactile provisions shall be made as per the Universal accessibility norms.

**25.9 Flooring Works:**

General: Various types of flooring, skirting, dado, window, parapets and balconies sill work shall be carried out by the contractor as per Architectural drawings/schedules. Contractor needs to refer schedule of civil items attached with tender document.

- (i) Contractor will submit all material or finishing samples to Engineer in charge for approvals before executing the respective job.
- (ii) Contractor shall need to protect the finished floor surface during execution of other activities using Cello or approved equivalent bubble guard of minimum 500 GSM thick (minimum size 8' x 4'), fixing the same over floor surface with mastic tape or another approved adhesive. Removing protective layer during handing over, disposal of all debris out of site, cleaning the entire covered flooring area as directed by the Engineer-in-charge.
- (iii) All flooring, skirting, dado, window, parapets and balconies sill works will be done in accordance with CPWD specifications 2019 Volume I & II with correction slips up to the last date of submission of tender documents. The provision of IS Codes listed in CPWD specifications shall form a part of this document with all latest codes.
- (iv) All the activity before laying of Tiles like surface preparing, screed morter (1:4) for leveling the surface shall be done by agency nothing will be paid separately for this.
- (v) Pattern for any type of flooring / dado shall be as per detail drawings. The joints of all flooring shall be in a straight line and should follow as mentioned below:
  - a) **For any type Granite / Kota Stone floor & dado: 1mm (one mm) joint filled with approved epoxy adhesive or other as specified.**
  - b) **For any type of tile floor & dado: 2mm to 4mm spacer joint filled with approved epoxy adhesive unless otherwise specified.**

**25.10 Vitrified/Ceramic Tile Work: (Manufactured at Mother plant)**

The work shall be carried out in areas as mentioned in schedule of civil items, flooring layouts, Indicative Specifications and as per the CPWD Specifications 2019 Volume I and II with correction slips up to the last date of submission of tender. The tiles shall be confirming to the related BIS codes up to the latest revisions. The testing shall also

be got done from approved labs in accordance with the BIS codes for the various parameters and as referred.

Contractor to obtain prior approval of Engineer in charge for tiles make, sizes, shade and colour as per Architectural drawings. The tiles shall be laid on the floor with highpolymer modified quick set tile adhesive type-III (water based) conforming to IS: 15477, in average 6 mm thickness, including grouting of joints with pigmented epoxy grouts. Tiles joints shall be as per the pattern provided in Architectural drawings.

#### **25.11 VITRIFIED TILES FLOORING: (Manufactured at Mother plant)**

Providing and laying full body homogeneous polished/ Matt Finish Vitrified floor tiles as per indicative specification of approved sample in flooring as per design and pattern shown in the drawing with different sizes such as 600mmX600mm/800x800 mm and other sizes (thickness to be specified by the manufacturer), with water absorption less than 0.06% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade laid with cement based high polymer modified quick set tile adhesive type-III (water based) conforming to IS :15477, in average 6 mm thickness, including grouting of joints with 2mm/3mm groove filled and finished with poxy grout of organic coated filler of desired shade complete in all respects as directed by the Engineer-in-charge.

#### **25.12 Antiskid/Matt Floor Tile Work: (Manufactured at Mother plant)**

Providing and laying rectified antiskid/matt finished full body homogeneous vitrified floor tiles in toilets, balcony, kitchen as per indicative specification and other area as per approved drawing of size 300x600mm/600x600mm based on size of bathroom and balcony (thickness to be specified by the manufacturer) with breaking strength not less than 1300N, modulus of rupture of minimum 32N/mm<sup>2</sup> of 1st quality of approved make, in all colours, shades, laid with cement based high polymer modified quick set tile adhesive type-III (water based) conforming to IS : 15477, in average 6 mm thickness, including grouting of joints as approved drawings without or with 2mm/3mm groove filled and finished with epoxy grout of organic coated filler of desired shade complete in all respects as directed by the Engineer-in-charge.

#### **25.13 Rectified Glazed Ceramic Wall Tile Work: (Manufactured at Mother plant)**

The work shall be carried out in areas as mentioned in schedule. The tiles shall be confirming to the related BIS codes up to the latest revisions. The testing shall also be got done from approved labs in accordance with the BIS codes for the various parameters and as referred.

Contractor to obtain prior approval of Engineer in charge for tiles make, sizes, shade and colour as per Architectural drawings and material palette before bringing it to site including grouting of joints with pigmented epoxy grouts. Tiles joints shall be as per the pattern provided in Architectural drawings.

Premium quality rectified glazed ceramic wall tile of with minimum size 600x300mm with highlighters, borders and pencil of approved quality & make, in all shades, design and prints of impression, HD matt/ HD polished series as approved by engineer-in-charge, in toilets kitchen at everywhere and other places as per approved drawing in dado upto false ceiling, over laid with cement based high polymer modified quick set tile adhesive type-III (water based) conforming to IS: 15477, in average 6 mm thickness, including grouting of joints as approved drawings without groove finished with epoxy

grout of organic coated filler of desired shade complete in all respects as directed by the Engineer-in-charge.

Floor tiles, dado, wall lining, granite in flooring is to be provided as per relevant CPWD specifications 2019 with upto date correction slips and scale of amenities given in this document as per samples approved by the Engineer-in-Charge.

#### **25.14 Floor tiles/ Wall tiles fixing/laying: (Manufactured at Mother plant)**

High polymer modified quick set tile adhesive type-III (conforming to IS: 15477) shall be thoroughly mixed with water and a paste of zero slump shall be prepared so that it can be used within 1.5 to 2 hours. It shall be spread over an area not more than one sqm at one time. Average thickness of adhesive shall be 3 mm. The adhesive so spreaded shall be combed using suitable trowel. Tiles shall be pressed firmly in to the position with slight twisting action checking it simultaneously to ensure good contact gently being tapped with wooden mallet till it is properly backed with adjoining tiles. The tiles shall be fixed within 20 minutes of application of adhesive. The surplus adhesive from the joints, surface of the tiles shall be immediately cleaned.

#### **25.15 Swimming Pool tiles: (Manufactured at Mother plant)**

Providing and laying Porcelain Vitrified Swimming Pool Floor and wall Tiles (pool tiles, new blue) in Approved Size (thickness to be specified by manufacturer) of Johnson Endura or equivalent , with water absorption not less than 2.5%, conforming to ISO : 13006 : 2018, EN 13006 : 2016 group 'A1b' Standard & manufactured as per FINA standard of approved make in all colours, shades laid with tiles adhesive in average 6-8mm bed thickness @ 5.70Kg/Sqm average 6mm bed thickness (notch trowel-12mmx12mm) as per directed by manufacture specification and Engineer in Charge.

#### **25.16 Granite work for coping:**

Providing and fixing 18 mm thick gang saw cut, mirror polished, pre moulded and pre polished, machine cut granite stone for coping of parapet, toe wall, planter wall, open sky area wall and width shall be as per drawing including projection upto 15mm, of required size, approved shade, colour and texture etc. including rubbing, moulding and polishing to edges to give high gloss finish etc. complete at all levels. Granite colour shall be as approved by Engineer in charge. Granite shall be fixied with adhesive, concealed dash fastenes and gap between head of dash fastner and granite surface shall be filled with epoxy of matching colour and shades.

### **26 False Ceiling work:**

Various types of false ceiling work shall be carried out by the contractor referring the false ceiling layouts as per Architectural drawings. Contractor needs to schedule of attached with tender document for all type false ceiling. Contractor will submit minimum three samples of each item proposed in tender document to Engineer in charge for approvals before executing the respective job. All false ceiling work shall be executed through the specialized sub-contractor/ vendors. The engagement of specialized agency/associated agency shall be approved by the Engineer-in-charge on submission of work experience certificate of that agency for the amount and number as per general condition of tender and as per specifications for various types of false ceiling detailed below.

#### **26.1 Gypsum False Ceiling:**

The False ceiling shall be done with 12.5mm thick tapered edge gypsum moisture resistant board conforming to relevant BIS code for all heights as per approved design and drawing:

Providing and fixing at all height false ceiling including providing and fixing of frame work made of special sections power pressed from M.S. sheet and galvanised in accordance with zinc coating of 120 gms/sqm (both side inclusive) as per IS:277 and consisting of angle cleats of size 25mm wide x 1.6mm thick with flanges of 27mm and 37mm at 1200mm centre to centre one flange fixed to the ceiling with dash fastener 12.5mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50mm of required length with nuts & bolts of required size and other end of angle hanger being fixed with nut and bolts to G.I. channels 45mm x 15mm x 0.9mm running at the rate of 1200mm centre to centre to which the ceiling section 0.5mm thick bottom wedge of 80mm with tapered flanges of 26mm each having clips of 10.5mm at 450mm centre to centre shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64mm dia x 230mm long G.I. wire at every junction including fixing perimeter channels 0.5mm thick 27mm high having flanges of 20mm and 30mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450mm centre to centre with 25mm long dry wall screws @ 230mm interval including fixing gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25mm at 230mm 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 3layers covering up to 150mm on both sides of joint and two coats of primer suitable for gypsum board as per manufactures specification and making openings for light fittings, grills, diffusers, cut-outs made with frame of perimeter channels suitably fixed all complete as per drawing and specification and direction of the Engineer-in-charge with 12.5mm thick tapered edge gypsum moisture resistant board conforming to IS:2095.(Part-I). Contractor needs to provide all types of coves and metal powder coated shadow profile at the junction of wall and ceiling as per the approved detailed false ceiling drawings by the Engineer in charge. The work to be carried out as per the CPWD Specifications.

## **26.2 Metal Ceiling System:**

The G.I. metal false ceiling shall be provided in toilets, part of kitchen and at ceiling where pipes are hanging to cover the hanging sanitary pipes & fittings in toilets, chimney fume pipe and loft tanks as per approved drawings, schedule of finishes and scope of work. GI metal false ceiling system of specified materials of size 600x600 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanized steel sections as per following specifications and as directed by Engineer-in-charge shall be provided:

The contractor shall provide and fix in positions Gl Clip in Metal Ceiling System of 600x600 mm module which includes providing and fixing 'C' wall angle of size 20x30x20 mm made of 0.7mm thick pre painted steel along the perimeter of the room with help of nylon sleeves and wooden screws at 300 mm center to centre, suspending the main C carrier of size 10x38x10 mm made of G.I steel 0.7 mm thick from the soffit with help of soffit cleat 37x27x25x1.6 mm, rawl plugs of size 38x12 mm and C carrier suspension clip and main carrier bracket at 1000 mm c/c. Inverted triangle shaped Spring Tee having height of 24 mm and width of 34 mm made of Gl steel 0.45 mm thick is then fixed to the main C carrier and in direction perpendicular to it at 600 mm center with help of suspension brackets. Wherever the main C carrier and spring T have to join, C carrier and spring T connectors have to be used. All sections to be galvanized @ 120 gms/sqm (both side inclusive), fixing with clip in tiles into spring T with : GI Metal Ceiling Clip in plain Bevelled edge global white/ approved color tiles of size 600x600 and 0.5 mm thick with 25 mm height, made of GI sheet having galvanizing of 120 gms/ sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation.

## 27 Plastering & Finishing Work

The joints between RCC members and masonry or any two dissimilar materials shall be covered by plaster mesh strips and a groove shall be provided at such joints.

### 27.1 Internal plaster:

- Inside walls of Residential blocks, Utility Blocks, Guard room, Boundary Wall, Public Toilet shall be plastered with 12 mm Plaster of Polymer (modified) with 1 mm putty added ready mix mortar finished with trowel including provision of 145 GSM fiber glass mesh (as per manufacturer specification) with Alkali Resistant coating at RCC-masonry junctions and at locations of conduits, pipes etc. with necessary nails/screws at junction of concrete and masonry work (AAC or concrete block) or between different materials, hacking of concrete/ application of bonding agent, finishing, curing, scaffolding for all floor, all level, all height etc. complete as directed by Engineer in charge
- Monolithic construction:- All Residential Blocks' Utility blocks- ceiling, Podium, inside retaining wall, staircase, lift lobby, reception, porch, stilt wall & wet area, Balcony etc. ceiling shall be plastered with 6 mm Plaster of Polymer (modified) added ready mix mortar finished with trowel including provision of 145 GSM fiber glass mesh (as per manufacturer specification) with Alkali Resistant coating at RCC-masonry junctions and at locations of conduits, pipes etc. with suitable nails at junction of concrete and masonry work (AAC or pre-cast concrete block) or between different materials, hacking of concrete/ application of bonding agent, finishing, curing, scaffolding for all floor, all level, all height etc. complete as directed by Engineer in charge.
- Non-monolithic construction :- All Residential units, Utility blocks ceiling (without false ceiling, Balcony), shall be plastered with 12 mm thick (average) premixed formulated one coat gypsum lightweight plaster having additives and light weight aggregates as vermiculite/ perlite respectively conforming to IS: 2547 (Part - I & II) 1976, applied on hacked / uneven background to finished in smooth line and level etc. complete after applying bond coat primer as per approval of Engineer-in-charge.

### 27.2 External plaster

Residential Blocks, Utility Blocks, Guard room, Boundary wall, etc.(except monolithic shutter finished surface outside walls), in development work etc. shall be plastered with 15 mm Plaster of Polymer (modified)with 1mm putty added ready mix mortar finished with trowel including provision of 145 GSM fibre glass mesh (as per manufacturer specification) with Alkali Resistant coating at RCC-masonry junctions at locations of conduits, pipes etc. with necessary nails/ screws at junction of concrete and masonry work (AAC or concrete block) or between different materials, hacking of concrete/ application of bonding agent, finishing, curing, scaffolding for all floor, all level, all height etc. complete as directed by Engineer in charge.

### 27.3 Workmanship

The mesh is to be fixed with nails/ screws and cement paste at the junctions of different materials (column and block work, at beam bottom level, on the face of beam and block work) to avoid cracks in the plaster. Fiber mesh shall be fixed before the plasterwork. The mesh shall be fixed in such a way that it is totally concealed in the plaster. Plaster mesh shall be fixed in such a way that minimum 150 mm mesh is provided on either side of the joint. The mesh shall be fixed on both the elements with the help of nail/ screws. Drilling shall be carried out if required in RCC member.

The work carried out at any height, position, shape, floor and for all necessary

scaffolding, etc. as may be required. Hacking/ bush hammering be done to form key for plaster or bonding agent application and for spatter dash treatment as specified as directed by engineer in charge.

All work in narrow width, rounded angles, chamfered external angles, drip moulds, grooves and for making good after all trades. Groove to be formed in plaster at junction two different materials i.e. RCC and brick work etc.

## **28      Exterior Grade Texture Paint**

- 28.1** This paint shall be executed on all exposed surfaces of buildings i/c exterior of walls, balcony walls, parapet, Staircase muntin, O/H tanks, compound wall, other locations, exposed soffits etc. as decided by Engineer-in-charge. Cleaning the surface free of dirt/dust and laitance, repairing the substrate must be checked for its soundness using small hammer, and filling the cracks with sealers and polymer modified cement mortar for bigger gaps making the surface smooth, even & free from cracks and local depressions.
- 28.2** Providing and applying one coat of acrylic primer in approved shade of texture coating mixed with wall sealer and water in the ratio of 1:1: 1 (1 sealer : 1 primer: 1 water) over the plastered surface followed by application of alkali resistant exterior acrylic modified resin-based primer coats in approved shade of texture @ 80 - 90 Sq.feet / kg / Coat by brush this shall be followed by providing and applying weather and UV Resistant, Water Repellent, Dust, Dirt & Stain Resistant, Fungus & Algae Resistant and 100% natural non-pigmented crushed granite Chips (100% natural crushed Granite chips) texture paint of approved make with final coat of texture with natural granite stone chips (attainable thickness: 0.80 to 0.90mm to offer grooved finish) applied with spray over a coat of texture without chips (attainable thickness: 0.80 to 0.90mm to offer smooth surface as base coat) of desired shade in two coats or more @ 4.0 - 5.0 Sq. Feet / kg / Coat in approved pattern. Finally, application of two coats of water base acrylic protection coat (co-polymer of acrylic) applied @ 140 - 160 Sq.feet / litre. / Coat with roller and brush to form a film of 30 – 40 microns thick and make the surface streak resistance. The texture paint shall be done after scrapping and properly cleaning the surface before application of wall sealer and primer as per the manufacturer's specification and direction of Engineer-in-charge. The texture applied shall form a durable membrane, seamless and have strong adhesion, high sheen and anti-carbonization properties. The entire operation including cost and conveyance of all material, labour, sundries, tools and machinery etc. all complete. (The base preparation with putty shall be done as required and shall be included & will not be paid separately). All complete as per direction and approval of Engineer-in-charge.

## **28.3    Premium Acrylic Emulsion Interior Paint:**

This paint shall be executed on all internal surface of residential towers and utility blocks, guard rooms, ATM, Public toilet etc. with stilts, podiums , ramps etc. with 1mm thick white cement based waterproof putty, priming coat, in atleast three coats of premium quality acryllic emulsion paint shades and colours of paint shall be as per materials palette approved by the Engineer-in-charge. The work shall be carried out as per CPWD 2019 specifications with correction slips up to the last date of submission of tender documents with provision of IS Codes listed in CPWD specifications shall form a part of this document with all latest codes.

Note: 1mm thick white based waterproof putty shall not be used on the gypsum plaster finished walls/ ceilings surfaces.

**29 Thermoplastic Paint:**

This paint shall be executed for road markings, parking areas demarcation in open area, stilt, marking at Parking columns upto 1200mm height, wall ramps and kerb stone painting, zebra crossing etc. as per the approved Architectural drawings. Paint shall be 2.5mm thick (retro-reflective) of specified shade/ colour using hot thermoplastic material by fully/ semi-automatic thermoplastic paint as per direction of Engineer-in-Charge and accordance with applicable specifications as per CPWD 2019 specifications Volume I and II with correction slips up to the last date of submission of tender documents with provision of IS Codes listed in CPWD 2019 specifications shall form a part of this document with all latest codes.

**30 Polycarbonate work:**

Opening of all shafts at terrace, courtyard opening/open to sky portion/core area at terrace and ramp openings leading to basement shall be covered with 16mm thick multiwall three or more layered polycarbonate sheet roofing supported on GI frames/truss as approved by Engineer-in-charge. Designing, providing and fixing 16 mm thick, 1000 ( $\pm 10\%$ ) wide panel with U value not more than 2.10 W/m<sup>2</sup>K and weight not less than 2.75 kg/sqm multiwall three or more layered polycarbonate sheet panel co-extruded Ultra Violet (UV) protective coating on external surface with standing seam on both the running ends, sheet shall be connected using polycarbonate connectors having grip lock double tooth locking mechanism and provided with endcap at the ends to ensure water and air tightness. The light transmission from transparent or translucent or opaque or in combination polycarbonate sheet varies from 15 to 85%, shall be decided by engineer in charge as per requirement. The polycarbonate sheet shall have Dart drop impact value more than 60 Joules as per IS14434:2023 and confirm either flame retardancy of class UL- 94HB/94V-0 category as per IS14434:2023 or category VO & 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 (D1925) shall be equal to or more than 10 unit or 6 units respectively on a sample after 5000 Hours of exposure of UV / sun light. The cross section ends of poly carbonate sheet shall be provided with self-adhesive aluminium impermeable tape at top and aluminium ventilated tape at bottom of the sheet and covered with polycarbonate / aluminium u-shaped protective profile. The poly carbonate sheet shall be held in position by using stainless steel (SS304 grade) trapezoidal cleat of 1 mm thick having minimum bottom width 35mm and top width 50mm or any other shape and size as per design requirement and manufacturer specification, cleat fixed with 2 or more stainless steel screws of 5 mm diameter with 25mm long with structural steel framework. The cleat shall be tested to withstand pull out force equal to wind speed of 50m/s as per IS: 875 and design test report shall be submitted to Engineer-in-charge for approval before use. The cost of ridge and gutters of pre-coated galvanized iron sheet of approved specifications and structural steel framework of shall be paid in respective item for separately.

Note: The fixing arrangement using cleat shall be designed separately for coastal areas for cyclonic wind speed. The work shall be carried out as per CPWD specification with up to date correction till last date of bid submission and direction of Engineer-in-charge. The contractor shall provide a guarantee/ warrantee bond of minimum 10 years against any manufacturing defect of the polycarbonate panels.

**31 Specification For Urinal Partition:**

All urinals shall be provided with 12mm thick frosted toughened glass urinal partition of required shape and size (900mm high and 450mm wide average dimensions) including Stainless Steel 304 grade bracket/clamp with required fasteners etc. complete as per direction of Engineer-in- Charge shall be provided in all urinals.

**32 Sanitary fittings:**

The sanitary fittings such as W.C., wash basin, taps (all of premium range) etc. are to be provided shall be as per relevant attached **Schedules of Sanitary and CP Brass fittings/Fixtures** in accordance with CPWD Specifications 2019 and according to in accordance schedule as attached in this tender document.

**33 Internal Water Supply Pipe Line(recessed):**

The internal water supply pipelines shall be of CPVC and shall be provided as per relevant CPWD Specifications 2019 with up-to-date correction slips and scale of amenities and drawings attached in this document. Fittings and fixtures like socket, reducer socket, elbow, reducer elbow, tee, reducer tee, nipple, unions, check valve, non-return valve, extension nipple, cross, cross over, plug, etc. of all CPVC clamps fixing by maximum 1 mtr spacing etc shall be provided by the contractor as per approved plumbing layout plans and as per direction of Engineer-in-charge. All the CPVC pipes to be used in the work shall confirm to IS 15778:2007 and other related IS codes as applicable with upto date amendment till last date of bid submission.

**33.1** Internal water supply pipe line of all outlets including bathroom, toilet, kitchen etc shall be of CPVC with all fittings, clamps for fixing shall be provided as per relevant CPWD specification with up to date correction slip. The water supply pipe grid running inside the residential units exposed on wall/ceiling shall be covered with suitable gypsum board false ceiling in box type / cove as per drawing and design approved by Engineer-in-Charge.

**33.2** All External garden hydrants system piping shall be uPVC 10 kg/cm<sup>2</sup> conforming to IS 4985

**33.3** Internal pipes exposed on wall in shafts, terrace and other exposed area, down water supply line from terrace water tank to individual flats, other toilets, kitchens etc. shall be CPVC & with press type fittings including fixing by SS clamps etc complete as per approved plumbing design and drawing and executed with prior approval of Engineer-in-charge.

**34 External (Exposed) Pipe Lines in buildings:**

i) GI pipes (Class-C) and fittings for water supply lines from UG tank to terrace, firefighting tanks etc. water feeding line shall be as per approved plumbing drawing. The G.I. pipes and to be provided as per relevant CPWD Specifications 2019 with upto date correction slips and scale of amenities, including fittings and fixtures like socket, reducer socket, elbow, reducer elbow, tee, reducer tee, nipple, unions, check valve, ferrule, non-return cross over, plug, etc. all shall be provided by the contractor as per valve, extension nipple, cross, approved plumbing layout plans and as per direction of Engineer-in-charge. GI pipes and fitting/fixtures shall confirm IS 1239 & IS 4736.

**35 Vacuum Dewatered Concrete (VDC):**

Vacuum dewatered concrete flooring will be carried out in the stilt parking, podium and area with required thickness as per design requirement to sustain load of vehicle movement in M-30 grade concrete minimum Thickness 150mm/As per drawing. Final brooming as per requirement (to achieve desired surface finish) shall be made before the floor top becomes too hard and if required at top surface to making groove cutting and filling with silicate etc. Hard top to be prepared with floor hardener as one part of dry cement, the hard top shall be provided over concrete base immediately after it is set, compacted, and leveled with as teel trowel.

**35.1 Material:**

All materials of construction like cement, aggregate, sand, water etc. shall be as per CPWD specifications. The total filler content consisting of cement and fine particle shall be limited to a minimum. This factor is of foremost importance both for the vacuum and for the reduction of shrinkage.

**35.2 Grade of Concrete:**

Minimum grade of concrete used shall be M-30 conforming to IS:456. Only Design Mix Concrete using admixtures with the prior approval of the Engineer-in-Charge shall be used.

**35.3 Special Requirement:**

All works covered by this specification shall be carried out by an experienced agency having expertise in vacuum dewatering concrete system after getting the same approved. Only skilled and experienced operators shall be employed for the purpose. Prior approval of the agency shall be obtained from the Engineer-in-Charge before starting the work. All the equipment shall be of approved and proven types and suitable for the work involved.

Concrete laying pattern shall be decided in consultation with the Engineer-in-Charge and with his approval. The maximum width of a slab strip shall not generally exceed 4 meters and minimum number of construction joints shall be used. Alternate slab strips shall be sequentially laid. Any damage to the already finished top surface shall be avoided. At construction joints no overflow of mortar or slurry on the already hardened surface shall be allowed while concreting the intermediate slab strip. Such construction joints shall be marked with a thread in a straight line while the concrete is still green. Continuity of reinforcement shall be maintained while laying concrete in slab strips. Edges at expansion joints shall be protected and proper arrangement of shear-transfer shall be provided standards.

For Concrete compaction after placing concrete in position, it shall be vibrated thoroughly using poker/ needle vibrators and thereafter leveled with surface vibrators to produce a homogeneous and smooth concrete surface. In order to achieve a smooth surface to the satisfaction of the Engineering-in-Charge, surface vibrators shall be very carefully used by skilled operators. Over vibration resulting in excess mortar near the surface shall be avoided.

**35.4 Dewatering:**

Suction mats shall be spread over the leveled fresh concrete surface and shall be connected by suction hose to the vacuum pumps for De-watering of surplus water in the concrete. During De-watering it shall be ensured that no cement/ cement slurry is pumped out.

**35.5 Floating and Troweling:**

This shall be done after De-watering by using skim floater (power floater). After this, surface shall be towed with minimum two passes of power trowel to achieve a wear resistant surface to the satisfaction of the Engineer-in-Charge.

**35.6 Curing:**

However, all care shall be taken to avoid any stain or any permanent stain on the surface. Any stain or permanent marking on the top surface shall be removed by approved means.

**Approach Working Platform & Formwork:**

The Agency shall arrange all approaches, scaffolding, working platforms etc. for carrying out the entire operation safely and in a work-man-like manner. The working area shall be nearly maintained, and all the facilities required by the Engineer-in-Charge for proper supervision of the work shall be provided. The specification and method

statement shall be submitted by the agency well in advance before the start of execution. The execution shall be allowed only after due approval of Engineer-in- Charge.

### **35.7 Additional Specifications for Roads:**

For designing and construction of internal roads, the consultant of the contractor has to consider road section, etc. based on projected traffic, IRC, BIS and other applicable codes/guidelines and as per MORTH specifications. However, following **minimum** specifications are to be adopted: -

- i. For stilt, podium, basement and over the basement slab and over any other RCC slab, ramps-150mm (avg.) Pavement quality concrete (PQC) in M-30 grade over waterproofing treatment.
- ii. Over ground i.e. directly on the earth-200mm Granular-Sub-Base (GSB), 100mm PCC(1:4:8) and 150mm Pavement quality concrete (PQC) M-30 grade.
- iii. Parking Ramp (over ground i.e. on earth if any)-150mm Granular-Sub-Base (GSB), 100mm PCC(1:4:8) and 150mm Pavement quality concrete (PQC) M- 30 grade.

### **35.8 Granular-Sub-Base: -**

Providing, laying, compacting, etc. close graded Material conforming to specifications, mixing in a mechanical mix plant at optimum moisture content (OMC), spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density in following 3 Grades, complete as per specifications and directions of Engineer-in-Charge.

- i. With material conforming to Grade-I (size range 75 mm to 0.075 mm) having CBR Value-30,
- ii. With material conforming to Grade-II (size range 53 mm to 0.075 mm) having CBR Value-25,
- iii. With material conforming to Grade-III (size range 26.5 mm to 0.075 mm) having CBR Value-20.

### **35.9 Road Marking: -**

Marking with approved quality thermoplastic paint of 2.5 mm thick road marking strips (retro reflective) of specified shade/ colour using hot thermoplastic material by fully/ semi-automatic thermoplastic paint applicator machine fitted with profile shoe, glass beads dispenser, propane tank heater and profile shoe heater, driven by experienced operator on road surface to be carried out on all internal roads, ramps, basement parking, etc. as decided by Engineer-in-charge.

### **35.10 In road work grooves of 5mm wide and 50mm deep as per approved pattern and design to be provided by the cutter and filled with PU Sealant.**

#### **35.10.1 The junction where RCC structure and soil come in contact with each other and over its road to be constructed, has to be treated with due care to avoid cracks in future and necessary reinforcement has to be provided.**

### **36 Aluminum Works:**

#### **36.1 All Aluminum works shall in general be executed in accordance with CPWD Specifications 2019 Vol-I & II with correction slips up to last day of submission of bid and as per approved drawings and as per the direction of Engineer-in-Charge and shop drawings for the same shall be got approved from Engineer-in- charge before execution. Minimum wall thickness for the structural members & non-structural**

member shall be 3.0 mm and 2mm, respectively or as per design approved by proof consultant in accordance with relevant IS codes.

**36.2** Aluminum extruded sections shall conform to IS: 733 and IS: 1285. All sections shall be fixed with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/neoprene gasket etc. Aluminum sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, aluminum snap beading for glazing / paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. Aluminum sections shall be Polyester powder coated (minimum thickness of polyester powder coating 50 micron). Extruded profiles shall be free from die lines, pressure marks, scratches or graphite lines.

**36.3 Aluminum Louvers:**

All service shaft opening and access doors and other such doors shall be made with aluminium frame & aluminium Louvers (factory fabricated powder coated of minimum thickness 50 micron) as per approved drawings. All aluminium louvered doors shall be fixed with stainless steel grade 304 butt hinges of required size as CPWD specifications. 180-degree stainless steel grade 304 hinges shall be used wherever required for fixing of aluminum members, door panels, etc. as per approved sample. Stainless steel grade 304 hardware shall be fixed as directed by the Engineer-in- charge. All plumbing and sanitary rain water pipe lines exposed on outer face of wall shall be covered with Aluminum Louver. The rain water pipe or any other any pipe exposed on outer face of balcony walls shall also be covered with Aluminum Louver or any other suitable materials of approved design, drawing and make by Engineer-In- Charge. Adequate structural support system and provision for maintenance of services shall also be provided. The specification includes all operations from manufacturing stage to the installation. Aluminum louvers panels shall be as per structure stability, and support pattern as per approved design requirement.

**36.4** All rain water, plumbing and sanitary lines exposed on outer face of wall/shaft shall be covered with Aluminum louver of approved design & pattern. Adequate structural support system and provision for maintenance of services shall also be provided.

**36.5** The Service lines/pipes shall not be visible on the exterior faces of the building. As far as possible all the services shall be taken through the shaft intended for that purpose. Inside the shaft, the service lines shall be carried on GI bracket of suitable size rather than fixing them directly on shaft walls.

**36.6** The shaft shall be duly covered in elevation with Aluminum Louvers to retain the aesthetic elegance of the building. MS platform of suitable size with supports of required section duly epoxy coated paint as per approval of Engineer-in-charge shall be provided in the shaft at every floor level to facilitate working for repairs.

**36.7** The louvers shall be with Aluminium horizontal Z- Louver system with screw at c/c distance 50mm. Louver shall be made out of 30mmx50mmx2mm or higher frame

with screw fixing. The necessary fittings for opening of louver system in the shaft shall be provided as per approved drawing and design and in the opening of podium elevation for fixed portion and openable part to be proposed by the firm and approved by the Engineer-in-charge etc. are in the scope of work.

- (a) All service shaft opening and access doors and other such doors etc as required at site shall be with louvers of approved sizes with Aluminium horizontal Z-Louver system with screw at c/c distance 50mm and made out of 30mmx50mmx2mm or higher frame with screw fixing arrangements. The necessary fittings for opening and closing of louver system in the shaft along with locking arrangements shall be provided as per approved drawing and design.

**36.8** Podium Façade: -As per Drawing.

**37 General Conditions for Water Proofing Works**

- 37.1** The Agency shall be responsible for the water proofing design, proper installation and performance of waterproofing systems to make the sub-structure and superstructure completely watertight.
- 37.2** The work shall be got executed from the specialized agency as approved by the Engineer-in-Charge. Agency shall submit the names of atleast three “water proofing specialist” from the list of approved makes given in this bid document along with information about their technical capabilities and list of similar works executed by the specialized agency in the past seven years for the approval of Engineer-in-Charge at least 100 days in advance from the start of waterproofing work. For the Quality assurance and quality of workmanship, waterproofing specialist applicator should be proficient in handling and installing water proofing membrane / crystalline compound etc.
- 37.3** Total quantity of the water proofing compound required shall be arranged only after obtaining the prior approval of the make by Engineer-in-Charge in writing. Materials shall be kept under double lock and key and proper account of the water proofing compound used in the work shall be maintained. It shall be ensured that the consumption of the compound is as per specified requirements.
- 37.4** The finished surface after water proofing treatment shall have adequate smooth slope as per the directions of the Engineer-in-Charge.
- 37.5** Before commencement of treatment on any surface, it shall be ensured that the outlet drain pipes / spouts have been fixed and the spout openings have been eased and rounded off properly for easy flow of water.
- 37.6** The approved specialized agency for the work of water proofing will have to execute a guarantee bond in prescribed proforma enclosed at for removing any defects for at least 10 years. Guarantee bond shall be signed by both the specialized agencies as approved by the Engineer-in-Charge and the main Agency to meet their liability under the guarantee bond. However, the sole responsibility about the efficiency of water proofing treatment shall rest with the main agency. Any leakage /defects in waterproofing arising during the defect liability period shall have to be got attended immediately within a reasonable time and rectified by the main Agency at

their cost to the satisfaction of the Engineer-in-Charge. This would include any incidental cost e.g. flooring, filling, tilling, piping and plaster etc. complete and nothing shall be payable to the agency on this account.

- 37.7** 10% of the cost of water proofing work shall be retained as additional security deposit and the amount so withheld would be released after ten years from the date of completion of the entire work under the agreement. If the performance of the work done is found unsatisfactory and any defects noticed during the guarantee period, they shall be rectified by the agency within seven days of receipt of intimation of defects in the work. If the defects pointed out are not attended to within the specified period, the same will be got done from another agency at the risk and cost of the agency.
- 37.8** In all waterproofing works, due care shall be taken on the openings, around pipes or any other service ducts / pipes etc. by using epoxy painting around it and providing bond with non-shrinkable water proof epoxy grout GP2 after sealing the bottom opening.
- 37.9** The specifications and method statement shall be submitted by the Agency well in advance before the start of execution. The execution will be done only by the applicator authorized by the manufacturer and after due approval of Engineer-in- Charge. Method statement for each type of water proofing shall have to be provided by the firm and work execution to be taken up only after approval of the Engineer-in- charge for the same.

#### **37.10 Waterproofing with Fully Bonded HDPE membrane**

- 37.10.1** Fully bonded HDPE membrane type water proofing is to be carried out in raft foundation work.
- 37.10.2** 1.5mm thick composite thickness (Bare film thickness of HDPE shall be minimum 0.90 mm) fully bonded weldable HDPE membrane confirming to IS 16471:2017, requirements to provide Type A fully bonded protection to underground structures and it shall provide an intimate bond to the underneath of the poured concrete used as base/ raft slab to resist water migration. Membrane shall be supplied with original manufacturer's material test certificate (MTC) and membrane shall be installed in strict accordance with original manufacturer's instructions. The agency shall prepare the method statement for the approval of the Engineer-in Charge before the execution of this item.
- 37.10.3** The fully bonded HDPE sheet membrane shall consist of a multi-layer composite film which consists of highly resilient HDPE film, self-adhesive polymer layer and a trafficable weather resistant layer and shall be capable of UV Resistance for the exposure of minimum 45days. The minimum width of the HDPE membrane shall be 2.00 meter in order to minimize the number of joints and with minimum 75mm factory made selvedges and confirming to IS 16471:2017 requirements of underground waterproofing structures. End laps and side laps should be a minimum of 75 mm width with double weld system, comprising of two parallel welds of 15 mm wide each with a 20 mm air channel gap in between the two weld lines.
- 37.10.4** Fully bonded HDPE sheet membrane shall be chemically resistant in all types of soil

or water and is unaffected by ground settlement beneath slabs. The fully bonded HDPE sheet waterproofing membrane shall have following typical properties:

- a) Peel Adhesion to concrete > 800 N/M (as per ASTM D903: 1998).
- b) Elongation (HDPE film)> 400% (ASTM D 412 Modified).
- c) Tensile strength>25Mpa. (ASTM D 412 Modified).
- d) Thickness: 1.5mm composite thickness, HDPE thickness not less than 0.9mm (ASTM D 3767).
- e) Puncture Resistance - 1000 N(ASTM E154).
- f) Resistance to Hydrostatic Head >70 m (ASTM D 5385 Modified).
- g) Lap Joint Strength at Overlaps > 15000 N/m (ASTM D 6392:2012) (Side and End Laps).

**37.10.5** Pre-applied fully bonded HDPE membrane shall be installed with selvedge laps, and end laps executed with supplier's instructions. Pre-applied fully bonded HDPE membrane shall be laid over the entire area and returned on to the diaphragm/retaining wall and terminated as per manufacturer's instructions till the level of raft slab.

**37.10.6** Purpose of these technical specifications is to establish, monitor and control all activities to execute the waterproofing and reinforced concrete retaining walls including, sampling, inspections and execution without any safety hazard. This procedure is exercised in order to meet the requirements specified in drawings, project specifications and up to the satisfaction level of Engineer-in-Charge and the consultant.

**37.10.7** Controlling specifications shall be of Original Manufacturer Shop Drawings (Private Label Supplier Shop Drawings not acceptable) and Original Manufacturer Method Statement (Pvt. Label Supplier Method Statement not acceptable) after due approval of Engineer-in-Charge.

### **37.11 Waterproofing of Underground & Overground Water Tank**

**37.11.1** First Step shall be treatment to concrete defects like Construction Joints, Cold Joints, Honeycombs & Porous Concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with IWP non shrink additive of approved make and sealing all the construction joints with styrene butadiene latex.

### **37.11.2 Wall and Slab Joint / Construction Joint Treatment**

After the entire surface preparation has been completed on the mother slab, all the Wall and Slab Joints / Construction Joints to be treated with joint tapes having minimum tensile elongation more than 300% of size 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of Waterproofing slurry on the Wall – Slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire Wall – Slab joints / Construction Joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner. as per original Manufacturer's specifications all over the entire horizontal and upto full height vertical surface.

### **37.11.3 Waterproof Coating**

After the entire surface preparation has been done, pre wetting of the entire concrete surface and providing and application of the 1st coat of approved make flexible cementitious waterproofing slurry with quick curing and waterproofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry. The total consumption of the product should be as per manufacturer specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1Mpa, adhesion strength of 2Mpa, crack bridging capacity of 2mm as per EN 1062-7 complete as per manufacturer's specifications and approved by Engineer-in-Charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.

- 37.11.4** Providing and laying of protection plaster 20mm thickness with 1:4 cement and sand mortor as per approved specification admixed with integral waterproofing compound as per original Manufacturer's specifications. to prevent the Waterproof Coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against leakage.
- 37.11.5** Laying slope making and protection with 40mm avg. thick of M25 grade fibrated screed and applying waterproof plastering with CM 1:4 of thickness 20mm admixed with integral waterproofing compound as per original Manufacturer's specifications.
- 37.11.6** Controlling specifications shall be of Original Manufacturer Shop Drawings (Private Label Supplier Shop Drawings not acceptable) and Original Manufacturer Method Statement (Pvt. Label Supplier Method Statement not acceptable) after due approval of Engineer-in-Charge.

## **37.12 Water Proofing of Water Retaining Structures- STP Tanks**

- 37.12.1** First Step shall be treatment to concrete defects like Construction Joints, Cold Joints, Honeycombs & Porous Concrete. All construction joints, honeycombs, cold joints, of concrete shall be treated by hacking and opening the affected area till sound concrete, fixing nozzle and grouting the same, under pressure with cement slurry mixed with IWP non shrink additive of approved make and sealing all the construction joints with Master Latex mortar.

## **37.12.2 Wall and Slab Joint / Construction Joint Treatment**

After the entire surface preparation has been completed on the mother slab, all the Wall and Slab Joints / Construction Joints to be treated with joint tapes having minimum tensile elongation more than 300% of sizes 25m x 200mm fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. Apply 1st coat of Waterproofing slurry on the Wall –Slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire Wall – Slab joints / Construction Joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner.as per original Manufacturer's specifications all over the entire horizontal and upto full height vertical surface.

## **37.12.3 Waterproof Coating:**

**37.12.4** After the entire surface preparation has been done, pre wetting of the entire concrete surface and providing and application of the 1st coat of flexible cementitious waterproofing slurry with quick curing and water proofing with a mason's brush. After the 1st coat has sufficiently dried now apply the 2nd coat of water proof slurry. The total consumption of the product should be as per manufacturer specification for two coat. The product should have a tensile elongation of 120%, tensile strength of 1Mpa, adhesion strength of 2Mpa, crack bridging capacity of 2mm as per EN 1062-7 as per manufacturer's specifications and direction of Engineer-in-Charge. After completion of the above said applications, the waterproofed coating should be left to air cure for minimum of 48 hours. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after air curing to check for any leakages.

**37.12.5** Providing and laying of protection plaster 20mm thickness to prevent the Waterproof Coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against leakage.

**37.12.6** Laying slope making and protection with 40mm avg. thick of M-40 grade fibrated screed and applying waterproof plastering with CM 1:4 of thickness 20mm admixed with integral waterproofing compound as per original Manufacturer's specifications.

**37.12.7** Controlling specifications shall be of Original Manufacturer Shop Drawings (Private Label Supplier Shop Drawings not acceptable) and Original Manufacturer Method Statement (Pvt. Label Supplier Method Statement not acceptable) after due approval of Engineer-in-Charge.

#### **37.12.8 Moisture Sensitive Bituminous Epoxy Coating:**

Over the plaster providing & applying 2 coats of Moisture Sensitive Bituminous Epoxy Coating at a consumption of @500/Gms/sq.mtr with Bonding / adhesion of 1.2 to 1.4 N/mm<sup>2</sup> as per ASTM D 4541, Water resistance, immersion – 7 days passes as per ASTM D 870-09, Chemical resistance, immersion in dilute acid alkali & salt solutions – 7 days -Passes as per ASTM 868 as per manufacturer's instruction.

**37.12.9** Controlling specifications shall be of Original Manufacturer Shop Drawings (Private Label Supplier Shop Drawings not acceptable) and Original Manufacturer Method Statement (Pvt. Label Supplier Method Statement not acceptable) after due approval of Engineer-in-Charge.

#### **37.13 Waterproofing of Landscape Garden/Hardscape:**

**37.13.1** The First part consist of all surface area should cleaned up to visible of hair cracks / aggregate texture. Cleaning of RCC member should be done by hacking tool, wire brush, wire grinder & air blower etc. Open cracks & construction joints should be sealed with cement mortar mixed with IWP of approved make. All clean & treated area should be tested for water tightness by flooding water. All wet spots & water leakage area should mark for treatment. Application shall be done by approved specialized agency, and comprehensive warranty shall be given by specialist applicator.

**37.13.2** Second part includes providing & applying solvent free resin/epoxy primer coat by roller @ 0.30 kg/sqm on the prepared surface. Allow to cure for max 5-6 hours. Spread anti-slip grains of 200-300 micron (dried sand) on wet primer at coverage of 0.8-1 kg/m<sup>2</sup> and allow to come to touch dry condition before application of Membrane. The epoxy primer shall have an adhesive strength of 2 Mpa.

**37.13.3** Third part shall consist of applying 2 components, solvent free, liquid applied elastomeric seamless hybrid polyurea Membrane coating@ 1.6 kg/sqm, using high pressure two components spray/brush equipment, to form a minimum system thickness of 1.5 mm in two or more alternative coats.

The coating should pass Dynamic Crack Bridging as per EN 1062-7, Method B for 20,000 cycles at - 20 degree temperature. The membrane shall be applied on horizontal surfaces and on verticals up to 300mm height above the FFL / Soil fill level, self-curing for 2 days, there after ponding with water for 2 days to test the water tightness.

The coating should be having the following minimum properties:

- i) Solids Content (zero VOC) (ASTM D1353) : 100%,
- ii) Tensile strength (ASTM D 412): >10 MPa,
- iii) Tear Resistance (ASTM D1004): > 60 N/mm,
- iv) Shore A Hardness (ASTM D 2240): >80,
- v) Elongation (ASTM D412): >450%,
- vi) Bond Strength/Adhesion to concrete (ASTM D 4541) > 2 Mpa,
- vii) Crack Bridging displacement (ASTM C 836)> 2 mm,
- viii) Puncture Resistance (ASTM E154) > 1000 N,

**37.13.4** Fourth part, before laying of screed is done single layer of non-woven nle membrane/cloth of 150 – 180 gsm shall be laid on the water proof coating so as to create separation layer between the coating and the screed and followed by laying of protective concrete screed of average thickness of 75 mm using M25 grade concrete with minimum thickness of 40 mm at the rainwater outlet and a slope of 1:120, making gola at the junctions of horizontal and vertical surfaces to a float finish, well compacted, curing for 7 days etc. complete

**37.13.5** Fifth part(for landscape areas) includes Providing and laying Dimple drain boards with inbuilt geo textile drainage membrane on top having dimple height of 20-25 mm, average number of dimples 400 per sqm, compressive strength not less than 180 kN/m<sup>2</sup> and geotextile drainage member having mass of 120 gsm, laid with minimum overlap of 50 man Note: If HDPE Drain cells / Drainmats along with a layer of geotextile having weight of 120 gsm and tensile strength not less than 2.4 kN/m as per ASTM D 4595 is provided in place of dimple drain board with inbuilt geotextile, it shall not be paid as extra.

This geotextile fabric composite allows passage of moisture through fabric while preventing fine soil from entering to drainage channel bonded to a high strength polypropylene geotextile fabric.

**37.13.6** Controlling specifications shall be of Original Manufacturer Shop Drawings (Private Label Supplier Shop Drawings not acceptable) and Original Manufacturer Method Statement (Pvt. Label Supplier Method Statement not acceptable) after due approval of

Engineer-in-Charge.

**37.14 Waterproofing of Terrace / Mumty / Roof Slab Waterproofing with Insulation:**

- 37.14.1 The system includes surface preparation by thorough grinding, construction joint treatment as per the methodology, making angle fillets of 125mmx125mm with polymer modified mortar at the junction between slab and parapets and allowing it to cure followed by applying two component high solids content cold applied pure Polyurethane liquid elastomeric seamless waterproofing membrane meeting the requirements of LAM as per ASTM C836 and having excellent tensile strength of > 6 MPa (As per ASTM D412), elongation > 600% (as per ASTM D 412), tear strength of 35 N/mm (As per ASTM D624), adhesion to concrete of > 1.50 MPa (as per ASTM D 4541), tack free time < 4 hours , full dry time < 24 hours , Shore A Hardness of > 70 (As per ASTM D2240), resistance to hydrostatic pressure head of 7 Bar (As per ASTM D 5385/ DIN 16726), puncture resistance of >300N (As per ASTM E154), static crack bridging ability > 3.5 mm (As per EN 1062-7 ),resistance to root (As per CEN TS/14416) and fire resistance of class E (As per EN 13501-1).

The coating shall be applied to achieve a total system DFT of 1.5mm thereby satisfying the requirements of LAM as per ASTM C898 and shall be applied on the entire horizontal surface extending upto 300mm above the FFL on the vertical surface including all around the pedestals for solar panels, thrust blocks etc.as per the methodology.

- 37.14.2 **Insulation Layer:** Spray applied an average minimum 75mm thick GRIHA enlisted CFC & HCFC polyurethane foam (To comply to the U-Value requirement of 0.33 W/m<sup>2</sup>K for roof as per ECBC guidelines) satisfying the requirements of application as per IS 12423-Part3 which is applied in multiple passes with each spray pass of average 10- 12mm thick with a skin formation on the top of each layer to enhance imperviousness of the layer. The spray applied polyurethane foam must have a free rise density of 33-35 kg/m<sup>3</sup> and a spray density in the range of 45- 50 kg/m<sup>3</sup>(as per ASTM D1622), initial thermal conductivity of 0.023 W/m.k at 24°C (as per ASTM C518), tensile strength of >400kPa (as per ASTM D 1623), compressive strength greater than 300kPa (as per ASTM D-1621), closed cell content greater than 95% (as per IS 11239 Part5) , water absorption less than 1.5% (asper ASTM D2856), fire test property conforming to Class B2 as per DIN 4102 and Dimensional Stability of < 1.5% for 7 days when tested at -15& +70°C (as per ASTM D2126). This layer shall not be executed over podium.

- 37.14.3 On top of Polyurethane foam, applying single component, elastomeric 100% pure Polyurethane coating free from bitumen & tar, which meets the requirements of LAM as per ASTM C836-18, having elongation of 400% (As per ASTM D412), Tensile strength greater than 2MPa (As per ASTM D 412), Tensile set >7% (As per ASTM D412), Tear strength greater than 15 N/mm (As per ASTM D 624), Water Vapor Permeability greater than 25 gm/m<sup>2</sup>/day (As per ISO 9932:91), Resistant to water pressure of 5 Bar (As per EN 12390:8), Crack bridging capability of 3.2mm (As per ASTM C1305) and extensibility after heat ageing of No crack observed for 6.4mm (As per ASTM C1522).The coating shall be applied with a total consumption of minimum 1.5 Kg/Sqm in two coats and shall be applied on the entire horizontal surface extending up to 300mm above the FFL on the vertical surface as per the

methodology. It shall be followed by laying 150 gsm Geotextile (non-woven polyester) over the entire membrane on horizontal areas maintaining proper overlaps. Elastomeric Polyurethane coating shall not be executed over podium.

- 37.14.4** Providing 100 mm average thick M25 grade PP fiber reinforced concrete screed mixed with Crystalline admixture Min. 75 mm thick at the rain water outlets, laid to a slope of 1:120, and making angle fillet of 100mmX100mm using M25 grade concrete at the corners, compaction, curing for 7 days etc. complete.

PU Foam shall have following Minimum properties:

Property	Test Standard	Results
Density	ASTMD 1622	45-50 kg/m3
Compressive strength	ASTMD1621	>300 kPa
Tensile Strength	ASTM D1623	>400 Kpa
Thermal conductivity	ASTM C 158	0.023 W/mk
Water Absorption	ASTMD 2842	<1.5%
Closed Cell Content	IS 11239 Part5, 1985 & ASTM D6226	> 95%
Dimensional stability	ASTM D 2126	<1.5 %
Flammability	DIN 4102	B2

Two components Polyurethane coating shall have following minimum properties:

Property	Test Standard	Results
	ASTMD 2369	> 98%
Elongation	ASTMD412	>600 %
Tensile strength	ASTM D412	>6 Mpa
Puncture Resistance	ASTME 154	>300 N
Shore A Hardness	ASTMD 2240	>70
Crack bridging displacement	EN 1062-7	>3.2 mm
Bond Strength to concrete	ASTMD 4541	>1.5 N/mm2

- 37.14.5** Top surface shall be provided with Heat Resistant Tiles of approved make and specifications as per directions of the Engineer-in-Charge.

- 37.14.6** Controlling specifications shall be of Original Manufacturer Shop Drawings (Private Label Supplier Shop Drawings not acceptable) and Original Manufacturer Method Statement (Pvt. Label Supplier Method Statement not acceptable) after due approval of Engineer-in-Charge.

**37.15 Waterproofing of Toilet/Bathroom, Sunken Area, Balcony, Refuse Floor and Similar Areas:**

Clean the entire surface free of dirt, dust, laitance, and all adhesion inhibiting materials, etc. and inspect for cracks depressions, holes on the entire surface if any and remove all surface imperfections, protrusions, loose concrete & filling of cracks with high strength polymer modified mortar/micro concrete and the surface shall be fully repaired and levelled.

**37.15.1 Wall and Slab Joint / Construction Joint Treatment:**

After the entire surface preparation has been completed on the mother slab, all the Wall and Slab Joints / Construction Joints to be treated with Joint Sealing Tape made up of High-end Polyethylene with upper and lower surface heat laminated, having minimum weight 0.06 kg/mtr., tensile elongation 300%. The size of tape shall be 25m x 200mm. the tape shall be fixed in place with flexible cementitious waterproofing slurry with quick curing and waterproofing. After surface preparation apply 1st coat of Waterproofing slurry (two component High strength acrylic waterproofing system) on the Wall –Slab joint and immediately place the tape over it and press it into the still wet slurry with steel trowel to ensure adhesion and release any trapped air. In the same manner the entire Wall – Slab joints / Construction Joints to be treated on the whole area. The water/pipe outlets to be treated in the same manner as per original Manufacturer's specifications all over the entire horizontal and upto full height vertical surface. The slab and wall junction shall be also make fillet of size 75x75 mm with by laying 150 gsm Geotextile (non-woven polyester) with proper over laps as per manufacturer specification.

### **37.15.2 Waterproofing of Coating –**

After the entire surface preparation has been done, Providing & applying solvent free resin/ epoxy primer coat by roller @ 0.30 kg/sqm on the prepared surface. Allow to cure for max 5-6 hours. Spread anti-slip grains of 200-300 micron (dried sand) on wet primer at coverage of 0.8-1 kg/m<sup>2</sup> and allow to come to touch dry condition before application of Membrane. The epoxy primer shall have an adhesive strength of 2 Mpa.

Providing & applying 2 components, solvent free, liquid applied elastomeric seamless hybrid polyurea Membrane coating @ 1.6 kg/sqm, using high pressure two components spray/brush equipment, to form a minimum system thickness of 1.5 mm in two or more alternative coats.

The coating should pass Dynamic Crack Bridging as per EN 1062-7, Method B for 20,000 cycles at -20 degree temperature. The membrane shall be applied on horizontal surfaces and on verticals up to 300mm height above the FFL / Soil fill level, self-curing for 2 days, there after ponding with water for 2 days to test the water tightness. Care should be taken that during this curing period walking or any other activities should be avoided on it. Ponding test can be done after curing to check for any leakages

The coating should be having the following minimum properties:

- i) Solids Content (zero VOC) (ASTM D1353) : 100%,
- ii) Tensile strength (ASTM D 412): > 10 MPa,
- iii) Tear Resistance (ASTM D1004): > 60 N/mm,
- iv) Shore A Hardness (ASTM D 2240): >80,
- v) Elongation (ASTM D412): >450%,
- vi) Bond Strength/Adhesion to concrete (ASTM D 4541) > 2 Mpa,
- vii) Crack Bridging displacement (ASTM C 836)> 2 mm,
- viii) Puncture Resistance (ASTM E154) > 1000 N,

### **37.15.3 Providing and laying of protection plaster 20mm thickness to prevent the Waterproof Coating from getting damaged. The waterproofing system should be applied directly by the manufacturer with 10 years of complete system warranty against leakage.**

### **37.15.4 Laying slope making and protection with 30 to 40mm avg. thick of M25 grade fibrated screed for horizontal surface and applying waterproof plastering with CM 1:4 of thickness 20mm for vertical walls upto 1 m height in toilets/bathrooms, 0.30m height in refuse floor and other areas admixed with integral waterproofing compound as per**

original Manufacturer's specifications.

**37.15.5** Sanitary pipe inserts shall be sealed in following manner:

- a. Place the pipe in the core cut (core cut dia. Shall be 25 – 30mm more than pipe dia.) remove all the dust, loose particles by air blowing or vacuum pump.
- b. Apply polymer bonding agent the pipe and substrate for enhanced bonding
- c. Close the bottom of sleeve/ core cut with by wrapping with double sided bituminous tape around the pipe
- d. Now pore the non-shrinkable polymer grout till full depth of core.

**37.15.6** Controlling specifications shall be of Original Manufacturer Shop Drawings (Private Label Supplier Shop Drawings not acceptable) and Original Manufacturer Method Statement (Pvt. Label Supplier Method Statement not acceptable) after due approval of Engineer-in-Charge.

**37.16 Waterproofing of Construction Joints:**

**37.16.1** Providing and laying swellable Water Stops at all construction joints for preventing water migration at construction joints below grade. Construction Joint should be swellable type of minimum 20mm X 25mm in position at all vertical & horizontal construction joints detailing and fixed by using epoxy adhesive @ 3.78 litre per 240 running metre. The swellable water stop shall be have water absorption min. 1.2 kg/m and shellability of more than 1000%.

**37.16.2** Controlling Specifications shall be of original manufacturer shop drawings (private label supplier shop drawings not acceptable) and original manufacturer method statement (private label supplier method statement not acceptable) after due approval of Engineer-in-Charge.

**37.16.3** The internal surfaces (floor and wall) of the water reservoirs like underground tanks, terrace tanks, sumps etc. shall be provided with ceramic tiles of size 300mm x 300mm or more of approved shade and brand with cement based high polymer modified quick set tile adhesive type-III(water based) conforming to IS: 15477 of approved make and specification complete as per directions of the Engineer-in-Charge.

**37.16.4** Crystalline Water proofing compound

Integral crystalline admixture for water proofing treatment shall be used for RCC structures like basement raft, retaining walls, reservoir, swimming pool sewage & water treatment plant, underground water storage tanks, overhead water tanks, podiums slab, refuge floor, terrace slab, mummy, lift machine room, toilet, balcony slabs etc. at the time of transporting of concrete into the drum of the ready-mix truck, using integral crystalline admixture @ 0.80% (minimum) to the weight of cement and cementitious content both per cubic meter of concrete or higher as recommended by the manufacturer's specification in reinforced cement concrete at site of work in accordance with the CPWD Specifications 2019 Vol-II. The crystalline admixture shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specifications and the directions of the Engineer-in-Charge. The minimum concrete design mix for all the liquid retaining structures shall be M-30. Before incorporating the crystalline admixture into the project it is imperative that a

comprehensive testing process shall be initiated.

### **38 Fire stops & Fire sealants**

All openings (provisions for MEP) & Joints (provision to accommodate movement) in rated wall & floor shall be closed with tested & listed firestop systems.

Firestop system for all MEP application should have 2 hours fire rating when tested in accordance with ASTM E 814/UL 1479 standards and IS 12458 and all joints shall be tested in accordance to ASTM E1966 and Façade joint between (non-rated) & rated floor shall be tested in accordance ASTM E 2307. If equivalent test standards are followed then equivalency can be arrived by comparing parameters like movement, Hose Stream test, L rating, Sound insulation, mould and mildew resistance etc.

**38.1** The system shall be UL listed & classified and product shall bear the UL & FM approval logo on the packing. If none of UL test certificate comply with actual application, an EJ document prepared by qualified personnel and based on nearest third party tested & approved systems like UL test certificates & in accordance with IFC guidelines shall be produced by manufacturer. A firestop submittal shall be produced by manufacturer, in accordance with approved passive fire protection method statement, for technical approval. Firestop installation shall be done by Company Accredited Firestop Specialty Contractor (CAFSC) and in accordance with Company guidelines and UL system test certificates or approved EJ document. Firestop Specialty Contractor needs to submit work completion certificate along with installation report through documentation Software CFS DM for periodic inspection & maintenance purpose.

**38.2** This method statement describes a proper work procedure that shall be followed for fire stopping applications as per site requirement, specification(s) and contract drawing(s). The scope of work covers:

38.2.1 Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions

38.2.2 Gap between edge-of-floor slabs and curtain walls

38.2.3 Openings/joints between structurally separate sections of fire rated wall or floors

38.2.4 Gaps between the top-of-walls and ceilings or roof assemblies

38.2.5 Openings and penetrations in fire-rated partitions or walls containing fire doors

38.2.6 Openings around structural members which penetrate floors or walls

**38.3** The aspects covered in the scope of work are as follows: -

38.3.1 Identification of breaches in fire rated walls/floors that need to be fire stopped as per fire plan or site requirement.

38.3.2 Identification and procurement of appropriate firestop assembly as per requirement of site, fire plan, specification(s) and/or contract drawing(s).

38.3.3 Surface preparation as per requirement and installation of firestop assembly

according to manufacturer's instructions.

**38.3.4 Inspection and documentation of firestop assembly.**

**39 Thermal Insulation.**

**39.1 Scope:**

As per the provisions of **ECO-Niwas SAMHITA 2024** amended upto the last date of submission of bids, the building envelope is to be constructed in such a way that the maximum value of residential envelope transmittance value (RETV) except roof shall not be more than the prescribed limit. The thermal transmittance of roof ( $U_{roof}$ ) shall not be more than 1.2W/sqm.K. The cost shall deemed to be included in the bid amount and nothing extra shall be payable to the agency on this account later on.

**40 Factory fabricated Modular Kitchen and Modular Wardrobe: - Modular Kitchen –**

**40.1.1 Under storage cabinets Floor Unit in Kitchen:**

Planning, designing, Providing & fixing Factory-made modular Kitchen cabinets with openable shutters and sufficient number of drawers to be fabricated as per the drawings approved by the Engineer-in-charge. The agency is to submit minimum 3 options to Engineer-in-Charge for the same. For the CPWD's approved option, the agency is to submit Good for Construction drawings based on the approved Kitchen drawings placed in bid document and get it approved before execution.

All carcasses shall be supported on approved quality Stainless Steel Grade 304 legs (not less than 4 inch) and shall be adjustable for different heights as per requirements. Shutters shall be made of at least 20mm HDF Prelaminated with 1.5mm thick laminate of approved shade and colour on both sides of shutters. The shutter shall have PVC edge banding tape with hot melt adhesive by through fit machine on edges, having color& shade matching with the laminates. Each shutter shall be fixed to the framework / carcass using two numbers of best quality cathodic electro deposition (CED) coated hinges of approved make including soft/auto closing hinges of approved make as per requirement fixed with SS screws etc. complete and all these shutters shall be provided with an approved quality of 128mm stainless steel/ zinc alloy coated handles and hardware of approved quality & make. Finished components shall be tested for the critical quality parameters, adhesion and impact test which enhances the life of kitchen.

Shelves to be made of 18mm thick (excluding laminate HDHMR board minimum density 850 kg/m<sup>3</sup> with 1.5mm thick laminate on both sides of approved shade and colour, with SS 304 baskets for drawers to be fixed using best quality heavy duty soft/auto closing telescopic channels with ball bearing and minimum load capacity of 45 Kg of approved make and model with edges sealed with PVC edge banding tapewith hot melt adhesive by through fit machine, having color & shade matching with the laminates. Each kitchen shall have pull out bottle track as per drawing for various usages such as dinner plate holders, tiffin plate holder, cup saucer holder, cutlery tray etc. Magic corner shall also to be provided.

The complete cabinet shall be of 18mm thick (excluding laminate) HDHMR board minimum density 850 kg/m<sup>3</sup> on front (shutter), sides, top, bottom, back panel as per Drawing. The whole inner portion of cabinet and outer back sides (in wall contact) all shall be laminated with 1.5mm thick laminate of matt/gloss as per approval of

Readymade cutlery organizer shall be of SS 316 grade of approved make. Modular kitchen basket and accessories such as right-angle basket (Plain Cup & Saucer, plant, Partition, Bottle rack, Thali, Cutlery) kitchen utensil basket, Dinner set basket, kitchen grain basket, Multipurpose basket as per mentioned drawing including finishing (wherever required) and fittings. The same shall be fixed with necessary stainless-steel nuts & bolts, screws & telescopic channel etc. as per approved drawing and direction of Engineer-in charge

Wooden carcass and shutters shall have to pass the test like Static Load test, Shelf deflection test. Modular kitchen accessories of approved make and models shall be fixed in the drawer / Cabinet with suitable provision with panels of bottom and rear shelves with thickness of 12 mm as per technical requirement. The carcase of floor units and tall units will be supported by minimum 100mm Stainless Steel Grade 304 height vertical adjustable legs of approved make which will be covered with powder coated aluminium skirting of matching colour, approved make attached by hardware of skirting. The unit shall be fixed to the floor/wall/slab using metal screws of appropriate size and raw plugs. The work shall be executed as per drawing/ Sample prepared in sample flat at site and direction of Engineer-in- Charge.

Fittings - Satin finished G type profile handle, Innotech channel system for drawer of approved make with necessary fixing complete cabinet to be made in mini fix with all fixtures as per requirement.

The contractor shall provide and install 1 no. chimney kit consisting of Aluminum flexible pipe of dia. 6-inch, length upto 8.5 feet, cowl, clamps, screw & wall plug for installation all complete in each quarter after making necessary size of hole in masonry/RCC and sealing the hole all complete as per direction of Engineer-in-charge. The contractor shall also cover the vertical exposed portion of chimney fume pipe all around by providing an installing stainless steel (grade 304) sheet of minimum 1.2mm thick with necessary bracket and fixing arrangement as per direction of Engineer-in-charge.

#### **41.1.2 Modular Kitchen: Top Unit in Kitchen:**

Planning, designing, Providing & fixing Factory-made modular Kitchen cabinets with openable shutters and sufficient number of drawers to be fabricated as per the drawings approved by the Engineer-in-charge. The agency is to submit minimum 3 options to Engineer-in-Charge for the same. For the CPWD's approved option, the agency is to submit Good for Construction drawings based on the approved Kitchen drawings placed in bid document and get it approved before execution.

Shutters shall be made of at least 20mm thick (excluding laminate) HDF Prelaminated minimum density 850 kg/m<sup>3</sup> with 1.5mm thick laminate on both sides of approved shade and colour. The shutter shall have 0.8mm PVC edge banding tape on edges, having color& shade matching with the laminates. Each shutter shall be fixed to the framework / cabinet using two numbers of best quality Cathodic Electro Deposition

(CED) coated hinges of approved make including soft/Auto closing hinges as per requirement fixed with SS screws etc complete and these shutters are provided with an approved quality and 128mm stainless steel/ zinc alloy coated handles and hardware as approved by Engineer-in- charge. Finished components shall be tested for the critical quality parameters, Adhesion and impact test which enhances the life of kitchen.

Shelves to be made of 18mm thick (excluding laminate) HDHMR board minimum density 850 kg/m<sup>3</sup> with 1mm thick laminate on both sides of approved shade and colour, with SS 304 baskets for drawers to be fixed using best quality heavy duty hinges of approved make and model with edges sealed with PVC edge banding tape, having color & shade matching with the laminates. Modular kitchen accessories shall be fixed in the drawer/ Cabinet with suitable provision with panels of bottom and rear shelves. The unit shall be fixed to the wall using SS 304 grade metal screws of appropriate size and raw plugs. The work shall be executed as per drawing / Sample prepared in sample flat at site and direction of Engineer-in-Charge.

The complete cabinet shall be of 18mm thick (excluding laminate) HDHMR board minimum density 850 kg/m<sup>3</sup> on front (shutter), sides, top, bottom, back panel as mentioned in drawing. The whole inner portion of cabinet and outer back sides (in wall contact) all shall be laminated with 1mm thick laminate of matt/gloss as per approval of Engineer-in-charge.

#### **41.1.3 Kitchen Accessories and Hardware:**

Fittings - Satin finished G type profile handle, Innotech channel system for drawer of approved make with necessary fixing complete cabinet to be made in mini fix with all fixtures as per requirement.

Note: - All samples for material and product to be used in the work shall be got approved from the Engineer-in-Charge.

#### **42.1 Modular Wardrobe, Cupboard etc.:**

Planning, designing, Providing & placing Factory made modular Wardrobe, cupboard etc with openable shutters and drawers & internal hanger as per approved drawings. The agency is to submit minimum 3 options to Engineer-in-Charge for the same. For the CPWD's approved option, the agency is to submit Good for Construction drawings based on the approved drawings placed in bid document and get it approved before execution.

The wardrobe/cupboard shall be made of 20mm thick (excluding laminate) Prelaminated HDF Board on front (shutters) and shelves, side panels, top, bottom, drawers, partition, etc. 18 MM HDHMR and back panel of 12mm thick HDHMR. The whole inner portion of cabinet (Carcase) including drawers and outer back sides (in wall contact) and all Outer face of wardrobe (shutter, side panels, front panels, etc ) and Carcasses shall be finished with 1.5 mm thick decorative laminate of approved shade, quality and colour. All edges shall be finished with PVC edge banding tape with hot melt adhesive by through fit machine on edges with matching color& shade of laminates. Each shutter shall be fixed to the framework using minimum 4 numbers of approved quality CED coated soft/auto closing hinges on each side as per requirement fixed with SS screws etc. complete and these shutters are provided with an approved quality handle of stainless steel, magnetic catcher and hardware, etc. Finished components shall be tested for the critical quality parameters, Adhesion and impact test which enhances the life of Wardrobe. Wooden carcass and shutters shall have passed the test like Static Load test, Shelf deflection test.

Fittings: Modular Wardrobe accessories shall be fixed in the drawers. A) Auto closing/soft close hinges, B) Drawers movements quadro soft close channels of size 450mm or more as approved, C) cloth hanging rod: 38 mm oval shape stainless steel 316 grade (minimum 12 gauge) with a pair of required stainless steel brackets

(minimum 14 gauge) fixed with SS screws as per technical requirement, D) All shutters shall have SS Satin finished fancy handle of approved make and minimum size 300 x 10 mm, E) Each drawer shall have powder coated aluminium profile handle of approved color, in full width of drawer as per make and other hardware including locking arrangements as approved by Engineer-in-charge. The carcasses of wardrobe units will be fixed on IPS platform made for the purpose. The work shall be executed as per drawing/ Sample prepared in sample flat at site and direction of Engineer-in- Charge. The Cabinet shall be with depth and dimensions as per approved drawings.

#### **43. Signages:**

Contractor shall develop shop drawings for all types of required signage's for the project as per the intent suggested by the Architect and shall submit to the Engineer in charge for approvals before executing the works. Contractor will arrange samples and required mock-ups as instructed by Engineer in charge for some important areas. The signages shall have provisions for universal accessibility related provisions like braille engravings, etc.

The scope in this section shall be engineering, procurement and execution of all types of signages like informative, cautionary and mandatory signages. Some indicative signages are mentioned below and any additional signage required as per local body requirements shall also be provided by the contractor, sizes of signages shall be sufficient in proper proportion as per the matter to be displayed.

#### **44.1 External Signages: -**

The contractor shall provide following signage as required, necessary and as per direction of engineer in charge. Sizes mentioned are indicative for intent purpose.

- 44.1.1** “Building name” signages in SS 316 grade cut letters of minimum 25mm thick, 500mm height in English and Hindi with back light on each tower.
- 44.1.2** “Buildings name” “Gate number” at main gates and “No parking” signages – SS 316 grade 3mm thick Stainless-Steel plate of minimum size 600X400mm, laser engraved text (English Language) in approved colour laser fused pigment, “Buildings name” signages at each main gate columns on front and back face, “No Parking” Signages on each buildings main entrance.
- 44.1.3** “You Are Under CCTV Surveillance” - Minimum 900 nos. if required more as approved drawing and local authority at various location in the campus in SS 316 grade 3mm thick Stainless-Steel plate of minimum size 300X300mm, laser engraved text with logo in approved colour laser fused pigment, fixed on wall.
- 44.1.4** “External Parking” “Way to Buildings, Basements, park” Signage of minimum size 600X150mm- Aluminium composite panel 4mm thick (ACP) as base board, micro prismatic retro reflective sheet and electro cut coloured overlay film. Micro prismatic retro-reflective sheet conforming to Type-IX of ASTM: D 4956- 07 shall be pressure fixed on ACP which will be over laid with electro - cut transparent film fixed on wall bat stilt, basements.

#### **44.2 Internal Signages: -**

The contractor shall provide following signage as required, necessary and as per direction of engineer in charge. The Sizes, shapes mentioned are indicative for intent purpose.

- 44.2.1** “Building Directory” at GF Entry - SS 316 grade 3mm thick Stainless-Steel plate of minimum size 900X1500mm, laser engraved text fixed on wall. Signages shall be fixed at appropriate location in every blocks as decided by Engineer-in- charge.
- 44.2.2** “Flat Number”, “Individual Room” and “Reception” - SS 316 grade 3mm thick Stainless-

Steel plate of minimum size 150X100mm, over wooden plate of minimum size 200X150mm made of 18mm plywood 4 mm thick veneer on front side and 0.80 mm thick matt finish laminate with teak beading of minimum size 30x10 mm including melamine polishing etc. Signages shall be fixed at every flat, individual room signage in rooms of Utility Blocks and reception signages at every reception counter.

- 44.2.3** “Floor Identification”, “Wash Room” for all common toilets - SS 316 grade 3mm thick Stainless-Steel plate of minimum size 300X150mm, “Floor identification” fixed at every floor of all staircases and every floor of all lift lobbies. “Wash room” for common toilets in Towers, Utility blocks and public toilet.
- 44.2.4** “Lift Number”, “Exit”, “Use stairs in case of fire”, “Fire Hydrant”, “Parking Number” – Signage of minimum size 300X150mm made with 4mm thick aluminium composite panel (ACP) as base board, micro prismatic retro reflective sheet and electro cut coloured overlay film. Micro prismatic retro- reflective sheet conforming to Type-IX of ASTM: D 4956-07 shall be pressure fixed on ACP which will be overlaid with electro - cut transparent film, fixed on wall and signages shall be fixed as i). “Lift Number” at every floor showing lift number ii). “Exit” at all lift lobby at every floor, basements, basement stair, ramps iii). “Use stairs in case of fire” in lift lobby at every floor iv). “Fire Hydrant” at all fire hydrant door at every floor v). “Parking Number” at stilt, basements etc. in the buildings.
- 44.2.5** “Entry” “Exit” and “Fire Evacuation Plan” – Signage to be in 4mm thick Acrylic Base + Photo luminescent sheet / Auto Glow sheet with 2hrs glowing effect+ Content in vinyl printing, some signage to be fixed with double sided tape with silicon paste on walls and some shall be double sides painted and hanging from ceiling with SS rods. Signages shall be fixed with intervals of 10metre centre to centre or as decided by engineer-in-charge and “Fire Evacuation Plan” to be pasted on the wall without hanger as per fire department guideline for standard size and drawing approved by Engineer-In-Charge.
- 44.2** **Rubber Guard-** Providing and fixing of 1000mm, corner rubber guard in L shape with yellow reflective tapes for high visibility in the parking area, columns, wall corners, podium, stilt, etc. as per direction of engineer-in-charge.

## 45 Monolithic Aluminum Form Work : General

The aluminum formwork shall conform to IS:14687-1999 and execution of work shall be in general as per CPWD SPECIFICATIONS 2019 (Vol.-I & Vol.-II) with correction slips up to last date of submission of bid. The formwork shall be made of aluminum extruded section conforming to IS 733: 1983. The formworks shall be designed based on the structural requirements of building units.

- i. Before taking up the work, the contractor shall submit his design, shop drawings and method statement for the Aluminum Form Work for approval of the Engineer-in-Charge.
- ii. The aluminum form work shall be customized as per the architectural and structural drawings of various buildings as approved by the Engineer-in-Charge.
- iii. The repetitions in usage of aluminum formwork shall not be more than 100 times.
- iv. In external walls, ties used in shutter connection create holes in wall after de-shuttering. Care shall be taken to clean and degrease these holes and thereafter

grout the holes to avoid any seepage or leakage. It shall be ensured that there shall not be any shrinkage cracks in the concrete sections anywhere. If required control strips may be provided in structure to control the shrinkage cracks due to heat of hydration.

- v. Aluminum form work should be designed and customized as requirement of architectural/ service drawings.
- vi. Contractor must bring required number of sets of shuttering to achieve construction as per the milestone, required quantity of cement slurry tight aluminum form work, its accessories, hardware and related items required to achieve the milestone progress to complete the project in time.
- vii. A mockup of aluminum formwork shall be inspected by the Engineer-in-Charge or his authorized representative at the factory location for which the agency will be required to make necessary arrangements.
- viii. It is advisable to order extra accessories and hardware to avoid site delays.
- ix. Lubricants for the formwork must be applied as per manufacturer guidelines.
- x. De-shuttering and stocking for formwork must be done as per manufacturer guidelines.

Manufacturer of aluminum formwork will provide adequate supervisors/ shuttering experts to execute the work under supervision, provide training and assistance to workers for entire period of RCC casting. The supervisors will provide training to workers in regard of erection of shuttering, conduiting, plumbing, casting of RCC, de-shuttering, stacking of de-shuttering material, oiling and lubricating etc.

- i. Since the finishing of concrete has the biggest role in the final finished product, it is mandatory to achieve the finish up to the satisfaction of the Engineer-in-Charge.
- ii. A sample unit with complete finishing items using approved material shall be constructed taking into account approved layout plans, location of electrical, sanitary and water supply appliances, switches and sockets, etc. The unit should be furnished complete in all respect with doors and windows including fittings, painting, hardware, flooring etc. Nothing extra shall be paid for the sample unit and same shall be refinished at the time of completion of project.
- iii. Aluminium formwork should be handled carefully by trained labourers of manufacturer or contractor.
- iv. Sealing of joints shall be done with approved material (non-shrink grout) for cut outs meant for sanitary/ water supply/ firefighting cables, pipes etc. after proper cleaning of the holes/grooves, for which nothing extra shall be paid.

#### **46.1 Material.**

- i) Aluminium for panel sheets shall be minimum 4 mm thick using grade 5052.
- ii) Aluminium for extruded sections shall be of grade 6061 (T-6).
- iii) Pins and wedges to be made of high-grade mild steel.

#### **46.2 Components**

##### **46.2.1 The form work includes:**

- i) Beam components i.e., beam side panel, prop head for soffit beam, beams soffit panel, beam soffit bulk head.
- ii) Deck components i.e., deck panel, deck prop, prop length, deck mid, soffit length, deck beam bar.
- iii) Wall components i.e., wall panel, rocker, kicker and internal soffit corner, external soffit corner, external corner, internal corner etc.
- iv) The panels shall be held in position by a simple pin and wedge system that

passes through holes in the outside rib of each panel.

#### **46.3 Tolerance**

- i) The tolerance of finished panels shall be (-1 mm).
- ii) Manufacturer of aluminium form work will submit certificate in every month through contractor to Engineer-in-Charge ensuring the form work is fit for achieving good quality concrete work in all respect. Agency has to remove defective aluminium formwork from site promptly.

#### **46.4** The firm will be required to prepare detailed method of statement for the work execution using aluminium formwork covering different steps involved, precautions to be taken and steps for achieving proper finish giving details of material and T&P to be used. The method of statement shall be submitted to the Engineer-in-charge for approval before taking up execution.

#### **47 Sport field**

Technical specification for Synthetic **Badminton court & Swimming pool**.

##### **(a) Badminton court:**

- i) Excavation for badminton court:- Preparation and consolidation of sub grade with power road roller of 8 to 12 tonne capacity after excavating earth to an average of 200mm 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 earth with lead up to 50 meters.
- ii) Earth filling for badminton court: - Providing, laying and spreading good earth in layers to raise level up to required height. Each layer shall not exceed 20cm in depth and compacting each layer by ramming and watering.
- iii) Termite for badminton court: - Providing, applying, and spraying anti-termite treatment, anti-weed using pre-construction chemical treatment using chemical containing chlorpyriphos systematic insecticide diluted to manufacturer's specification @ 1 Ltr solution per Sqm as per site requirement.

##### **IPS/CEMENT CONCRETE for base FLOORING: (As per 11.4 of DSR-2023)**

62 mm thick cement concrete flooring with concrete hardener topping, under layer 50 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12 mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate, 6 mm nominal size) by volume, hardening compound mixed @ 2 Litre per 50 kg of cement or as per manufacturer's specifications. Aluminium strip 15 mm wide and 3 mm thick to be fixed in a pattern as shown in drawings or as directed by Engineer-in-Charge in joints of cement concrete floors. Scope to Include materials, labour, wastages, curing, cleaning, lead, lifts, tools, tackles, protection till handover, etc., finishing the top with desired finish as per specifications and directed by the engineer in-charge complete and any other related works, all complete as per drawings, specifications and as directed by the Engineer in charge.

##### i. Nine Synthetic layer of approved material:

1. Primer: One coat of Primer
2. Filler course: Once coat of acrylic resurface blended with approved silica sand.
3. Cushion course: Four layers of cushion court.

4. Texture course: Two coats of Deco base I, blended with deco colour MP classic to give uniform surface texture and determines the speed of play and traction on the court.
5. Finishing course: One coat of Deco colour MP Classic to create vibrant, durable finish highly resistant to weather and ultraviolet degradation.
6. Lines: Two coat of heavy bodied latex, deco colour white stripping paint.

**(b) Technical specification for Swimming Pool ( 01 Nos):**

1. Construction of SWIMMING POOL (proposed size- 20m x 10m), and other buildings like deck area, diving platform. Design, Supply, Installation, Testing & Commissioning of Automated swimming pool filtration system comprising of re-circulating pumps, FRP composite filter vessels, chemical dosing systems, piping with pool fittings, valves, support arrangement for piping and filters, PLC Based electrical panels and cabling, providing accessories like suction sweepers and maintenance equipment, stainless steel ladders, overflow gratings, water testing kits, Disinfection System, Automatic pH correction system, external lighting arrangements in the deck area, pool area and Diving platform etc. and their operation & maintenance till completion of defect liability period of entire project. The work shall be executed as per FINA specifications and additional specifications in part B, and drawings enclosed in the NIT.
2. The standards and specifications laid down by Sports Authority of India (SAI) for swimming pool as per hand book on field of play and specifications for sports infrastructure at SAI part-II & FINA specifications shall be followed in designing and construction of swimming pool.
3. The cutting, supply and filling of earth to maintain the required levels in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.
4. The EPC Contractor should engage the specialized agency for execution of above work. The product makes shall be as per FINA approved makes and manufacturers (Preference to be given to Indian manufacturers). Testing of materials to be done as per FINA specifications. Video clippings of installation process, line marking, and As- Built Drawings shall be submitted to Engineer in Charge.

**MINIMUM SPECIFICATIONS FOR SWIMMING POOL:-**

1. Providing and laying flamed finish granite flooring as per the approved drawings by the Engineer-in-Charge & as per DSR 2023 Item No. 11.55.1 for all the deck area.
2. Providing and fixing Porcelain Vitrified swimming pool floor and wall Tiles of swimming pool including pool fittings like Internal cove, External Angle, Internal Angle of wall-Floor junction, Junction of 3 external angles, External angles of wall-floor junction as per the approved drawings by the Engineer in Charge & as per DSR 2021 Item No. 11.53 .
3. Providing and laying 18mm thick Polished Granite stone flooring in required design & pattern approved by Engineer in charge & as per CPWD DSR'23 item

- no. 11.56 coping with double nosing shall be provided over swimming pool wall.
4. Starting platform shall be constructed as per FINA specifications & as per the direction of Engineer In charge.
  5. Providing and Commissioning of Standard/Overflow Type Ladder in SS 316 as MOC, 5 step, 4 step, 3 step as per requirement and as per direction of Engineer in charge. Staircase and railings shall be designed as per the FINA specifications & as per the direction of Engineer In charge.
  
  
  
  
  
  
  6. Providing and Fixing of Modular type overflow gratings, White colour made of polypropylene (PP) as per specification & minimum size:450mm x 450 mm. Grills shall be fabricated with buffers or slats parallel to pool edge to limit deck splash over. Grills shall have an antiskid surface meeting local code requirement.
  7. Providing PVC/CI/Bronze Valves like Ball Valves, Butterfly Valves, Non-Return Valves with fittings like nut bolt, washer, gasket, flanges, tail piece and other fittings as per design accordance.
  8. Starting platform shall be designed by the consultant as per FINA specifications & as per the direction of Engineer In charge.
  9. Rate quoted by contractor is inclusive of GST and Labour Cess, nothing is payable on this account.
  10. All services civil and electrical i/c filter system shall be made functional (independently or jointly) by agency without any extra cost.

**NOTE: The above list is only indicative and not exhaustive. The contractor has to plan and execute all the missing fittings / fixtures / item to make the game to the full use. Nothing extra shall be paid on this account. DSR codes used above to describe the items/specifications to be followed shall be CPWD DSR 2023 with up to date corrections slips till last date of bid submission. Shifting of sewer lines/cables/water supply lines passing through the proposed site is under scope of work. Nothing extra shall be paid on this account.**

#### **48. Rolling Shutter:**

Supplying and fixing rolling shutters of size 80x1.25 mm M.S. laths with 1.25 mm thick top cover and 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 including ball bearing for rolling shutters and mechanical device chain and crank operation for operating rolling shutters if required as per direction of engineer-in-charge.

#### **49. 40 mm thick Dholpur Stone & 30/35 mm thick Granite Stone Dry Cladding:**

- (i) Stone :The stone shall be red or white as specified in the drawings. The stone shall be hard, sound, tough, free from cracks, decay & weathering. In case of red sand stone,

white patches or streaks shall not be allowed. However scattered spots upto 10 mm diameter will be permitted. Before starting the work the contractor shall get samples of stone approved by the Engineer-in Charge. The stone shall be gang saw cut into slabs of required thickness along the planes parallel to the natural bed of stone.

- (ii) Surface Preparation- The RCC element (Beam / Band) surface is properly cleaned by removing any loose material, dirt, or debris, ensuring it's dry and free of any contaminants. This may include filling in any hair cracks or holes with filler, then sanding for a smooth surface. Sealing any hole / gap with high strength grout which helps prevent water infiltration and ensures a clean finish.
- (iii) Preparation of MS Frame Structure - The primer is done to all elements of MS Frame Structure i.e. MS plate, MS tube, angles, channels etc. This is ensured before starting framework installation to prevent corrosion. First of all 8mm thick MS plate of required size is fixed on the RCC member (Beam / Lintel / Band) with required number of SS fasteners of size 12x100 mm of Hilti brand. After fixing of MS plates, vertical MS tube of size 96x48 is fixed to the MS plate using Arc welding and with help of required cleats etc. as per the structural design. The maximum horizontal spacing of vertical tubes is 1.8 m as per the structural drawings. Proper MS cleat angles are used to support MS tube junction. Fixing MS angles/channels to plates & MS tubes as required according to the site condition. The vertical tubes are fixed after necessary check of line and plumb. After fixing of vertical MS tubes, the horizontal MS tubes of size 60x40 is fixed to the vertical tubes using Arc welding and with help of required cleats etc. as per the structural design. The maximum vertical spacing of horizontal tubes is 490 mm as per the structural drawings. Proper MS cleat angles are used to support MS tube junction. After completion of framework, the line, level and plumb of framework is re-checked before starting the stone cladding work. The frame work is painted with epoxy paint of any good brand like Asian paint having properties as durability, and resistance to harsh conditions. While painting it is ensured that no welded portion in any corner is left unpainted.
- (iv) Starting of Stone cladding work - Application of Sealant on stone Surface: Apply a protective coating (Sealer proofing) behind the stone cladding for making the stone surface sealed enough to prevent any water absorption by the stone .
- (v) Fixing of Stone cladding to the frame with SS Clamp - Carefully position the SS clamp on horizontal MS tubes after due checking of line and level of the stone cladding to be installed. After temporary fixing the clamp and then cross checking its line, level and plumb, the holes are being done in the tube through the clamp to fasten it to the tube using SS nut and bolt. Fix the SS clamp with the MS tubes using Arc welding as well as nut and bolt of size. After SS clamps are fixed, the welded portion must be painted again with the epoxy paint. Final checking of plumb of the clamps before starting the cladding of the stones. Securely fasten the stone to the SS clamp using the appropriate method while fixing the stone, small Gap of 5 mm is kept in vertical direction after every stone (of height 490 mm) to ensure the sufficient space for thermal expansion of the stones in vertical direction also in horizontal direction the gap is left at both ends of shaft to ensure for thermal expansion in horizontal direction.
- (vi) Filling of gaps using sealant / silicon - After the stones are fixed, before filling of the gap using sealant / silicon the final line level and plumb of the fixed stones are checked. Filling up of the gap using silicon / sealant to prevent any ingress of water

through the gap. The sealant should be good quality and to accommodate thermal variation without rupture.

- (vii) Final cladding and finishing using extra pins etc. as per site requirement - Checking and fastening of all the bolts and pins, ensuring proper and secure fastening of the stone to the Framework.
- (viii) Final Checks: - Ensure proper welding & removing of carbon before stone fixing. After welding and before stone fixing, any weld portion left unpainted must be painted with the Epoxy paint. Ensure the stone cladding is line, level, plumb, and properly aligned with the design and Structural & architectural Drawings. Ensure proper fasteners & chair clamps used. Check for any gaps or loose stones and make necessary adjustments. Clean any debris or dirt that may have accumulated during the installation process. The grooves left should be filled with proper sealant to prevent any ingress of water behind the stone.

## **50. KOTA STONE FLOORING:**

The kota stone slabs shall be of selected quality, hard, sound, dense and homogeneous in texture free from cracks, decay, weathering and flaws. They shall be hand or machine cut to the requisite thickness. They shall be of the colour indicated in the drawings or as instructed by the Engineer-in-Charge. The slabs shall have the top (exposed) face polished before being brought to site, unless otherwise specified. The slabs shall conform to the size required. Before starting the work the contractor shall get the samples of slabs approved by the Engineer-in-Charge. Dressing Every slab shall be cut to the required size and shape and fine chisel dressed on the sides to the full depth so that a straight edge laid along the side of the stone shall be in full contact with it. The sides (edges) shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges of the slabs shall be true, square and free from chippings and the surface shall be true and plane. The thickness of the slab after it is dressed shall be 20, 25, 30 or 40 mm as specified in the description of the drawings. Tolerance of  $\pm 2$  mm shall be allowed for the thickness. In respect of length and breadth of slabs Tolerance of  $\pm 5$  mm for hand cut slabs and  $\pm 2$  mm for machine cut slabs shall be allowed. Preparation of Surface and Laying The specification shall be as described in except that the edges of the slabs to be jointed shall be buttered with grey cement, with admixture of pigment to match the shade of the slab. The thickness of the joints should be minimum as possible. In any location, it shall not exceed 1 mm. Polishing and Finishing The specifications shall be as described in except that (a) first polishing with coarse grade carborundum stone shall not be done, (b) cement slurry with or without pigment shall not be applied on the surface before polishing.

## **51. EPOXY PAINT:**

Primer for plaster/wood work/Iron & Steel/Aluminium surfaces shall be as specified below:

S.No	Surfaces	Primer to be used
1	Wood work (hard and soft wood)	Pink conforming to IS 3536
2	Resinour wood and plywood	Aluminium primer conforming to IS 3585
3	(A) Aluminium and light alloys	Zinc chromate primer conforming to IS 104
	(B) Iron, Steel and Galvanized steel	Red Oxide Zinc chromate Primer conforming IS 2074
4	Cement/Conc/RCC/brick work, Plastered surfaces, non-asbestos	Cement primer conforming to IS 109

	surfaces to receive Oil bound distemper or Paint finish.	
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The application of priming coat for relevant steel or cement surface shall be as per the description. Epoxy paint is supplied in two parts i.e. (base and hardener). Stir the base and hardener separately. Mix hardener gradually into the base under continuous stirring as per mixing ratio as specified by the manufacturers.

The epoxy paint shall be consumed within the working pot life as specified by the manufacturers. Part mixing should be avoided. To achieve optimum performance of the product, minimum 2-3 coats by brushing would be required to get the desired dry film thickness (DFT) as specified by the manufacturer. Relative humidity in the environment should preferably be below 85%.

#### **52. CNC cut Aluminium Jali:**

Designing, Supplying, Assembling/ fabricating, Installation, finishing, testing and fixing in position of 2 mm thick 6063 T6 Aluminium Laser/CNC Cut Elevational Panels (Jali design) of approved make, color, shape, size & design and to have monotonous span without joint as per manufacturers specifications & standards with a warranty of 20 years. The product composition to be Aluminium with extended exterior coatings and with a warranty for coating of 20 years. The assembly to be fixed using 19mm SS316 (10mm or 20mm), Coloured 22mm Wafer Head Screws, Aluminium rivets etc complete to the satisfaction of the Architect & Engineer in charge and as per directions.

#### **53. 12MM THICK FRAMELESS TOUGHENED GLASS DOOR SHUTTER:**

The 12mm thick clear toughened safety glass frameless shutter is fixed with the help of corner patch fittings. The corner patch fittings are simply a bolt through glass metal fitting requiring a corner cut out and hole in the glass. These discrete corner patch fittings provide a sleek and clean frameless look. The lock body patch fitting can also be installed where there is a necessity to provide locking arrangements for frameless shutter. The maximum size of frameless doors shutters using corner patch fittings should not exceed from 1000mm X 2400mm. Bigger size doors should not be fixed with these fittings.

The frameless toughened glass door shutters of required thickness as specified in the item should be installed with the help of 304 grade stainless steel patch fittings of approved brand and manufacturer. These fittings should be complete in all respect with top and bottom pivots and double action hydraulic floor spring types fixing arrangement. These fittings should be based on a modular system, consisting of a base unit, functional inserts, and clip-on covers in a wide range of finishes. The fittings should be suitable to support the weight of the complete glass door in such a way that the movement of the door is smooth and free. The fittings should be got approved from the engineer-in-charge and all the fixings etc. shall be done as per manufacturer specification and corresponding codes described in the description of the fitting.

#### **54. HETROGENEOUS PVC VINYL FLOORING:**

Supply & Installation of 3.45 mm thick heterogeneous PVC Vinyl flooring in required colour, profile and pattern of specified approved make of required size as per the site conditions, etc. all complete. The vinyl flooring shall be certified by EN (European Standard) 14904, total weight 3295 g/m<sup>2</sup>, Shock Absorption as per EN 14808 - 6%, Friction as per EN 13036-4 - 80 to 110, Vertical deformation as per EN 14809 - 0.4mm, Vertical Ball Behaviour as per EN 12235 - 98%, 100% recyclable, VOC emission after 28 days lower than ≤10µg/m<sup>3</sup>, Phthalate Free. The flooring shall comply the fire rating

CFL S1 as per EN 13501. The flooring shall be laid over damp proof base using rubber based adhesives of approved quality. The joints should be thermo welded with matching welding rods provided by the manufacturer. After welding the flooring will be seamless. The subsurface should be absolutely at one level (Zero).

#### **55. EPDM (ETHYLENE PROPYLENE DIENE MONOMER) RUBBER FLOORING:**

Providing and fixing 36 mm thick Styrene Butadiene Rubber (SBR) with EPDM (Ethylene Propylene Diene Monomer) rubber flooring out of total Thickness of 36 mm the First Layer of 30 mm thick should be of Black SBR, Second Layer of 6 mm thick should be with Color EPDM. The above flooring of EPDM should be done with different color grains as per design approved by engineer in charge. The glue used should be of

- 1) PU Binder, it's glue which gives bonding to Rubber and should be in Transparent Color, USP of it should have low UV minimal color change EDPM Granules.
- 2) Butyl Acetate, its again a kind of Glue which gives bond in-between different layers.

SBR Buffing (Styrene-Butadiene Rubber), it should be in Black Color and should have excellent weather properties (Ethylene Propylene Diene Monomer), should be in Multi Color Options, its should be Synthetic Rubber which should have water resistance, durable, UV stable high & consistent quality product, including necessary slope, finishing, etc. all complete as directed by the Engineer-in-Charge.

#### **56. Locker:**

Supplying & fixing in position GREENLAM or equivalent LOCKER, Locker made of heat, bacteria, water, chemical, scratch and impact resistant 03mm & 09mm thick solid compact laminate panels including doors, self, side panels finished with approved texture/shade as per the details drawings and as per IS 2046 (Indian Standard). The compact laminate should be anti bacterial and having Green Guard Certificate. This also includes providing and fixing in position necessary hardware made out of Aluminium (Grade-6063-T6) and Stainless Steel (Grade-304) (i) Camlock (ii) Hinges (iii) Front Section (iv) Back Section (v) Infill Section (vi) Rubber Lining (vii) Screws, Nuts and Bolts. Locker shall be constructed with 4 aluminium interlocking supporting frame work, making it strong and rigid. Tier-4-Suede-1898, (Thickness, Door, Divider Height, Overall Height, Depth, Width -As per drawing.)

#### **57. Open Cell False Ceiling:-**

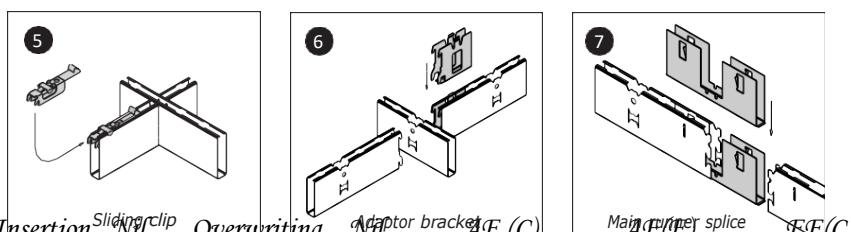
##### **PANELS**

Cell 50 panels are assembled from aluminium U-profiles and create perfect detailing of the connecting profiles, which are designed to conceal uncoated edges.

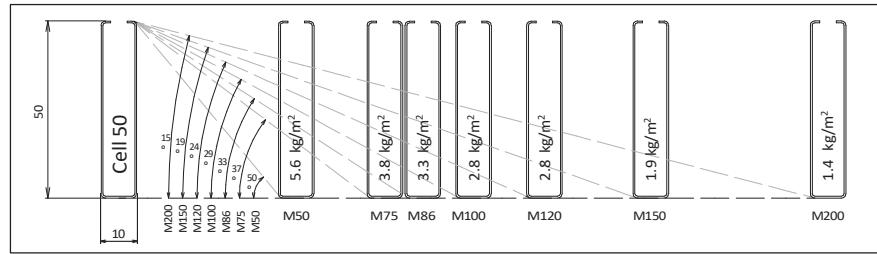
##### **SUSPENSION**

The 600 x 600 mm and 600 x 1200 mm panels feature an integrated system with main and cross runners from the same profiles as the panels. The panels are easily (de)mounted with the sliding clips.

##### **CONSTRUCTION DETAILS:**



## MODULES, WEIGHTS AND VIEWING ANGLES



### MODULES AND

#### HEIGHTS

#### (AVAILABILITY)

Tiles are made from 0.5 mm thick aluminium strip.

Module	Height		
50 x 50	50	100 x 100	50
75 x 75	50	120 x 120	50
86 x 86	50	150 x 150	50
		200 x 200	50

### Material specifications for open cell ceiling :-

**Base Material:** Cell Ceiling systems are manufactured from aluminium alloy HD5050 or equal (according to EN 1396).

**Coating:** The tough and durable 2-layer polyester finish in a nominal thickness of 20 microns is stove enamelled in a continuous coil-coating process to ensure uniform coating thickness and absolute adhesion.

**Colour range:** The standard Hunter Douglas or equivalent interior colour range for Cell Ceiling systems includes a wide variety of colours and finishes. For more information, see our colour chart.

Any other (RAL or NCS) colour is available upon request.

## 58. Wooden Wall Paneling with Melamine Polish – Specification

### 1. Material

- Core:** Marine Plywood (BWP, I.S. 710)/Wooden Plank with appropriate thickness (18mm depending on structural needs).
- Face:** High-quality wood veneer.
- Finish:** Melamine polish coating for surface protection and aesthetic appeal.

### 2. Dimensions

- Panel thickness:** 18mm (depending on design and wall requirements).
- Panel size:** Typically 4 ft x 8 ft sheets or custom dimensions as per design.

- **Edge finish:** Smooth, sealed, and treated with melamine polish to prevent chipping and moisture ingress.

### **3. Surface Treatment**

- Panels to be coated with **melamine polish**:
  - Clear or tinted, glossy or matte finish depending on design.
  - Provides high resistance to scratches, stains, heat, and moisture.
  - Multiple coats (typically 2-3 coats) with proper sanding between coats for smooth finish.

### **4. Installation**

- Panels to be fixed on M.S./Aluminium framework using concealed fasteners or adhesive.
- Joints between panels to be seamless or covered with matching wooden strips or trims.
- Expansion gaps as per manufacturer's recommendations to accommodate wood movement.

### **5. Performance Requirements**

- Resistant to scratches and abrasion.
- Resistant to moisture and humidity – suitable for interior use.
- Fire retardant treatment if required (confirm local fire codes).
- Easy to clean and maintain.

### **6. Accessories & Trims**

- Matching wooden trims or molding to cover panel edges.
- Optional integrated grooves or designs as per architectural requirements.

### **7. Quality Assurance**

- Material to comply with relevant standards for Marine plywood and surface finishes.
- Sample panels to be approved by client/architect before installation.
- Finished panels inspected for uniform polish, no bubbles, cracks, or defects.

## **59. Specification for NP-2 and NP-3 RCC Pipes**

### **1. General**

- **Standard:** Pipes shall conform to IS 458: 2003 (Specification for Precast Concrete Pipes, Pipes Joints and Accessories for Drain and Sewerage) & CPWD Specifications 2019.
- **Type:** NP-2 and NP-3 pipes are nominal pressure pipes designed for specific pressure classes.

### **2. Materials**

- **Concrete:** Minimum Grade M25 (1:1:2 mix or as per IS standards), using ordinary Portland cement, clean coarse aggregates, and clean potable water.
- **Reinforcement:** High yield deformed steel bars (Fe 415 or Fe 500 grade), placed according to design for structural strength.
- **Mortar:** Cement mortar for jointing pipes to comply with IS standards.

### 3. Dimensions and Pressure Rating

Parameter	NP-3 RCC Pipe
Nominal Diameter (mm)	As per Mentioned in Drawing
Nominal Pressure (kg/cm <sup>2</sup> )	3 kg/cm <sup>2</sup>
Thickness	Varies based on diameter and pressure class (as per IS 458)
Length	Standard length: 1.0m or 1.5m (custom lengths as per site requirement)

### 4. Manufacturing

- Pipes manufactured using centrifugal casting or spinning process ensuring uniform compaction.
- Curing: Pipes cured for a minimum of 14 days to achieve design strength.

### 5. Physical and Mechanical Requirements

- **Compressive Strength:** Concrete to have minimum compressive strength of 25 MPa (or as specified).
- **Water Tightness:** Joints to be watertight, tested as per IS standards.
- **Load Bearing:** Pipes must withstand soil and live loads as per design criteria.
- **Tolerance:** Diameter, thickness, and length tolerances shall comply with IS 458.

### 6. Jointing

- Joints shall be flexible or rigid as required.
- Use of rubber gaskets or cement mortar joints for sealing.
- Jointing materials must ensure water-tight and gas-tight seals.

### 7. Testing

- Each batch of pipes shall be tested for compressive strength, dimensional accuracy, and joint tightness.
- Pipes must pass hydrostatic and load tests as per IS standards.

### 8. Marking

- Each pipe should be marked with:
  - Manufacturer's name
  - Date of manufacture
  - Nominal size
  - Pressure class ( NP-3)
  - Batch number or code for traceability

**60. Acoustic wall paneling:**

Providing & fixing of 100% Natural Material- Magnesite (Hygroscopic & biologically sound binding agent) bonded woodwool Panel "Heradesign - Superfine series planks of 600Mm\*1200Mm\*25Mm thickness made out of wood wool fibre of width 1Mm Fiber thickness mixed with Natural water & Magnesite (No-Cement) with open & smooth surface texture. A Completely harmless Environment & Human Friendly & also a disposable or recyclable Material & can last for long span in building interiors As it has long lifespan & suitable for Indoor conditions with relative air humidity of upto 90%. Magnesite protects the wood cells against ageing & fungal attack. To achieve upto NRC=1.00 it should be a clear gap of 200Mm from wall slab. Heradesign Woodwool - Acoustical Wall Mounting System Solutions- Ecologically Sound Material with high mechanical strength with Crash test of 90Km/H with Ball Impact Test DIN18032 & EN13964 with flying colors & A sustainable material (PEFC & FSC Certified) along with EPD Certified Acc. to EN ISO 14025 (AUB-EnvironmentalProduct declaration). To ensure specification of tiles, Manufacturers Test Certificate is required having complete site address & duly signed by Manufacturer

**61. Modular type Rainwater Harvesting:-**

**ITEM DESCRIPTION**

**Modules:-**

Supply and installation of a 100% recycled polypropylene modular tank system (non-plate and non- hyperboloid design) engineered for underground applications. The system shall be based on a mat raft foundation with a single-column base structure and unidirectional assembly of modular units. Each module measures 600 mm × 600 mm × 250 mm and offers an effective water holding capacity of 85 litres, with a void ratio of 94.5% for maximum runoff storage. The design allows tool-free stacking up to 6 meters, making it ideal for deep cavity installations. Made from high-quality recycled PPCP, the structure is resistant to chemicals and high temperatures and offers a minimum service life of 20 years. It is designed to withstand vehicle loads up to SLW 60 (HGV class) with appropriate backfilling and features a double-lock connection mechanism for enhanced stability. The vertical column structure is engineered to distribute loads evenly, with column spacing not exceeding 75–80 mm and a minimum column density of 75–80 columns per square meter. Systems using more than four components per module shall not be permitted.

Unit: Cubic Meter (CUM)

**Geotextile:-**

Supply and installation of high-strength, non-woven polypropylene (PP) geotextile fabric, minimum 400 GSM, used for wrapping modular tanks to enhance filtration and prevent silt ingress.

- Tear Strength: ≥ 250 N (ASTM D4533)
- Width-wise Strength: ≥ 215 N (ASTM D4533)
- Puncture Resistance: ≥ 1550 N (ASTM D6241)
- Elongation at Break: ≥ 57% (ASTM D4595)

Fabric is needle-punched, heat-welded, and made from long synthetic fibers ensuring high porosity, effective filtration, and seamless percolation. Includes all necessary activities such as cutting, sizing, seaming, and wrapping around tank modules.

**Application:** Essential for proper tank functioning, sediment control, and structural reinforcement. **Unit:** Square Meter (SQM)

**Filtration Unit: -**

Supply and installation of FRP-based Rainwater Harvesting Microfilter with 750mm diameter and 1000mm height, equipped with dual 6" inlet and outlet ports. The filter includes an internal SS 304 mesh for effective primary filtration.

- Flow Rate Capacity: Minimum 40–45 KL/hr
- Constructed from UV-resistant, corrosion-proof FRP body for long life
- Suitable for rooftop and stormwater collection
- Must be GRIHA and SVAGRIHA Certified (GRIHA Criteria 18 & 21, SVAGRIHA Criterion 9) with valid certification on date of installation
- Compatible with modular tank systems for both recharge and reuse applications

**Pumping facility :-**

A suitable capacity pumps system shall be installed to use the stored water for Horticulture and other purpose. A stand by pump alongwith all electrical panels and cabling shall be provided for using the stored water for Horticulture purpose or pumping the surplus water into the municipal drain in the rainy season.

**Ground water recharge borewell : -**

For groundwater recharge, supply, assembly, lowering, and fixing in a vertical position of unplasticized PVC (uPVC) medium well casing (CM) pipes and uPVC medium well screen (RMS) pipes with ribs, of 200 mm diameter, conforming to IS:12818, shall be carried out complete with all necessary fittings, accessories, labour, and hire charges. The work shall be executed for all depths as directed by the Engineer-in-Charge.

The recharge bore shall be constructed to a total depth of minimum 65 metres depending upon water availability in the sub soil strata. From the ground level up to a depth of 10 metres, uPVC medium well casing (CM) pipes shall be used. Below this level, a combination of uPVC medium well casing (CM) pipes and uPVC medium well screen (RMS) pipes with ribs shall be provided to facilitate efficient groundwater recharge.

All works shall be completed in accordance with the relevant specifications, IS standards, and the instructions of the Engineer-in-Charge.

**Section-III**  
**Additional Specifications for Plumbing Works**

1. The scope of work which the agency will be required to carry out is detailed as under:-

**1.1. External Water Supply System:**

- i) Connection from GMC for entire water requirement of residential buildings.
- ii) Water transfer pumps for towers will be designed & placed in pump room/s to be constructed along with storage tanks.
- iii) Water pumping & water distribution System:  
Water pumps for Towers will be designed & placed in pump room/s.
- iv) Garden Hydrant System (Irrigation system):  
Garden irrigation pumps & equipment's and distribution system for project will be designed & provided in STP/other locations as required, to be constructed.

**1.2. Sewerage System**

- i) Collection and Conveyance.
- ii) Connection to external Sewerage line.
- iii) Sewage Treatment Plant.
- iv) Sewage treatment plant for residential towers under works.

**1.3. Reuse of Treated Water from STP for Flushing & irrigation:**

Equipment's for reuse of water from STP for flushing & irrigation will be placed in proposed plant room of STP/ other locations as required, as covered in work.

1.3.1 Extra treated water received from the STP shall be disposed into the nearby GMC drain/sewer line or to the UG reservoir for the nearby colonies; permission for the same is to be obtained by the agency from the GMC. Any statutory fee to be paid for this work shall be borne by the agency and reimbursed by the Engineer-in-Charge on production of the original receipt.

**1.4. Storm Water Drainage System:**

- i) Collection and conveyance of excess storm water outside the boundary wall to the local municipal line through RCC open drain with FRP drain cover as per drawing and as per direction of Engineer in charge.
  - ii) Disposal to external storm water line & area outside the boundary wall to the local municipal line through RCC open drain with FRP drain cover as per drawing and as per direction of Engineer in charge.
- Construction of rainwater harvesting recharging wells as per CPWD Rainwater Harvesting & Conservation Manual-2019/NBC-2016 and as per guidelines of Central Ground Water Board (CGWB), Ministry of Water Resources, Govt. of India.

- a) Construction of on ground and underground rainwater structure/ systems for Modular Rainwater Harvesting.
- c) Rainwater from open surface as well as from roof top would be taken to filtration units. Filtration unit should consist the following units in chronological order: -
- d) Sedimentation tank (de-silting & oil trap chamber)
- e) Filtration through micro-filters of FRP filters or similar arrangements (filtration chamber)
- f) Sand filter with geotextile layer at top.
- g) Water then would be taken to the Modular Rainwater Harvesting unit.

#### **1.5. Existing drain along with boundary wall**

The existing open drain along the boundary wall approximate 275m shall be dismantled and replaced with a 1200 mm diameter RCC pipe drain. The work includes supplying, laying, and jointing RCC Non-Pressure (NP-3 class, medium duty) pipes, laid either by manual or mechanical means. The pipes shall be laid true to line and level, maintaining a uniform slope of 1 in 450, and jointed using collars/spigot joints with a stiff cement mortar mix in the ratio of 1:2 (1 cement : 2 fine sand).

The scope of work also includes the construction of 16 nos. manholes as per item 19.11.1 of CPWD DSR 2023, testing of all joints for water tightness, and ensuring proper alignment throughout the drain length. A 100 mm thick cement concrete bed of mix 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate) shall be provided below the RCC pipes to form a stable and durable foundation.

All works shall be executed in accordance with the approved drawings, relevant specifications, and as directed by the Engineer-in-Charge, complete in all respects nothing extra will be paid for this work. The suitable bypass arrangements shall be made to bypass the sewerage coming in the existing drain till the completion of new drain.

#### **1.6. Internal Plumbing Works:**

- i) Internal water supply system.
- ii) Soil, waste, vent & rainwater pipes
- iii) Disposal to 1st manhole/ storm water drain.
- iv) All sanitary fixtures and fittings.
  - a) To recycle and reuse the products as much as possible recharging the underground water sources.
  - b) To use standard engineering practices.

#### **2. Water Supply System:**

The requirement of water supply will be worked out based on parameters / guidelines provided in National Building Code-2016(as amended up to the last date of submission of bids).

The source of water shall mainly be from:

- 1) Municipal water supply connection as much as possible to meet the requirements from the

GMC.

- 2) Augmentation from boring tube wells as per prevailing practice and after obtaining the necessary permissions from all the concerned authorities.
- 3) By recycling the treated effluent of the STP for flushing and horticultural purposes.

### **3. Location for Plant Room & Storages for Project:**

#### **3.1. Plant room & water storage tank for Project towers.**

The U.G. water tanks for Project building shall be as mentioned in drawings and adjacent to the plumbing & fire fighting plant room having fire pumps, water supply pumps. These services shall act as a centralized system within the respective parts. In the pump room for firefighting, no other equipment's will be installed.

### **4. Materials for External Water Supply System:**

- 4.1 All external water supply underground shall be GI 'C' Class pipes as per IS:1239 (Heavy Class)
- 4.2 All external water supply rising main shall be GI 'C' Class pipes as per IS:1239 (Heavy Class) & fittings shall be malleable cast iron fittings as per IS:1879 with welded flanged connections.
- 4.3 All water supply pipes from the UG tank/ STP tank till terrace water tanks etc shall be GI pipes (class-C).
- 4.4 All down water supply pipes exposed on wall and in shafts, on terrace and other exposed area from terrace water tank to individual flats, and any other toilets, kitchens etc. shall be CPVC pipes.
- 4.5 All water supply distribution pipes laid within toilets, kitchens in ceiling, horizontal runs within the residential units or in concealed chases shall be CPVC pipes and accessories/ fittings.
- 4.6 All tubewell rising mains from tubewell nominal dia to be decided as per the design capacity and shall be double flanged ductile iron pipes of class K-9 conforming to IS:8329. The specials for ductile iron pipes shall be of class K-12 conforming to IS:9523.

### **5. Valves:**

#### **5.1 Butterfly valves (80mm and above):**

Butterfly valves shall be of centric disc construction with single piece body of cast iron with disc of CF 8 stainless steel with nitrile seat and stem shall be of stainless steel. Butterfly valve shall conform to PN 10/16/25 rating and shall be provided with suitable matching flanges compatible with PN 10/16/25 rating of valves.

#### **5.2 Non-return valve (80mm and above):**

Cast iron non-return valves of diameter 80mm and above shall be dual plate non-return valve of PN 10/16/25 rating with ductile iron disc and SS 304 spring & hinge pin.

#### **5.3 Ball valves (65mm and below):**

Ball valves shall be lever operated, screwed type of gun metal ball valve of PN 10/16/25rating as

per IS:318 with SS ball and SS stem with mild steel lever.

#### **5.4 Non-return valve (65mm and below)**

Non-return valves and 65mm and below shall be gun metal non-return valve of PN 10/16 rating (class 2) as per IS:778 with screwed ends.

#### **5.5 Pressure Reducing Valves (Bellow type)**

Pressure reducing valves shall be of Gun metal/bronze body with screwed female ends to BSP. Pressure reducing valves shall have high quality Nitrile rubber "O" ring and setting pressure of 1-2Kg/cm<sup>2</sup> in the downstream side. Provide strainer, isolation & reducing valves

Special type of control valves like pressure reducing valves (PRV) and solenoid valves shall be provided as per requirement to control and regulate the flow of water. PRV's shall be provided at easily accessible location to enable repair / maintenance.

#### **5.6 Air Release Valves.**

Air release valves shall be single acting type air valves with cast iron body and bronze/gunmetal internal parts and plastic float.

#### **5.7 Strainers.**

Strainers shall be bucket type strainers with gunmetal/bronze body up to 50mm dia and SS-304 body above 50mm dia. It shall have screwed female ends to BSPT, flanged ends to BS:10, Table D and shall have perforated S/S(AISI-304) sheet with large screen area.

### **6 Sewerage System:**

**6.1** Independent sewage network will be laid for Project Towers. The external sewage network for these towers shall collect the sewage, and flow by gravity for further treatment in the proposed sewage treatment plant located near these towers.

### **7 Type of distribution:**

**7.1** Generally, all flow shall be by gravity up to the final disposal points. Wherever gravity flow from the discharging units into the external sewer line is not possible a local sewage pumping system shall be provided either directly to the final disposal point or into the external sewer line.

### **8 Final Disposal of Treated Effluent:**

The treated effluent from the sewage treatment plant shall be recycled for flushing, gardening purposes etc. Surplus treated water from STP shall be disposed into the nearby GMC drain/sewer line or to the Underground reservoir for the nearby colonies; permission for the same is to be obtained by the agency from GMC. Any statutory fee to be paid for this work shall be borne by the agency and reimbursed by the Engineer-in-Charge on production of the original receipt.

### **9 Appurtenances & Material Specifications for the Sewerage System:**

#### **9.1 Pipes:**

##### **i. Upto First Manhole:**

The sewage from the vertical stack shall be carried through the Hub-less centrifugally spun cast iron pipes upto the first manhole as per approved drawing and design.

**ii. NP-3 RCC pipes for storm water & sewerage:**

After first manhole, NP-2/NP-3 of required diameter shall be provided conforming as per IS: 458:2021 for normal slopes and general site conditions and as per design requirements.

**iii. Manholes:**

The manholes shall be constructed of brick masonry as per standard specifications of National Building Code and shall be having details as follows:

**Type 'A' — Rectangular**

- i) Rectangular of size 900x800mm upto0.90-meter depth.
- ii) Rectangular of size 1200x900mm upto2.5 meter depth.

**Type 'B' — Circular**

- i) Circular of size 910mm dia for depth upto 1.65 meter.
- ii) Circular of size 1220mm dia for depth above 1.65m and upto2.3 meter depth.
- iii) Circular of size 1520mm dia for depth above 2.30 meter & up to 9 meter depth.

**9.2 Depths of Manhole:**

- i) On branches — 1.0 M.
- ii) On laterals and mains — 1.5 M to 2.0 M.

**9.3 Spacing:**

- i) Manholes shall be provided at all junctions, change of directions, change in diameters as per connection requirements from every unit.
- ii) A distance of 30 meters or less on the main sewer lines depending on dia. Of pipe and local conditions.

**9.4 Manhole Covers:**

The contractor shall Provide and fix Fiber Reinforced Polymer (FRP) manhole covers made of composite material of isophthalic polymer matrix reinforced with fiber glass mat with multiple layers are specially designed and arranged by suitable process of Hydraulic Mold Pressing technique having inbuilt liquid pigments for required colours and the top layer is specially designed and treated with Gelcoat for anti-screeding and abrasion resistance. The cover shall be fixed with MS Bolts at all four corners. The core of the cover consists of a specially formulated mixture of resin and polymer fibre composite with sizes of 600x600mm square in shape. The manhole cover shall consist of Frame and cover suitable to fit on drain/manhole chamber of clear opening 600mm in square sizes. The testing method of load bearing capacity and permanent Set confirms as per BS EN: 124 / IS: 1726 (1991) which determine the permanent deformation in cover after multiple loading within a short time as specified in the code. The material shall be get priorly approved from the Engineer-in-charge before execution.

- a) For manholes on service roads having approximate total load capacity 40 MT.
- b) For manholes on main roads having frequent heavy traffic, having minimum load carrying capacity 60 MT of minimum size 600x600mm.
- c) FRP recessed type/flat type/flushed type chamber cover of load carrying capacity 40 MT for storm water drainage with adequate numbers of holes on the chamber basin of 5mm dia. Filling material in the chamber basin shall be lawn grass. Size of chamber shall be 450x450mm /600x600mm and suitably be fitted on chamber size of 600x600/ 900x900mm.

### **9.5 The following colour codes are recommended for Water Pipes:**

Sl.No.	Particulars	Ground colour	First Colour Band	Second Colour Band
(I)	(2)	(3)	(4)	(5)
1	Drinking water	Sea green	French blue	Signal red
2	Treated water	Sea green	Light orange	-
3	Fire water	Fire red	Crimson red	-
4	Cold water from storage tank	Sea green	French blue	Canary yellow
5	Domestic, hot water	Sea green	Light grey	-
6	Untreated sea/river water	Sea green	White	-
7	Filtered water	Sea green	Light brown	-
8	Soft water	Sea green	Light brown	Signal red
9	Sprinkler and Hydrant water	Sea green	White	Signal red
10	Wastewater	Sea green	Canary yellow	Signal red
11	Warm water	Sea green	Light grey	Canary yellow
12	Cooling Water	Sea green	French blue	

### **10 Sewage Treatment Plant in this Project: As per SH : Electrical, (Part-C) of this NIT.**

#### **10.1 Drainage & Rainwater Harvesting System:**

##### **10.1.1 Introduction**

Due to urbanization of the land and sharp growth in population and thus increase in water demand for various uses, the fresh water is becoming scarce in most regions of the area. In certain areas due to almost total dependency on the underground water, the wells and bore wells are getting deeper and deeper. Also, due to increase in paved surface/roof areas, the amount of natural percolation of rainfall is reducing very drastically.

Therefore, it has become necessary to harvest the rain water as much as possible. The drainage system needs to be planned with a view to incorporate rainwater harvesting principles as detailed in the NIT.

### **10.1.2 Irrigation Works:**

10.1.2.1 Irrigation system for Project areas shall be designed & planned as follows.

- a) Irrigation system for Project areas around shall be catered by independent STP treated effluent being planned and constructed in Project.

## **10.2 Design Considerations:**

### **10.2.1 Source:**

Due to acute shortage of water in Guwahati primarily treated effluent from STP will be utilized to cater irrigation water requirements.

### **10.2.2 Water Demand:**

Water demand for landscaping areas for Package-III works shall be calculated from NBC-2016 Part-9 as 6-8 litre/m sq./day for lawns. For shrubs and trees, the lower value can be adopted.

### **10.2.3 Type of Irrigation System to be adopted:**

- a. Land irrigation system through ring mains with the help of garden hydrant points comprising valves and chamber for surface irrigation of lawns.
- b. Drip irrigation system for shrubs, trees and plants distributing water through a network of valves, pipes, tubing, and emitters.
- c. As the water is being used from STP spray sprinkler system is not suggested. However, agency shall plan for automatic sprinkler system for bigger lawns areas, which are away from habitable towers.

### **10.2.4 Key Factor to be considered in Planning of Irrigation System:**

- a. The irrigation system shall be designed considering the wind direction slope and proposed grade, type of soil percolation and type of vegetation to be watered.
- b. Spray irrigation to be designed to avoid dry spots and spray on to paved areas and un planted surfaces.
- c. Spray irrigation is to be avoided in areas of width less than 3 meters.
- d. Irrigation hydrants shall be un-obtrusively located and generally at the edge of shrub planting and additionally in close proximately to a drainage chamber and catch basins to avoid water log.
- e. Hydrant points shall not be located inside chamber to minimize water log from leaking pipes causing various health related hazards. Hydrants shall be located 200 mm above the ground level.

#### **10.2.5 Distribution System:**

- a. The entire distribution for irrigation system will be through network of independent pipes connected to STP, planned at required number of locations within the campus. The lines feeding to irrigation system shall be independent to those lines which are feeding to cater flushing water requirements. The distribution network will be planned & installed as approved by Engineer-in- charge.
- b. The entire network of irrigation system will be divided in zones with the help of isolation valves and sub mains feeding garden hydrant and drip irrigation system.
- c. The sprinkler system network shall be fully automatic controlled with timer based and solenoid valves. Sub mains for sprinkler system shall be independent connected with isolation valve with main grid.
- d. The entire water for garden hydrant system/sprinkler system will be pumped with help of multiple automatic pumps placed in STP plant rooms.

#### **10.2.6 Materials:**

- a. All garden hydrant/sprinkler ring mains and sub mains and branches shall be uPVC pipes as per IS: 4985 of class 10kg/cm<sup>2</sup> rating with matching fittings.
- b. For drip irrigation system LLDP drip tubing of 10kg/cm<sup>2</sup> rating with all matching fittings and special e.g. coupling, tees, bends and reducer etc., with solenoid valve assemblies shall be provided.
- c. Sprinkler system will comprise pop-up spray sprinklers assemblies with gear driven rotors, plastic risers and lockable covers. Sprinkler system will be provided with fully automation units comprising solenoid valves with outdoor type turf controllers. The radius and type of sprinkler will be designed & selected considering the availability of spaces.
- d. All pumping system shall be vertical inline stainless-steel pump placed in the STP plant room. All electrical works for the pumps including control cables shall be included.
- e. Suitable filtration units, disc filters, pressure gauges, air release valves shall be provided as accessories for irrigation system.
- f. Materials of valves used in the irrigation system shall be suitable for use for STP treated water with required pressure rating and functionality.
- g. Confirmation about adequacy of water head available at site for safe operating of the system shall be proposed by the agency.

### **10.3 Proposed Storm Water Drainage System:**

**10.3.1** The system to be been proposed after studying the site conditions and considering the following factors:

- a. The slope pattern of site terrain.
- b. The existing conditions of site and surrounding.
- c. The final levels and patterns of different type of roads.

- d. The need for incorporation of rainwater harvesting within the site area.
- e. Final disposal to external drainage system as per site.

**10.3.2 Planning of drainage system shall be as follows:**

- i) The rainwater from the terraces and related clean paved areas of individual Towers/Buildings shall be collected in the collection chambers (Modular type rainwater harvesting system) and shall be ultimately connected to the main storm-water drainage system.
- ii) The rainwater from the terraces and related clean paved areas of individual Towers/Buildings shall be collected in the collection chambers (Modular type rainwater harvesting system) and shall be ultimately connected to the main storm-water drainage system.
- iii) The network of storm water system shall be mostly catch basins and RCC pipe network, as per requirements.
- iv) For Roof Drainage: Rain water pipes for roof drainage shall be designed as per NBC-2016, Table-23 of Part-9.
- v) Rain water pipes and fittings shall be minimum 150 mm dia Low noise system rain water pipes made of mineral reinforced Poly Propylene (PP) with fittings. Proper & required numbers of rain water pipe for drainage from balcony, Fire shafts, fire refuge floor, terrace, etc. shall be provided.
- vi) All pipes shall be provided alongwith required hardware/ accessories of approved make, specifications and design requirements as per approval of Engineer-in-charge.
- vii) The surface storm water drainage system of roads, paved area & green area within campus shall be planned with independent network of storm water pipes, catch basins & manholes & discharging to rain water harvesting and if excess than through into external municipal storm water drain.

**10.4 Bypass arrangement of storm water disposal:**

A suitable bypass arrangement for the storm water drainage system shall be provided through the installation of storm water pumping facilities and appropriate sluice gates, located near the modular rainwater harvesting chamber or as required by the design. The collected storm water shall be utilized for groundwater recharge and horticultural purposes.

During periods of heavy rainfall, such as the monsoon season or any instance of high water inflow, the bypass system shall be capable of effectively diverting excess water from the internal drainage network to the municipal drain. The arrangement should be planned by the agency and submit for approval of Engineer-In-Charge before execution of work.

The capacity of the bypass drainage pumps shall be designed to handle a minimum rainfall

intensity of 25 mm/hour across the entire site.

## **11 Internal Plumbing Systems:**

- 11.1 Plumbing System Adopted:** - Two pipe (stack) system as recommended in code of practice for soil and waste pipes above ground (IS: 5329 – 1964). The colour coding for pipes shall be as per NBC 2016. This implies there are separate vertical stacks as per the following: -
- Soil pipes shall carry the wastes from WC's & urinals. Soil pipes shall connect directly to manhole outside the building.
  - Waste pipes shall carry the wastes from wash basins, sinks, floor drains, etc. Waste pipes shall connect to gully traps outside the building, which shall in turn be connected to the external manholes.
  - Rainwater pipes shall also be provided which shall dispose outside the building into the external catch – basin chambers / external drains for rainwater harvesting purpose.
- 11.2** To ensure that the plumbing system is unhindered, all wet – areas shall be designed with the following structural provisions: -

<b>Details</b>	<b>Requirements/Recommendation</b>
Wet Areas slab to be partially sunk	<p>Approx. 100mm sunken area required in wet areas (toilet/wash &amp; kitchen) for connection of wash basins sinks &amp; floor drains. For balconies also, 100mm sunken area is required.</p> <p>All traps, soil &amp; waste pipes shall be hanging at ceiling level below, by hanging the pipes with G.I structural supports/dash fasteners and proper clamping etc. with proper slope (1:60).</p> <p>Cleanout plugs shall be provided at the ceiling level below as per detailing.</p> <p>All structural beams at ceiling level should be inverted (upwards oriented) for toilet /kitchen area.</p> <p>Cut-outs for traps and WC soil pipes shall be marked and provided before execution.</p> <p>In case any Indian WCs are provided, adequate depth as required for sunken slab shall be provided for that area. However, P-trap shall be hanged with G.I structural supports/dash fasteners and proper clamping etc. at the ceiling level and further connected to the soil pipe.</p> <p>This option is recommended for most wet areas from the point of view of easy cleaning and maintenance of the plumbing systems, as all pipes are accessible from the ceiling for easy repair and replacement.</p> <p>Sturdy metallic false ceiling in kitchen/toilets shall be provided.</p> <p>However the decision of the Engineer-in-charge shall be final and binding to the contractor.</p>

## **11.3 Fixtures and Fittings (As per Schedule of Sanitary and CP Brass Fittings/Fixtures):**

**11.3.1** All Sanitary fixtures shall be off-white /pastel colours/special colours vitreous china and of standard quality and make, as per approval of Engineer-in-Charge complying to the preferred makes as per NIT of respective items.

**11.3.2** All CP fittings shall be of standard quality and make as per Schedule of Sanitary and CP Brass fittings/fixtures, as per approval of Engineer-in-Charge complying to the preferred makes as per NIT of respective items.

#### **11.4 Materials for Internal Plumbing Soil, Waste & Rainwater Pipes:**

Double stack system shall be proposed for drainage system with separate pipes for soil and waste disposal. The soil, waste, vent & rain water pipes shall be designed as per NBC-2016 with the required colour coding.

**11.4.1** Waste pipe from sinks, wash basins, Urinals shall be Hubless Centrifugally Cast (Spun) Iron Pipes of minimum 100 mm diameter/as mentioned in Drawing with epoxy coated inside & outside IS: 15905 with all the required Hubless Centrifugally Cast (Spun) Iron Fittings to make the soil waste and vent pipe system complete and functional in all respects as per drawings approved by Engineer-in-charge.

**11.4.2** All suspended soil, waste and vent pipes and fittings (horizontal in toilets/kitchens and vertical in shafts) shall be cast iron hubless pipes (vertical pipes and fittings nominal dia shall be minimum 100mm /as mentioned in Drawing as per IS: 15905 (Epoxy coated inside & outside) and jointing with stainless steel (SS-304) shielded coupling with a double stainless steel bolt and screw housing incorporating a elastomeric rubber gasket system having low noise level with proper test certificate as per code IS/ASTM including all necessary fittings and fixing by GI lamps, anchor fasteners, Clamps/Channels etc as approved by Engineer in charge.

Note : Horizontal connection pipes and fittings in toilets/ kitchens nominal dia shall be minimum 100mm or required more as per design and , the horizontal main connection pipes from verticle shaft at ground level to STP shall be minimum 200mm nominal dia or required more as per design.

**11.4.3** All soil & waste and vent pipes and fittings (main headers at Ground level) shall be hubless pipes.

**11.4.4** All soil, waste & vent pipes & fittings laid in sunken/underground shall be centrifugally spun cast iron pipes & fittings as per IS:3989 and jointed with drip sealant joints.

**11.4.5** For rainwater pipes shall below noise (less than 18 db) system rain water pipes made of hubless including all fittings, grating at inlet face of bend/Tee, collar in the vertical lines should be between 1-2 mtrs and as recommended by the manufacturer and direction of engineer in charge.

#### **12 List of References to be followed with all the amendments upto the last date of submission of bids:**

1. Hand book of Water Supply and Drainage, Bureau of Indian Standards.SP-35 (S&T) 1987.
2. Manual of water supply & Treatment–1997, Central Public Health and Environmental Engineering Organization.
3. Manual on Sewerage and Sewage Treatment revised upto 1993 (Ministry of Urban Development, New Delhi), (Govt. of India)
4. Schedule of specifications of C.P.W.D. revised upto 2009, (Govt. of India) with all latest amendments issued from time to time
5. National Building Code -2016 by Bureau of Indian Standards.
6. Code of practice for provision and maintenance of water supplies for firefighting IS: 9668:1990
7. Other relevant ISI codes.
8. Code of basic requirement for water supply, drainage and sanitation IS:1172:1983 by Bureau of Indian Standards.

## **13 SOLID WASTE MANAGEMENT:**

### **13.1 Agency will provide waste composter as under**

Fully automatic, Aerobic, heater based organic waste converter machine of designed capacity to convert domestic food waste and horticulture waste, having capacity to reduce the volume upto 80-90%.

**500 Kg/Day x 2 nos. Organic Waste Convertor machines** for handling organic waste. The machine made out of Inner body / all contact parts SS 304, Structure & Frame SS 304 (Except Base frame which is in MS), Outer Body SS 304. Housing to be completely openable for maintenance and machine having interlock facility (auto shut off in case of inlet /outlet is opened) having outlet door of SS304 and dual inlet through shredder and direct inlet for liquid items. Machine should be with

**Inbuilt shredder** (Twin shaft, Grinding mechanism). High strength 4140 alloy steel with blade hardened and ground. Gearbox & Motor: Bonvario / Bonfiglioli or equivalent, **Conversion chamber** SS 304 round bottom tank SS 304 seamless. Agitator to come with unique shaft breakage protection system to safeguard the gearbox. Insulated jacket heater. Insulated Jacket Heaters to cover the conversion tank. Cerawool Insulation Jacket of 750 deg.C capacity. Heat Saving colour coating of 350 deg. C. Heater Thickness: 40 mm. with multiple heater banks. proper aeration.

**Control panel** Make of Switches / displays / electricals: L&T / Siemens /Salzer or equivalent Temperature controller / Sensors: Temperature Sensors to measure the waste and tank temperature. Forward & Reverse feature for shredder: Main Agitator to rotate Forward and Reverse at 2RPMMoisture sensor & Power saving mode: Moisture Sensor to automatically enable the power on process completion saving mode based on set point. Live moisture percentage display on HMI Panel Touch Screen/HMI Operation: PLC Based with HMI Panel

and of Delta or Select Make Operational logs storage feature : one week data log storage features.

**Output Quality** Output to be in dry format (Soil Amendment) with approx. 30% moisture content and should not be burnt

- 13.2** The manufacturer should have the following certifications: ISO 9001:2015, Quality Management System (IAF Certified Board), ISO 14001:2015, Environment Management System (IAF Certified Board), OHSAS 45001:2018 Occupation Health and Safety Management System (IAF Certified Board)ISO 50001:2018 Energy Management System (IAF Certified Board) Waste Management Agency must have minimum experience of 4 years in the Integrated Solid Waste Management area and must have executed at least one successful project, preferably in the Government Sector.

**14. The scope of the defect liability will be as under:**

S.No	Description	Defect Liability
(i)	Concrete	(a) Rectification of structural /superficial/non-structural cracks. (b) Rectification of dampness/leakages/seepage in roof slab/junctions & sunken portion, depressed portion, through RCC slab, vertical ties, bands, walls, base slab, junction of RCC walls with base slab and construction joints of RCC water tanks. (c) Rectification of cracks in beam, slab, column, lintels, vertical ties, plinth bands, lintel bands etc.
(ii)	Brick work/AAC blockwork Solid Concrete blockwork	(a) Rectification of cracks in confined masonry panel wall/partition wall in full length or in part portion. (b) Cracks / settlement of main wall, partition wall or dwarf walls. I Rectification of efflorescence, dampness.
(iii)	Woodwork	(a) Replacement of warped / bent / weather affected joinery, termite & borer affected joinery of wooden door / window shutters and frames. (b) Cracks in panels, bars / rails / styles of wooden door / window shutters etc.
(iv)	Builders Hardware	(a) Repairs / Replacement of loosened / premature failure of fittings including lever mechanics in door locks, hydraulic door closers, handles, tower bolts, cupboard locks etc. (b) Tightening / Replacement of sag in mosquito proofing SS net.
(v)	Steel & iron work	(a) Rectification / Replacement of defective part of gate, shutter, etc. (b) Redoing of defective portion in fabrication / welding including painting thereon. I Structural steel work and MS railing with Epoxy paint. (d) Windows, grills, gates etc. – Defects to be rectified.
(vi)	Roof treatment	(a) Rectification of leakage / seepage in roof slab, expansion/ seismic joints, floor junctions, inadequate/ faulty slope, drain outlets, including covering at junction till guarantee period.
(vii)	Finishing	(a) Rectification of structural / superficial cracks. (b) Rectification of protruding / peeling off plaster. I Rectification of efflorescence, dampness appeared. (d) Undulation / unevenness in plaster. I Paint & polishing.

(viii)	Flooring	<p>(a) Rectification of sunken / deflected / depressed portion of plinth protection, flooring in rooms, toilets, entrance foyer, staircase and other locations.</p> <p>(b) Rectification / Replacement of settled floors.</p> <p>I Settlement of foundation &amp; floors and resultant undulation of door finishes.</p> <p>(d) Rectification / Replacement of floor tiles which are sunken / uneven / undulating at joints / different in colour, texture, etc.</p>
(ix)	Aluminium Doors & windows and Flush doors	<p>(a) Rectification / Replacement of defective part of uPVC windows and flush door shutters.</p>

**Note:**

- (i) The above list is illustrative for civil work and not exhaustive. The rectification will include all Civil and Electro-Mechanical works including internal and external services without any exclusion.
- (ii) Security deposit will be released as per Schedule-F after expiry of periods from the date of completion of work on satisfactory performance during defect liability period.

**15. Comprehensive Maintenance**

1. Comprehensive Maintenance during DLP
2. The comprehensive maintenance including manpower and materials, of the assets within first year after the certified date of completion shall be free and no payment shall be made for maintenance during the first year of DLP.
3. The maintenance will aim at effective and economic means of keeping the building and associated services utilizable for which these were intended to. The ordinary use for which building and associated services are designed is a prime factor in determining the standard of care. The scope of work under maintenance shall include day to day Civil maintenance, annual repairs, etc. of the buildings and associated services constructed under the contract. The rates shall be inclusive of all the necessary cost of skilled/ non skilled labours, cost of required materials, equipments / Tools & Plants, scaffolding, ladders, trolleys / cycle rickshaws / battery operated rickshaws, shotcreting / guniting machines, welding sets, electric generators, etc. required for maintenance of works / items of works. However, the maintenance shall not include “Additions / Alterations / Upgradation”, “Housekeeping” and “Security”.

**16. Day to Day Maintenance**

1. Day to day maintenance / repairs is to be attended on day to day basis through a service centre. These services shall be provided through a service centre operating round the clock with all the required manpower, materials, T&P, etc. for all days including Sundays and Holidays. A suitable space for service centre may be provided to the contractor free of cost in the campus of **RBI Guwahati**. The responsibility of running and maintenance of service centre including receiving complaints through emails, phones etc, operating staffs, computers & peripherals, necessary consumables, software, internet / broadband connection, etc shall rest with the contractor at his cost. The service centre shall start functioning immediately from the date following recording of completion of the project

by the Engineer-in-Charge. The operation of service centre shall include the following:

- a. Downloading the complaints received online on daily basis.
- b. Recording the complaints received at service centre in person or telephonically.
- c. Assigning the work to the workers of respective trade.
- d. Uploading the status of attending of the complaints on daily basis.
- e. Preparing the abstract of attended / unattended complaints on daily, weekly and monthly basis.
2. The contractor shall deploy all the required manpower for day to day maintenance / repairs work of both civil & electrical works. The tentative number of man days deployed by the contractor for civil work in one month shall be as follows:

Sl No.	Category	Nos of Man days
1	Maintenance Engineer/Supervisor	30
2	Mason	8
3	Carpenter	8
4	Plumber	8
5	Sewerman	8
6	Beldar	30

3. However the contractor will be given free hand to deploy and manage the above manpower according to requirements in such a way that no complaint shall be left unattended as per the details given in para "Other Conditions" below.

#### 4. Other Conditions

- a. The execution of items shall be carried out in accordance to relevant CPWD specifications (amended upto date of receipt of tenders). For the items which are not covered under CPWD specifications, the Particular Specifications / B.I.S. Specifications shall have to be followed. The decision of Engineer-in-Charge shall be final in this regard.
- b. Wherever any reference is made to any Indian Standard, it shall be taken as reference to the latest edition with all amendments / revision issued thereto upto the date of receipt of tenders.
- c. Unless otherwise specified, the agreement rates for all items of work of the Schedule of Quantities are for all heights, depths, leads and lifts involved in the execution of work.
- d. The contractor shall make his own arrangement of water required for the work.
- e. The contractor shall make his own arrangements for obtaining electric connection for carrying out any maintenance activity and make necessary payment to the department concerned. In the absence of electric connection or failure of power supply, the contractor shall make his own arrangements of generators.
- f. Other agencies working at site will also simultaneously execute the work. The contractor shall offer necessary cooperation to other agencies wherever required.
- g. On account of security consideration, there could be some restrictions on the working

hours, movement of vehicles for transportation of materials, etc. The contractor shall be bound to follow all such restrictions and adjust the programmes for execution of works accordingly.

- h. The work shall be carried out in a manner complying in all respects with the requirements of any prevalent statutory laws enacted either by Central Govt. as well as State Govt.
- i. No claim of the labourers shall be entertained including that of providing employment, regularization of services etc.
- j. The contractor shall take immediate action to attend any complaint received from occupants. In all cases, he shall attend the complaints in the specified duration as mentioned below:-

  - i. No delay complaints – Complaints of emergent nature such as electricity / data networking not being available, plumbing or sewerage systems not working etc. are to be attended on emergent basis but in no case delayed beyond 3 hours.
  - ii. Minor complaints – Complaints relating to the trades of mason, carpenter, air-conditioning are to be attended within 48 hours.
  - iii. Major complaints – Complaints other than no delay & minor complaints.
  - iv. In case of any complaint mentioned under column (i) and (ii) above is registered again with a period of 7 days, it will treated as if the complaint registered earlier was not attended.

- k. In case of failure to meet deadlines to attend a complaint, a lump sum amount of Rs. 200/- (Rupees two hundred only) per complaint per day from the date / time of expiry of attending the respective complaint will be recovered from any sum due to the contractor.
- l. Any malba / building rubbish generated is to be removed from the site within 24 hours and to be stacked at a pre-designated place. The malba / building rubbish so stacked shall be disposed off as soon as one truck load is accumulated (275uthori 5 cum) from such designated place.
- m. In case the malba / building rubbish is not removed either from the site of original malba generation point or from the designated malba stacking place within a period as specified above, recovery of Rs. 1,000/- per day shall be effected from any sum due to the contractor.
- n. This malba / building rubbish has to be disposed off to the dumping ground as approved by the Engineer-in-Charge. The rates quoted by the contractor are inclusive of all operations, labour, leads and lifts from site of work to the dumping ground.
- o. Maintenance Engineer/Supervisor shall carry mobile telephone (s) to enable the Engineer-in-Charge / occupants to have easy and quick communication. Nothing extra shall be paid to the contractor on this account and his quoted rates for various items under this contract will be inclusive of this obligation.
- p. The replaced materials used shall have same or richer specifications to the original materials and compatible to the work.
- q. The staff employed by the contractor should be well behaved and any complaint of misbehavior shall be taken very seriously and such staff will have to be removed by the contractor immediately from the site.
- r. The dismantled materials shall be taken away and disposed off by the contractor at his cost. Nothing extra shall be paid / recovered on account of this.
- s. The contractor shall make all safety arrangements required for the labour engaged by him at his cost. All consequences due to negligence on behalf of security / safety or otherwise shall be on the contractor. The department shall not be responsible for any

mishap, injury, accident or death of the contractor's staff. No claim in this regard shall be entertained / accepted by the department.

- t. Contractor shall be fully responsible for any damages caused to government property or allottee's property by him or his labour in carrying out the work and shall be rectified by the contractor at his own cost.
- u. Chases, holes, etc shall be done using power operated tools.
- v. Each worker shall maintain a complaint diary and get the feedback recorded from the allottee regarding attending the complaint. In case, it is found that the complaint has not been attended satisfactorily, it will be considered as unattended.
- w. The contractor shall be required to maintain sufficient quantity of spares at site to meet with the requirement of attending the complaints as per direction of Engineer-in- Charge.

## Section-IV

### **1.0 List of Preferred Makes for Civil Works:**

1.1 Brand names of materials to be used as per the scope of work are listed here. The agency should use ‘Make-in-India’ products only as per the Govt. of India “Make in India “policy updated upto the last date of submission of bids. The agency should also consider the availability of spare parts/components for maintenance purposes while proposing any brand/manufacturer. In case of non-availability or technical non- compliance of stipulated makes/brands, the alternate makes/brands can be proposed by the firm and used only after the approval of NIT approving authority. The agency shall submit at least three brands from the list given below along with the rates (the difference in rates shall not be more than 10%) and specifications for the approval of Engineer-in-Charge before placing order. Any other equivalent brand shall be allowed only if the already provided brands in the preferred make are not available in the market. **Preference shall be given to ‘Make-in-India’ products.** In case of non- availability of ‘Make in India’ brands, then only the proposal for use of international brands is allowed with the prior approval of NIT approving authority complying with all Government of India norms. The list of preferred makes for civil work is given below:

1	Ordinary Portland Cement/Portland Pozzolana Cement	ACC / ULTRATECH / AMBUJA / BIRLA / SHREE CEMENT / DALMIA
2	White Cement	BIRLA WHITE / JK WHITE / ULTRATECH / WONDER CEMENT
3	Ready Mix Concrete (Other than the Contractor’s RMC plants dedicated to the project)	ACC/ULTRATECH / RMC INDIA / NUVOKO
4	Reinforcement Steel (Low alloy steel Fe 500D/550D)	SAIL / TATA STEEL LTD / RINL / JINDAL STEEL & POWER LTD (PANTHER)/ JSW-NEUA
5	Mechanical Bar Couplers for Reinforcement	DEXTRA INDIA / G-TECH / TATA
6	Mechanical Fastener, Anchor Fastener, Chemical Anchor Fastener, Core Cutting Machine/ Dry Stone Cladding Clamps, Expandable Fastener	HILTI / WURTH INDIA / 3M INDIA/ FISCHER
7	Structural Steel	TATA/ JSW STEEL LTD/ SAIL / JINDALSTEEL & POWER LTD / RINL/APOLLO
8	Super Plasticizer / Plasticizers /Admixtures	SIKA / STP LTD/ FOSROC/ BASF
9	Aluminum Shuttering	S-FORM/ EINS TECHNIK/ MFE/ KUMKANG/MIVAN/KNEST

10	AAC Block	AEROCON/J K LAKSHAMI / MODCRETE/ULTRATECH/FERROUSCRETE/SURYA
11	AAC Block Adhesive	ULTRATECH /ARDEX ENDURA /MYK LATICRETE/ FERROUSCRETE/STP LTD. /UNITED
12	Polymer modified Cementitious grout	MYK ARMENT / PIDILITE / SIKA / BASF
13	Curing Compound	SIKA / PIDILITE/FOSROC / BASF / MYK ARMENT / STP LTD/ROFF
14	Expansion Joint-(Modular type)	HERCULES / Z-TECH / SANFIELD INDIA / MIGUA/ BASF / VR ENGINEER/PIDILITE
15	Expansion Joint Armour Board	DURAFILL / DECOCRETE / SUPREME
16	Anti-Termite Treatment	BAYER / HINDUSTAN INSECTICIDES/ DENOCIL
17	Binding wire	TATA/JSW/JSPL/SAIL

**WATERPROOFING**

18	Waterproofing Self-adhesive (HDPE) Membrane	PIDILITE / SIKA / BASF / MYK ARMENT / STP LTD/ASIAN/ROFF
19	Double Component Liquid PU Elastomeric Membrane (spray applied)	PIDILITE / STP LTD / MYK ARMENT/MAPEI / ROFF
20	Waterproofing Compound (Crystalline)	KRYTON /PENETRON/MYK ARMENT/STP LTD. / ROFF
21	EPDM Waterproofing	POLYGOMA/ PIDILITE/ STP LTD/KRYTON/ ROFF
22	Acrylic Cementitious Coating	FOSROC/ STP LTD/ SIKA /PIDILITE / ROFF
23	Acrylic Distemper	ASIAN / DULUX/ JK CEMENT / BIRLA OPUS
24	Elastomeric Acrylic UV resistant liquid applied coating	PIDILITE / MYK ARMENT / STP LTD/ ROFF
25	Construction Joints (Water Stops)	KRYTON / STP LTD / MYK ARMENT
26	Drainboard	PIDILITE/ SIKA/ OVILITE
27	Food Grade Epoxy Coating	PIDILITE / SIKA/ FOSROC / STP LTD/ BASF
28	Bituminous Epoxy Coating	PIDILITE / STP LTD / SIKA / FOSROC

**DOOR, WINDOWS &WOOD WORK**

29	All Types of Ply boards	GREENPLY / CENTURY /KITPLY/ /MERINO/ JAYNA/ACTION TESA
30	Laminates	MERINOLAM/GREENPLY/GREENLAM/ CENTURY /ARCHID PLY/KITPLY / JAYNA

31	Veneer	MERINOLAM/GREENPLY /CENTURY /GREENLAM/KITPLY / JAYNA
32	Moisture Resistant HDF Board /MDF Board / HDHMR Board	ACTION TESA / GREENPANEL /CENTURY/ GREENPLY
33	Flush Doors Fittings	DORMAKABA/HAFELE / HETTICH /GEZE / DORSET / KICH
34	Flush door shutters	GREENPLY/CENTURY/ MERINO/ DURIAN/KITPLY/JAYNA
35	Modular Kitchen cupboard, Wardrobes, Fittings	DORMAKABA / HAFELE / HETTICH / GEZE
36	Wooden factory made Door Frames	D.S DOOR / JAYNA / KUTTY'S / A1 WOODS/MP WOODS
37	Factory made modular cupboard, Wardrobes, Kitchen units	GODREJ INTERIO/ SLEEK / IKEA / BROWN CRUST
38	Glass wool Insulation	UP TWIGA / POLY GLASS / LLOYDS/ OWENS-CORNING
39	Rock Wool Insulation	LLOYDS / ROXUL ROCKWOOL/ KANUF
40	Polycarbonate Sheet	GE LEXAN / DANPALON/ GALLINA / DPI SYSTEM / MPP
41	Decking Steel sheet	TATA STEEL / LLOYDS / JSW
42	Fire Sealant/ Fire Smoke Seal	HILTI / 3M INDIA / FISCHER
43	Extruded Polystyrene Insulation System	STP LTD / SUPREME / PIDILITE
44	Metal / Glazed- Fire rated Door System	NAVAIR / PACIFIC FIRE CONTROLS / SHAKTI-HORMANN / SAINT GOBAIN/AMVOR
45	uPVC Doors & Windows	NCL-VEKA/FENESTA/KOMMERLING/ / SAINT GOBAIN/ REHAU
46	uPVC Door/Windows Hardware	G-U /YALE/ HOPPE/ HIVIK
47	Fire rated glass (2 hours fire rating)	SAINT GOBAIN /SCHOTT/ASAHI/ PYROGAURD
48	Cement Fibre Board	LAFARGE / CENTURY / NCPL / EVEREST
49	WPC Board	ALSTONE/FLORESTA/ECOSTE/ GREENPLY/ CENTUR/RAJSHREE
50	Gypsum Board	GYPROC/SAKARNI/GYPTECH
<b>FINISHING</b>		
51	All types of paint/primer, water proofing cement paint, melamine polish	ASIAN PAINTS/ DULUX /NEROLAC/BIRLA OPUS
52	Premium acrylic emulsion paints (interior) (for Rd bungalow, Officers flats, Club 1&2, Community halls & Recreation area)	ASIAN PAINTS: ROYALE LUXURY EMULSION, NEROLAC : IMPRESSION, DULUX : VELVET TOUCH, BIRLA OPUS: ONE PURE ELEGANCE

53	Premium acrylic emulsion paints (interior) <b>(for staff flat &amp; ancillary area)</b>	ASIAN PAINTS : APCOLITE EMULSION, NEROLAC : BEAUTY SERIES, DULUX : SUPERCLEAN 3IN1., BIRLA: OPUS PRIME 150
54	Textured exterior paint	ASIAN PAINTS, NEROLAC, DULUX, BIRLA OPUS
55	Synthetic enamel paint	ASIAN: APCOLITE PREMIUM GLOSS ENAMEL, NEROLAC : SYNTHETIC HI GLOSS, DULUX : GLOSS SYNTHETIC ENAMEL, BIRLA OPUS: PRIME N53
56	Polyester Powder Coating Shades	ASIAN PAINTS /DULUX/NEROLAC
57	Cement based Wall Putty	BIRLA WHITE / JK WHITE / ASIAN PAINTS/ SAKARNI
58	Adhesives	ANCHOR / DUNLOP / PIDILITE- FEVICOL
59	Textured Exterior Finish	ASIAN PAINTS / ULTRATECH/SAKARNI/JK CEMENT
60	Epoxy Paint	AKZONOBEL(DULUX)/ ASIAN PAINTS/ FOSROC / STP LTD
61	Fire Retardant Paint	ASIAN PAINT/ JOTUN/ AKZONOBEL/ NIPPON
62	Gypsum Plaster	ULTRATECH/FERROUSCRETE/SAKARNI/BERG ER/JK PLASTO MAX/ ELITE (90) OF GYPROCK
63	Cement based Ready Mix Plaster	ULTRATECH/MYK ARMENT/SAINT GOBAIN / ARDEX ENDURA /FERROUSCRETE
64	Pre-Cast GRC Jali	BIRLA GRC/ UNISTONE/DALAL
65	Polysulphide sealant	FOSROC / SIKA / PIDILITE / MYK LATICRETE / STP LTD
66	Silicone / Weather Sealant	WACKER / DOW CORNING / GE /MCOY /ALSTONE

**STEEL & ALUMINIUM WORKS**

67	Stainless Steel Grade 316	JSW / SAIL/ TATA STEEL/ JSPL
68	Welding Electrodes	ADVANI-OERLIKON / MODI / TATA
69	Dash / Anchoring Fasteners	HILTI/FISHER/BOSCH/KONCEPT/WURTH INDIA
70	Anodised Aluminium Hardware (Heavy Duty)	JINDAL ALUMINIUM/BALCO/ NALCO/HINDALCO
71	Aluminium Structural Members – Windows, Glazing and Partitions	JINDAL / HINDALCO / NALCO
72	Modular Stainless- Steel Railing, Accessories etc. (Grade SS 316)	DORMAKABA / HETTICH / HAFELE

73	Fabrication of factory made modular Stainless- Steel Railing System with Accessories etc. of Grade SS 316	DORMAKABA / HETTICH / HAFELE /D-LINE
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<b>CEILINGS</b>		
74	False Ceiling – Gypsum with Grid System	SAINT GOBAIN / USGKNAUF / INDIA GYPSUM/ARMSTRONG/GYPTECH
75	Metallic False Ceiling & Grid System	ARMSTRONG / LINDNER/ HUNTER DOUGLAS/SAINT/GOBAIN/USG/KNAUF/DURLUM
76	False Ceiling Grid System	GYPROC /AEROLITE/ARMSTRONG/ LINDNER/ HUNTER DOUGLAS/SAINT GOBAIN/USG KNAUF
77	Acoustical Tile False ceiling	ARMSTRONG / SAINT GOBAIN / DEXUNE /AEROLITE/ ANUTONE
78	Open Cell Ceiling System	HUNTER DOUGLAS / DURLUM INDIA PVT LTD / ARMSTRONG/AEROLITE
79	Moisture Resistant Calcium silicate ceiling system	GYPROC / AEROLITE /ARMSTRONG(MYLAR)/EVEREST
80	Cement Fibre board	LAFARGE / INDIA GYPSUM /CENTURY/EVEREST
81	Glass Mosaic Tiles/ Porcelain Vitrified Swimming Pool	BISAZZA/ ORIENT BELL/ PALLADIO/ITALIA GLASS/ JOHNSON
<b>FLOORINGS/ WALL TILES</b>		
82	Floor & Wall Tiles: Rectified Ceramic /Vitrified / Antiskid / Matt / Glazed/ Full Body Vitrified tiles/Tactile tiles (Manufactured by Mother plants only)	KAJARIA/SOMANY/ RAK/JOHNSON
83	Wooden Laminate Flooring	PERGO/DECK/ARMSTRONG/ACTION TESA
84	Engineered stone - Marble/ Quartz/Korean Marble	ASIAN / JOHNSON / NITCO
85	Tile Adhesive / Stone Adhesive (Type-III)	ROFF/ PIDILITE/ FERROUSCRETE/SAKARNI/JK CEMENT
86	Floor hardener	PIDITOP 333 BY PIDILITE / FOSROC / SIKA /BASF/ STP LTD
87	Bonding Agent	NITOBOND EP OF FOSROC / SIKADUR 32LP OF SIKA / CONCRESIVE 1414 OF BASF / JK BOND MAX

88	Norton Tape (Double sided) Adhesive tape	NORTON / 3M / SAINT GOBAIN
89	Epoxy Flooring	FOSROC / SIIKA/ MYK LATICRETE / PIDILITE
90	Ceramic based Heat Resistant Tiles(10mm)	KAJARIA/SOMANY/ RAK/JOHNSON
91	Over deck foam Insulation	LLYODS / PIDILITE / STP LTD
92	C&D Waste Precast Elements (Kerb stones, Paver blocks, CC Blocks etc.)	6M CONCRETE / IL&FS /NITCO/ DALAL TILES INDUSTRIES
93	PVC skirting	REHAU / EBCO / LEGRAND
94	Tile Grout	MYK LATICRETE/ PIDILITE/BASF/ FERROUSCRETE
<b>GLAZINGS</b>		
95	Clear / Float / Frosted Glass / Looking Mirror	MODIGUARD / SAINT GOBAIN/ DISTEMPER /AIS
96	Toughened Glass / Hermetically sealed glass / High Performance Glass	MODIGUARD / SAINT GOBAIN/ GUARDIAN/AIS
97	Glass Shower Partition	DORMAKABA / HAFELE/JAQUAR/ KOHLER/ SAINT GOBAIN
98	Nuts / Bolts & Screws	HILTI / WURTH INDIA / FISCHER
99	All type of hardware and fittings for all type of glazing / doors/ windows etc. including mortise latch & lock, tower bolt, ball bearing butt hinges, friction stay hinges, sliding door bolts, lever handle, magic eye, hydraulic door closer, etc.	DORMAKABA / HAFELE / HETTICH / GEZE/
100	Modular Toilet Cubicles	MERINO / GREENLAM / DORMAKABA
101	Hardware for Fire Check Door/ panic bar/ panic trim/ door closer/ hinges/ mortise lock / Dead Lock, etc.	DORMAKABA / GEZE/ HORMANN/ BRITON
102	EPDM Gasket	IGP / CROWN GASKET / OSAKA
<b>PLUMBING &amp; SANITARY</b>		
103	GI Pipes	JINDAL (HISAR) / TATA STEEL/ SURYA PRAKASH
104	GI Fittings	UNIK / ZOLOTO / SURYA/ KS/SANT
105	SS Pipes & fittings (316 Grade)	JSL LYFESTYLE / VIEGA / AQINOX/VSH
106	DWC HDPE Pipes	RELIANCE POLYMERS / PRINCE / SUPREME/ ASTRAL

107	DI Pipes	ELECTROSTEEL (VEDANTA) / JINDAL/TATAMDUCTURA
108	DI Fittings	ELECTROSTEEL (VEDANTA) / JINDAL/TATA DUCTURA / KESORAM
109	CI Double flanged sluice valve	KIRLOSKAR /KARTAR/ZOLOTO /IVC /NVR
110	Float Valve	LEADER / ZOLOTO / KSB/IVC/ NRV /SANT
111	Hubless Centrifugally Cast (Spun) Iron Pipes & Fittings	NECO / KAPILANSH/ SKF/RPMF/BIC
112	Centrifugally Cast (Spun) Iron (Class LA) Pipes	NECO / ELECTRO STEEL / SKF/TATA/ BIC
113	Centrifugally Cast (Spun) Ductile Iron Pipes & Fittings	NECO/SKF/ HEPCO
114	G.I. Steel Door Frame	NAVAIR/ SHAKTI/TATA
115	CI Manhole covers, Frames & GI Gratings	NECO / RIF / SKF/ RPMF / ELECTROSTEEL CASTINGS
116	SFRC Manhole Covers &Gratings	OCR / PARGATI / ECO/DUDHI/NECO
117	Stoneware Pipes and Gully Traps	PERFECT / PARRY / BURN / ANAND / RK / HIND
118	RCC Manhole covers & Frames	KK MANHOLE / GRATING CO. (P) LTD/DALAL TILES INDUSTRIES
119	Gun Metal Valves, Globes	ZOLOTO / CASTLE / KARTAR
120	<b>CP Fittings &amp; Fixtures ( For RD Bungalow, Officers Flat, Club 1&amp;2, Community halls &amp; Recreation area)</b>	JAQUAR / KOHLER/ GROHE/ROCA
121	<b>Concealed Cistern &amp; its Accessories ( For RD Bungalow, Officers Flat, Club 1&amp;2, Community halls &amp; Recreation area)</b>	JAQUAR / KOHLER/ GROHE/ROCA
122	<b>Sanitary Vitreous Chinaware ( For RD Bungalow, Officers Flat, Club 1&amp;2, Community halls &amp; Recreation area)</b>	JAQUAR / KOHLER/ GROHE/ROCA
123	<b>Toilet &amp; Bathroom Accessories (towel ring, rod, toilet paper holder, soap dish, wash couplings, extension nipples, Cockroach trap, SS Gratings etc.) (For RD Bungalow, Officers Flat, Club 1&amp;2, Community halls &amp; Recreation area)</b>	JAQUAR / KOHLER/GROHE/ROCA
124	<b>CP Fittings &amp;Fixtures (For Staff Flat &amp; ancillary area)</b>	JAQUAR (CONTINENTAL SERIES)/ HINDWARE (ITALIAN COLLECTION)/ PARRYWARE (ETERNAL COLLECTION)
125	<b>Concealed Cistern &amp; its Accessories (For Staff Flat &amp; ancillary area)</b>	JAQUAR (CONTINENTAL SERIES)/ HINDWARE (ITALIAN COLLECTION)/ PARRYWARE (ETERNAL COLLECTION)

126	Sanitary Vitreous Chinaware ( <b>For Staff Flat &amp; ancillary area</b> )	JAQUAR (CONTINENTAL SERIES)/ HINDWARE (ITALIAN COLLECTION)/ PARRYWARE (ETERNAL COLLECTION)
127	Toilet & Bathroom Accessories (towel ring, rod, toilet paper holder, soap dish, wash couplings, extension nipples, Cockroach trap, SS Gratings etc.) ( <b>For Staff Flat &amp; ancillary area</b> )	JAQUAR (CONTINENTAL SERIES)/ HINDWARE (ITALIAN COLLECTION)/ PARRYWARE (ETERNAL COLLECTION)
128	uPVC/ CPVC Pipe& Fittings	ASTRAL/ SUPREME / FINOLEX/PRINCE
129	Non-Return Valve (Check valve) and other kind of Valves	ZOLOTO / SANT / LEADER
130	Brass Ferrules	DHAWAN SANITARY UDYOG / KALSI / POINEER /STERLING
131	Insulation for hot water pipes	MARSHLAND/ARMAFLEX / CAREFLEX / LLOYD
132	Pipe protection for external water supply pipes	PYPKOTE /ARMAFLEX/ MAPOLYKOTE
133	Stainless Steel Sink	NEELKANTH / NIRALI / ALLEX / KOHLER
134	RCC Pipes	LAKSHMI / SOOD & SOOD / JAIN & CO./ INDIAN HUME PIPE/MAHESHWARI
135	Dash/ Stud/ Anchor Fasteners	HILTI / BOSCH/ FISCHER/ KONCEPT STEEL/WURTH INDIA
136	SMC Water tanks	AMITEX/SINTEX
<b>MISCELLANEOUS</b>		
137	Irrigation Equipment	JAIN IRRIGATION / KISAN / FINOLEX / PLASSON
138	PVC water tank	SINTEX /SUPREME /VECTUS
139	Modular Rainwater harvesting	RETAS WATER HARVESTING / ADWYNIMPEX PVT. LTD / LIFE GREEN SYSTEM / BANTAIR
140	Stainless Steel hardware, fittings & Accessories for Modular Kitchen and wardrobe	HETTICH / HAFELE / GODREJ/ DORMAKABA
141	Organic Waste Composter	ECOBOT / BIORECO / EXCEL INDUSTRIES
142	Window Blinds	DECK / HUNTER DOUGLAS/AEROLUX / /VISTA
143	Modular SS Grade 316 Curtain Rods and Accessories	JINDAL / HAFELE / DECK/ KONCEPT STEEL
144	Urinal Frosted Glass Partition-12mm thick toughened	JAQUAR / KOHALER/ROCA/GROHE
145	FRP Cover	THERMODRAIN / FIBREONE / HP/FIBRE LIGHT
146	Micro Silica/ Silica fumes	ELKEM/ CRETESTONE/ PYRAMID

147	Swellable water stopper	PENETRON / MYK ARMENT/ SIKA
148	Acrylic cementitious coating	MYK ARMENT/ SIKA/ PIDILITE
149	Two component hybrid Polyurea	MC BAUCHEMIE/FOSROC/ PIDILITE / STP LTD / MYK ARMENT
150	Factory made cover blocks	FOSROC / FINCRETE/ KGM
151	SS Mesh 316 GRADE	GKD / WMW / EQUIVALENT AS APPROVED BY ENGIINEER IN CHARGE
152	SPORT FIELDS	STOCKMEIRF/POLYTAN/PORPLASTIC/MONDO FLOORS/ CONICA
153	WPC DOOR FRAME & SHUTTER	ALSTONE/ALUPLAST/KOEMMERLING/GREEN PLY
154	SYNTHETIC ACRYLIC SPORT FIELD	REBOUND/ ACE/ PACE COURT/ KDF/ PFS
155	Aluminum Composite Panel	REYNOARCH/ALUCOBOND/ALPOLIC

Note: - (a) Material bearing ISI mark and having BIS certifications shall only be used in the work, where articles of different designs/makes bearing ISI/BIS certifications are available.

- (b) Where material bearing ISI mark and having BIS certifications are not available, then material conforming to relevant BIS certifications shall be used with prior approval of Engineer-in-Charge. The decision of Engineer-in-Charge about the design/ make to be used in the work shall be final & binding on the agency.
- (c) When two or more alternative brands have been mentioned, the brand to be finally used shall be as decided by the Engineer-In-Charge. Nothing extra on this account is payable.
- (d) If the brand or specifications of any item is not available, then the decision of the Tender accepting authority regarding quality shall be final & binding on the agency.
- (e) Sl. No. 1, 2, 4, 7, 10, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 40, 44, 45, 46, 49 and 133 of above make list shall be directly procured from fully owned factory of the manufacturer, not from any Joint Venture, Dealer or Distributor.

**Schedule of Sanitary & C.P. Brass Fittings/Fixtures to be provided in each Toilet/ Wash/Kitchen**

<b><u>Jaquar</u></b>				<b><u>Kohler Series</u></b>			<b><u>Roca</u></b>		
<b>Sl. No.</b>	<b>Product Image</b>	<b>Product Name</b>	<b>Catalogue No.</b>	<b>Product Image</b>	<b>Product Name</b>	<b>Catalogue No.</b>	<b>Product Image</b>	<b>Product Name</b>	<b>Catalogue N</b>
1		Rimless, Blind Installation Wall Hung WC with UF soft close slim seat cover, Hinges, Fixing Accessories and Accessories set Size : 375x520x400 mm	Jaquar SLS-WHT-6953BIU FSM		Tru Rimless • Eco Power Flush 3.6L • Fully Skirted • Compatible with Kohler IWT, Flush Valve • PP seat	KOHLER - APT Round K-29150IN-0		Gap Round Rimless Wall Hung WC With Soft Close Seat Cover	RS3460NL460 +RA801D12003
2		Single Piece Concealed Cistern with Floor Mounting Frame, Installation Kit, S-Type Drain Pipe Connection Set and accessories; straight discharge	26353IN-M-NA		SINGLE PIECE SLIM CONCEALED INSTAFIT+ NXT GEN MECHANICAL CISTERN WITH FLOOR MOUNTING FRAME WITH 1 HARDWARE KIT INCLUDE	26353IN-M-NA		Slendra Plus Slim Concealed Cistern with Floor Mounted Full Frame with Drainage Pipe, Installation Kit	RE890010020

Correction...Nil Deletion... Nil

Insertion...Nil

Overwriting... Nil

AE (C)

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		pipe P- 90mm, Bend discharge pipe S 110mm, Adaptor sleeve, Protection cap cover all complete for Wall Hung WC.						
3		Hand Shower (Health Faucet) with 8mm Dia, 1 Meter Long Flexible Tube & Wall Hook with N.R.V (Back Flow Preventer)	Jaquar ALD-CHR-577		COMPLEMENTARY™ Deco health sprays with metal hose and holder in polished chrome	KOHLER- K-12927IN-CP		Be Fresh Health Faucet With Hose & Hook RF9060A1
4		2-Way Bib Cock With Wall Flange	Jaguar FLR-CHR-5041N		Apt 2-way Bib Tap with flange	KOHLER-K-33645IN-4-CP		Escuadra Two Way Bib Cock. RT5A9320CA1

Correction...Nil

Deletion... Nil

Insertion...Nil

Overwriting... Nil

AE (C)

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EE(C)

5		Wall Basin Hung With Fixing Accessories Size: 560X415X200 Mm	Jaguar CNS-WHT-801		Brive 540mm plus wall mount basin with single faucet hole in white	KOHLER-K-8703IN-1WH-0		Ona Over Counter Top Basin, Size: 500x370x147 m	RS3275L000C
6		Waste Coupling 32mm Full Thread	ALD-CHR-705		Waste Coupling 32mm (Full Thread &	20746IN-CP		Waste Coupling W/o Pop Up 32mm Ft (80mm)	RF5054018A1
7		Bottle Trap (With Internal Partition) 32mm Size With 300mm & 190mm Long Wall Connection Pipes & Wall Flange	Jaquar ALD 769L300x190		COMPLEMENTARY™ 300mm bottle trap in polished chrome	KOHLER-K-7314IN-CP		Bottle Trap Eco	RF9066A1
8		Pillar Cock	Jaquar FLR-CHR-5011N		APT FLUX PILLAR TAP COLD ONLY	KOHLER-34067IN-4-CP		Escuadra Pillar Cock.	RT5A4220CA1 Chrome

Correction...Nil Deletion... Nil

Insertion...Nil

Overwriting... Nil

AE (C)

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EE(C)

9		Stop Cock With Circular Handle And Wall Flange + PVC connecting pipe with CP brass nuts	Jaquar FLR-CHR-5053N Angle Cock Florentine		APT ANGLE VALVE with wall flange	KOHLER-33978IN-4-CP		90 Degree Angle Valve W Ceramic Cartr1/2	RF525164500
10		Shower Arm Casted 160mm Long Light Body Round Shape For Wall Mounted Showers With Flange	Jaquar SHA-CHR-477		Complementary™ Shower arm with escutcheon in polished chrome	KOHLER-99054IN-CP		Torrente 400 mm Round Shower Arm	RF525883100
11		Overhead Shower 120Mm Dia Round Shape Single Flow (Face Plate Stainless Steel & Abs Body In Chrome Finish) With Rubit Cleaning System	Jaquar OHS-CHR-1663		Daisyfield™ Multifunction showerhead, 9.6 lpm	KOHLER- K-24547IN-CP		Rain sense Square 200x200mm	RF5B2350C00

Correction...Nil

Deletion... Nil

Insertion...Nil

Overwriting... Nil

AE (C)

AE(E)

EE(C)

12		Concealed Body for Single Lever Diverter 40mm Cartridge with Button Assembly (Button On Top) But without Exposed Parts	Jaquar ALD-CHR-065M		Aqua Turbo™ 230 Recessed non-thermostatic bath and shower valve	KOHLER-K-75201IN-CP		SL Conc. Diverter Body with R 37 valve	RT5258433A1
13		Single Lever Exposed Parts Kit of Diverter Consisting of Operating Lever, Cartridge Sleeve, Wall Flange (with Seals) & Button Assembly Sleeve & Button (Compatible with ALD- 065M)	Jaquar FLR-CHR-5065MK		APT Flux AT230 trim	KOHLER-33992IN-4FP-CP		Victoria Plus Bath shower Mixer Upper Trim	RT5A064FCA1
14		Bathtub Spout With Wall Flange Stainless Steel	Jaquar SPJ-CHR-5429S		APT W/O BATH SPOUT	KOHLER-33995IN-CP		Estrella Spout with round flange	RT5A0203CA1

Correction...Nil

Deletion... Nil

Insertion...Nil

Overwriting... Nil

AE (C)

AE(E)

EE(C)

15		Toilet Roll Holder With Stainless Steel Flap	Jaquar ACN-CHR-1153S		COMPLEMENTARY™ Tissue holder with cover in polished chrome	KOHLER-K-5633IN-CP		Lure Paper Holder With Cover	RA816070159
16		SOAP DISPENSER WITH METALLIC BOTTLE	Jaquar ACN-CHR-1137N		CRUZ™ Soap dispenser and holder with frosted glass bottle in polished chrome	KOHLER-K-10712D-CP		Countertop soap dispenser	RA817673C60 Matt white finish
17		Soap Dish Holder	Jaquar ACN-CHR-1131N		COMPLEMENTARY™ Soap dish in polished chrome	KOHLER-K-5634IN-CP		Lure Soap Dish	RA816070132
18		Tumbler Holder	Jaquar ACN-CHR-1141N		COMPLEMENTARY™ Tumbler holder in polished chrome	KOHLER-K-5637IN-CP		Tumbler Holder	RA816705001 Chrome
19		Towel Rack 600mm Long Without Lower Hangers, Stainless Steel	Jaquar AKP-CHR-35781PFS		COMPLEMENTARY™ 610mm towel shelf in polished chrome	KOHLER-K-17529T-CP		Towel rack	RA816707001

Correction...Nil

Deletion...Nil

Insertion...Nil

Overwriting...Nil

AE (C)

AE(E)

EE(C)

20		SINGLE TOWEL RAIL 600MM, Stainless Steel	Jaquar ACN-CHR-1111SM		COMPLEMENT ARY™ 610mm towel bar in polished chrome	KOHLER-K-5630IN-CP		Lure Towel Rail	RA816070165
21		Towel Ring Round With Round Flange	Jaquar ACN-CHR-1121BN		COMPLEMENT ARY™ Towel ring in polished chrome	KOHLER-K-5631IN-CP		Lure Towel Ring	RA816070172
22		Robe Hook( 2 nos on each door )	Jaquar ACN-CHR-1191N		COMPLEMENT ARY™ Robe hook in polished chrome	KOHLER-K-5635IN-CP		Lure robe hook	RA816070121
23		Sink Cock with Regular Swinging Spout (Wall Mounted Model) With Wall Flange	Jaquar LYR-CHR-38347S		Beam™ One-hole wall-mount kitchen sink faucet, cold only	KOHLER-K-25418IN-4-CP		Single-lever kitchen sink mixer with swivel spout and flexible supply hoses. Cold start.	Roka-RT5A8501C Chrome

Correction...Nil

Deletion... Nil

Insertion...Nil

Overwriting... Nil

AE (C)

AE(E)

EE(C)

24		Glass shelf	Jaquar: continental ACN 1171N		COMPLEMENTARY™ Glass shelf in polished chrome	KOHLER-K-5636IN-CP		Shelf	RA816661001
25		Trap square flat cut stainless steel AISI 304 (18/8) floor drain cover with jali grating glossy finish drain pipe 100 mm outer frame size 153x153 mm	Chilly cockroach trap CCT- SFC-153-GF		COMPLEMENTARY™ Floor drain in polished chrome- 100mm x100mm	KOHLER-K-7275IN-CP			

Correction...Nil

Deletion... Nil

Insertion...Nil

Overwriting... Nil

AE (C)

AE(E)

EE(C)

26		SS kitchen sink with drain board Nirali: Elegence ultra NG Large 1000x510 mm overall size with bowl size of 560x410x215 mm					
27		Orissa Pan with P trap, Wall Hung Cistern along with 39mm Drainage L-Bend & Extension Pipe with Gasket, O-ring & Installation Kit (Top Cover with Ledge) all etc. complete with fixing of premium quality of make Jaquar, Kohler, Roca, or equivalent make as approved by engineer-in-charge.					
28		Differently-abled Toilet Set which includes floor mounted EWC, S trap, Soft close seat cover, wall hung wash basin, Single lever clinical faucet, wall mounted grab bar, wall mounted hinged hand rail, Paper holder and bottle trap etc. complete fittings of premium quality of make Jaquar, Kohler, Roca, or equivalent make as approved by engineer-in-charge.					

**Note:1.** The above table is indicative mentioning the required items for sanitary and CP fittings, which will however remain subject to the compliance to the specification in the NIT and the preferred makes given. The selection of particular model of the sanitary fixtures and CP fittings will be decided by the Engineer-in-Charge of make Jaquar, Kohler, Roca, or equivalent make. The Engineer-in-Charge will approve the model in the selection process of particular sanitary fixtures or CP fittings within the ±10% of the basic cost and such cost adjustment shall not be paid/ recovered.

**DOOR/WINDOWS HARDWARE SCHEDULE**

<b>Door Fittings for Residential Quarters, Utility Blocks &amp; other Buildings</b>	
1	<b>Door (Except uPVC Casement/sliding balcony door shutters)</b> <ul style="list-style-type: none"> <li>a). Satin finish stainless steel grade 316 Mortise D-Type Handle set with Lock Body with internal thumb turn and external key operation all complete with 3 keys for both main doors of residential and all rooms doors of Utility blocks except toilets.</li> <li>b). Satin finish stainless steel 316 grade sliding door bolt of sizes 300mmx16mm fixed with SS screws etc. with (2 nos. in each door) at both faces (Inside &amp; outside) for SS grill main door.</li> <li>c). Satin finish stainless steel 316 grade sliding door bolt of sizes 250mmx16mm fixed with SS screws etc. with (2 nos. in each door) at both faces (Inside &amp; outside) for other room doors and toilets of Utility blocks/ Public toilet.</li> <li>d). Satin finish stainless steel 316 grade wall mounted door buffer set of minimum 75mm long and 22mm thick having 50mm base with rubber tip fixed with SS screws with 1 no. in each flush door.</li> <li>e). Satin finish dual rod stainless steel 316 grade door stopper with rubber tip having minimum weight of 200gm with 1 no. in each door.</li> <li>f). Satin finish stainless steel SS 316 handle 150mm long with SS screws fixing in each flush door shutters including toilets (2 Nos. in each door).</li> <li>g). Satin finish stainless steel SS 316 tower bolt 250mmx10mm &amp; 150mmx10mm size in each doors including toilets except main doors.</li> <li>h). Satin finish stainless steel SS 316 tower bolt 450mmx15mm size for main doors at top edge in each shutter.</li> <li>i). Minimum 4 nos. two way ball bearing hinges of Stainless steel 304 grade size 127x76x3mm in each doors and minimum 5 nos. in main doors of residential units.</li> <li>j). Door closer of minimum capacity of 80 – 120 kg in all outer doors.</li> <li>k). SS grill Wire Mesh main door: There shall be of 2 nos. SS 304 tower bolt of size 250mmx15mm size, 1 no. Stainless Steel inter lock with minimum 8 lever of approved make.</li> <li>l). Magic eye/Peep Holes for each main door.</li> </ul>

2	<b>Glazed aluminium door</b>	<ul style="list-style-type: none"> <li>a). Satin finish stainless steel Mortise Handle set with Lock Body with internal thumb turn and external key operation all complete with 3 keys.</li> <li>b). Satin finish stainless steel 304 grade wall mounted door buffer set of minimum 75mm long and 22 mm thick having 50mm base with rubber tip fixed with SS screws.</li> <li>c). Satin finish dual rod stainless steel 304 grade door stopper with rubber tip having minimum weight of 500gm.</li> <li>d). SS 304 tower bolt 450mmx15mm size</li> <li>e). Two Ball Bearing Hinges of Stainless steel 304 grade size125x75x3mm minimum 3nos.</li> <li>f). Door closer of minimum capacity of 80 – 120 kg in all outer doors</li> </ul>
3	<b>uPVC door, windows, ventilators &amp; fittings</b>	All doors windows ventilators, D-type handle, other fittings, locking arrangements shall be as per the CPWD norms and specification retain in this NIT and with locking arrangement of sliding doors in the balcony.

**Note:** The contractor shall submit the samples of material as listed above for obtaining approval from the Engineer-in-charge before placing bulk order. In case, any of the make/model listed above is not available, equivalent make/model shall be submitted by the contractor for obtaining approval from the Engineer-in-charge whose decision of Engineer-in-charge shall be final and binding on the contract.

## LIST OF ACCESSIBILITY NORMS OF BUILDINGS

### **I. Outdoor features :-**

- (i) Accessible route/approach of buildings
- (ii) Accessible Parking-Reserved parking near entrance
- (iii) Accessible pathway to entrance

### **II. Indoor features:-**

- (i) Accessible Reception (ii) Accessible Corridors and Tactile Flooring (iii) Accessible Lift (iv) Staircase with handrails (v) Accessible Toilets (vi) Accessible Drinking Water Facility (vii) Signage (viii) Emergency evacuation/exit.

### **I. Outdoor features :-**

**(i) Accessible route/approach of buildings** :- The laid down specifications of accessible Route/approach of buildings were (i) anti-skid floor surface (ii) colour contrasting surface (iii) Tactile guiding path width of at least 300 mm (iv) Directional signage regarding accessibility Features.

#### **(ii) Accessible Parking-Reserved parking near entrance**

The laid down specifications of Accessible parking-Reserved parking near entrance were (i) Vertical signage (Minimum height 2100mm) and on floor signage (ii) Parking lot having Minimum dimensions of 5000 mm X 3600 mm.

#### **(iii) Accessible path way to entrance**

The laid down specifications of the accessible path way to entrance were (i) Ramp of gradient of 1:12 (ii) Continuous round handrails on both sides (iii) Entrance door minimum clear width of 1000 mm (iv) Anti-skid flooring(v) colour contrast (vi) signage.

### **II. Indoor features:**

#### **(i) Accessible Reception:**

The laid down specifications of accessible reception were (i) counter with two heights (ii) Signage for easy identification (iii) Counter with clear knee space of 750 mm high by 900 mm wide by 480 mm deep (iv) Information regarding accessible features of the building (washrooms, drinking water, etc.)

#### **(ii) Accessible Corridors and Tactile Flooring:**

The laid down specifications of accessible corridors and tactile flooring were (i) Unobstructed corridor width of at least 1500 mm (ii) Anti-skid flooring (iii) tactile guiding path(at least 300 mm wide) (iv) colour contrasting surface (v) Supported by directional and informational signage (vi) Room doors are not to open outside to the corridor.

#### **(iii) Accessible Lift:**

The laid down specifications of accessible lift were (i) Minimum internal car dimensions of 1500 mm X 1500 mm (ii) Braille buttons, (iii) auditory announcement systems and digital display (iv) operating mechanisms (control panels) at an accessible height of 800 mm to 1000 mm. (v) Signage outside the lift (vi) Hand bars at 900 mm height (vii) Mirror on the rear wall (viii) Warning tactile tiles outside the lift.

#### **(iv) Staircase with handrails:**

The laid down specifications of staircase with handrails were (i) Warming tiles before and after the sloped surface (ii) regular steps of tread (width) 300 mm and rise (height) 150 mm (iii) Colour contrasting strips (glow in the dark, retro-reflective kinds) at the edge of the nosing (iv) Continuous handrails on both side (v) hand rail on both sides, at a height of 760mm - 900mm (vi) Braille indicator at both ends of the handrails.

**(v) Accessible Toilets:**

The laid down specifications of accessible toilets were (i) One unisex washroom/toilet in all floors in multi-level building (ii) Minimum internal dimensions of washroom/toilet 2200 mm X 2000 mm (iii) Door double swing or outward-opening and sliding) (iv) door width Minimum 900 mm (v) Water closet (WC) top height 450 mm to 480 mm (vi) Grab bars.

**(vi) Accessible Drinking Water Facility:**

The laid down specifications of accessible drinking water facility were (i) The area has a clear space of 900 mm X 1200 mm (ii) Lever type tap systems (at two levels) with easy-to-use systems (iii) Low height counter (countertop at 900 mm) (iv) Clear knee space between the bottom of the apron and floor or ground of at least 750 mm wide, 200 mm deep and 680mm.

**(g) Signage**

The laid down specifications of signage were (i) Colour contrast (white on blue) (ii) Pictograms and accessibility symbols for quick reference (iii) Positioning and Viewing Distance prominent.

**(h) Emergency evacuation/exit**

The laid down specifications of emergency evacuation/exit were (i) step free or ramped accessible evacuation route identified lending to the exit or the ramp or to the refuge area 20 (ii) orientation and direction signs installed frequently along the evacuation route and internally illuminated (iii) the alerting system.

DOOR FITTINGS INVENTORY FOR TYPICAL UNIT OF CLUB BUILDING									
Sr. no.	Name of Fittings	Single Leaf Flush Door	Glass Door	Double Leaf Glass Door	Shaft Door	Main Toilet Door	Toilet Door	Double Leaf Fire Door	Single Leaf Fire Door
1	2	4	5	6	7	8	9	10	11
1	SS 304 grade Butt Hinges 125 mm	4	-	-	3	4	4	8 (4 for each)	4
2	SS 304 Grade/Brass Lever Handle with 6 lever Brass Mortise Lock and Latch	1	-	-	-	1	-	-	-
3	SS 304 Grade/Brass Lever Door Handle	-	-	-	-	-	-	-	-
4	SS 304 grade Tower Bolt 200 mm height and 10 mm dia.	1	-	-	2 (1 at Lintel level and 1 at door bottom level)	-	-	-	-
5	SS 304 Grade/Brass Sliding Door Bolt 300mm	-	-	-	-	1	1	-	-
6	SS 304 Grade Shaft Lock	-	-	-	1	-	-	-	-
7	SS 304 grade Pull Handles	-	-		1	-	1	-	-
8	SS 304 Grade Pull Bar (450	-	1	2 (1 for each)	-	-	-	-	-
9	SS 304 Grade/Brass Magic Eye	-	-	-	-	-	-	-	-
10	SS 304 grade Floor Door Stopper	1	-	-	-	1	-	-	1
11	Hydraulic Door closers <b>IS- 3564 for door weight up to 80kg and up to 1000mm</b>	-	-	-	-	-	-	2 (1 for each shutter)	1
12	SS 304 Hydraulic Patch Top Fitting	-	1	2 (1 for each)	-	-	-	-	-
13	SS 304 Hydraulic Patch Bottom Fitting			2 (1 for each)					
14	SS 304 Floor Lock	-	1	2 (1 for each)	-	-	-	-	-

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

15	Single Point Double Side Panic Bar	-	-	-	-	-	-	2 (1 for each shutter)	1
16	SS 304 Grade Mortise Latch with Chain								
17	SS 304 Floor Spring		1	2 (1 for each)					

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

DOOR FITTINGS INVENTORY FOR TYPICAL UNIT OF FLAT										
Sr. no.	Name of Fittings	Main Door	Single Leaf Flush/ Panelled Door	Glass Door	Double Leaf Glass Door	Shaft Door	Main Toilet Door	Toilet Door	Double Leaf Fire Door	Single Leaf Fire Door
1	2	3	4	5	6	7	8	9	10	11
1	SS 304 grade Butt Hinges 125 mm	4	4	-	-	3	4	4	8 (4 for each)	4
2	SS 304 Grade/Brass Lever Handle with 6 lever Brass Mortise Lock and Latch	1	1	-	-	-	1	-	-	-
3	SS 304 Grade/Brass Lever Door Handle	1	-	-	-	-	-	-	-	-
4	SS 304 grade Tower Bolt 200 mm height and 10 mm dia.	1	1	-	-	2 ( 1 at Lintel level and 1 at door bottom level)	-	-	-	-
5	SS 304 Grade/Brass Sliding Door Bolt 300mm	-	-	-	-	-	1	1	-	-
6	SS 304 Grade Shaft Lock	-	-	-	-	1	-	-	-	-
7	SS 304 grade Pull Handles (150 mm)	-	-	-	-	1	-	1	-	-
8	SS 304 Grade Pull Bar (450 mm)	-	-	1	2 (1 for	-	-	-	-	-
9	SS 304 Grade/Brass	1	-	-	-	-	-	-	-	-
10	SS 304 grade Floor Door Stopper	1	1	-	-	-	1	-	-	1
11	Hydraulic Door closers IS-3564 for door weight upto 80 kg and up to 1000mm	-	-	-	-	-	-	-	2 (1 for each shutter)	1

12	SS 304 Hydraulic Patch	-	-	1	2 (1 for each)	-	-	-	-	-
13	SS 304 Hydraulic Patch Bottom Fitting				2 (1 for each)					
14	SS 304 Floor Lock	-	-	1	2 (1 for each)	-	-	-	-	-
15	Single Point Double Side Panic Bar	-	-	-	-	-	-	-	2 (1 for each shutter)	1
16	SS 304 Grade Mortise Latch	1								
17	SS 304 Floor Spring			1	2 (1 for					

**Section-V****ESTABLISHING SITE LABORATORY AND TESTING OF MATERIALS**

Equipments for conducting necessary tests (as per CPWD Specifications 2019 volume I and II) 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>Sl.No.</b>	<b>Equipment</b>	<b>Numbers</b>
1.	100MT compression testing machines(electrical-cum-manually operated)	1
2.	Slump cone, steel plate, tamping rod, steel scale, scoop	10
3.	Vicat Apparatus with Desk pot	1
4.	Megger& earth resistance tester	1
5.	Pumps and pressure gauges for hydraulic testing of pressure Pipes	1
6.	Weighing scale platform type 100 Kg capacity	1
7.	Graduated glass measuring cylinder	As per requirement
8.	Sets of sieves of 450mm internal dia for coarse aggregate [100mm, 80mm, 40mm; 2mm; 12.5mm,10mm; 4.75mm complete with lid and pan]	1
9.	Sets of sieves of 20mm internal dia for fine aggregate [4.75mm; 2.36mm; 1.18mm; 600 microns; 300 microns & 150 microns, with lid and pan]	1
10.	Sieve Brushes and sieve shaker capable of 20mm and 300mm dia sieves, manually operated with timing switch assembly	1
11.	Cube mould size 70mmx70mmx70mm	6
12.	Cube mould size 150 mm x 150 mm x 150mm	36
13.	Ultrasonic Test Equipment (For concrete)	1
14.	Hot air oven temp. Range 50°C to 300°C- sensitivity 1 degree	1
15.	Electronic balance 600gx0.1g., 10kg and 50 kg	2
16.	Physical balance weight up to 5 kg	2
17.	Digital thermometer up to 150 degree centigrade	2
18.	Air Content of concrete testing machine	1
19.	Measuring jars 100ml, 20ml, 500ml	2 Nos each size
20.	Gauging trowels 100mm & 20mm with wooden Handle	12
21.	Spatula 100mm & 20mm with long blade wooden handle	12
22.	Vernier calipers 12" & 6" size	2 each
23.	Digital PH meter least count 0.01mm	1
24.	Digital Micrometer least count. 0.01mm	1
25.	Digital paint thickness meter for steel 500 microns Range	1
26.	GI tray 600x450x50mm, 450x300x40mm,300x250x40mm	1 each
27.	Electric Motor mixer 0.25 cum capacity	1
28.	Rebound hammer test digital rebound hammer	2

29.	Screw gauge 0.1mm-10mm, least count 0.05	2
30.	Water testing kit	2
31.	Motorized sieve shaker	1
32.	Pruning Rods 2 Kg weight length 40 cm and ramming face 25 mm <sup>2</sup>	1
33.	Extra Bottom plates for 15 cm cube mould	10
34.	Standard Vibration Table for gauging the cubes	1
35.	Pocket concrete penetrometer 0 to 50kg/ sq.cm	1
36.	Concrete temperature measuring thermometer with Brass protection sheath 0- 100 degree centigrade	2
37.	Mortar Cube vibrator	1
38.	Dial type spring balance preferable with zero correction knob capacity 100 kgs. reading to ½ kg.	1
39.	Counter scale capacity 1 kg and 10 kg	1
40.	Measuring cylinder TPX or Poly propylene capacity 100 ml, 500 ml, 250 ml, 100 ml	1 each
41.	Pyrex, corning or Borosil beakers with cover capacity 500 ml, 20 ml, 50 ml	1 each
42.	Wash Bottles capacity 500 ml	6
43.	Thermometers 1-100 degree centigrade / max. and Min/ Dry and wet with table	2
44.	Set of box spanner ratchet	1
45.	Hammer 1lb& 2lb	1 each
48.	Distance metre (of 100 metre)	1
49.	Hacksaw with 6 blades	1
50.	Measuring tape (5 metre)	4
51.	Depth gauge 2 cm	2
52.	Shovels & Spade	2
53.	Steel plates 5 mm thick 75x75 cm	2
54.	V- funnel	10 Nos.
55.	L- Box	10 Nos.
56.	Any other equipment for site tests as outlined in BIS codes and as directed by the Engineer-in-Charge.	As per site requirement

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

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

**Section-VI****LIST OF MINIMUM PLANT AND EQUIPMENT REQUIRED AT SITE**

<b>S.No.</b>	<b>Equipment</b>	<b>Numbers</b>
1.	Tower Crane	3
1.	Builders hoist	6
2.	Centralized concrete batch mix plant of capacity 60 cum per hour and 30 cum per hour (fully automatic with computer control and printing facility and operator)	1 nos - 60 cum/hr or 2 nos- 30 cum/hr
3.	Excavator cum loader (JCB 3D model or equivalent).	3
4.	DG set of minimum capacities of 62.5 KVA.	1
5.	Mini batching plant (6 cum/hr).	2
6.	Transit mixers.	As per requirement
7.	Concrete pump	2
8.	Needle Vibrators.	10
9.	Screed leveller.	2
10.	Plate Vibrator	10
11.	Automatic Ring making machine (Reinforcement)	2
12.	Dumper/Tipper	5
13.	Reinforcement bending machine.	8
14.	Reinforcement cutting machine.	8
15.	Power driven earth rammer (Soil compactor).	2
16.	Total station and related equipments	1
17.	Water tanker (Minimum capacity of 5000 liters)	3
18.	Welding machine 400 Ampere	7
19.	Screener for coarse sand and fine sand	5
20.	Centrifugal mono block water pump minimum capacity 2 HP	4
21.	Road roller 8 to 10 tons	As per requirement
22.	Vibratory roller	As per requirement
23.	Drilling machine	2 Nos.
24.	Shuttering with necessary props	As per requirement
25.	Steel scaffolding and staging materials	As per requirement
26.	Air compressor	1 Nos.

27.	Floor grinding/polishing machines	3 Nos.
28.	Granite cutting machine	4 Nos.
29.	Ceramic tile cutting machine	10 Nos.
30.	Granite polishing machine	5 Nos.
31.	Granite hand polishing machine	5 Nos.
32.	Mobile tower crane	As per requirement
33.	Software- AutoCAD latest version for CPWD site office	2 Users
34.	Any other machinery required for completion of the work as per decision of Engineer-in-Charge.	As per Actual requirement

Note: 1. The above list is only indicative and not exhaustive. The Bidder may be required to deploy more T&P as per requirement of work.  
 2. All the above plants & equipment's are to be deployed as and when required or as directed by Engineer-in-Charge.

# PART-C

## (E & M Works

## Scope & Additional

## Conditions)

**Name of Work :** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]

## GENERAL TERMS & CONDITIONS FOR ALL ELECTRICAL & MECHANICAL PACKAGES

### **1. GENERAL**

- 1.1 This specification covers planning, designing, supply, installation, testing and commissioning of all Electrical & Mechanical services required to be provided in the said scheme & as detailed in the NIT. The work shall be executed as per scope & specifications of E&M works given here after in respective packages / part of the scheme or sub-head including drawings. **If any services/ work required to make the building/ scheme habitable & functional, including the statutory compliance, is not specifically mentioned in the scope of services**, the same is deemed to be included within the scope of this tender and nothing extra shall be paid on this account.
- 1.2 The scope of works also covers the checking of drawings for E & M schemes, Inventories of Fittings, Fixtures, E & M Equipment etc. and corrections, if any and approval of the same from the Engineer-in-Charge, before commencement of work. The contractor shall submit shop drawings of various E& M services mentioned in the tender as per the requirement of sites before execution of work for approval.
- 1.3 The bidder shall obtain necessary approval from respective local bodies / CFO / lift inspector etc. as applicable in respect of electrical & mechanical services which require approval before commencement of execution of work at site. During execution, if the local bodies / CFO etc. require a modification, the same shall be executed without any extra cost. Finally, after execution, obtaining approvals /NOCs / clearances from local bodies / CFO etc. shall be the responsibility of the successful bidder for which nothing extra is payable, in case any modification/extra work is required the same shall be done by the contractor without any extra cost. **All statutory fees/charges required for obtaining clearances from CEA/ Local Bodies shall be paid by the contractor which shall be reimbursed by the department after receipt of proper documents.**

### **2. CONFORMITY & APPLICABILITY WITH STATUTORY ACTS, RULES, STANDARDS AND CODES as amended upto date:**

- i) CPWD General Specifications for Electrical Works Part I Internal – 2023.
- ii) CPWD General Specifications for Electrical Works Part II External – 2023
- iii) CPWD General Specifications for Electrical Works Part III (Lift & Escalators) –2003
- iv) CPWD General Specifications for Electrical Works Part IV Substation–2013
- v) CPWD General Specifications for Electrical Works Part V Wet Riser &Sprinkler System — 2020
- vi) CPWD General Specifications for Electrical Works Part VI Fire Detection and Fire Alarm System-2018
- vii) CPWD General Specifications for Electrical Works Part VII DG Sets- 2013
- viii) CPWD General Specifications for Heating Ventilation & Air Conditioning (HVAC) - 2024
- ix) National Building Code of India-2016
- x) Indian Electricity Rule-2005
- xi) National Electrical Code of India-2017
- xii) Energy Conservation Building Code of India-2017
- xiii) Barrier Free and Accessibility 2014
- xiv) Space for Electrical and Mechanical services in building – 2013
- xv) Quality Assurance Policy and Checking List of E & M services – 2016
- xvi) CPWD Guidelines for sustainable Habitat – 2014
- xvii) Manual on Accessible in Environment – 2019
- xviii) Green rating manual 2021

3. In the case of discrepancy between the scope of work, specifications given in bid documents, CPWD specifications mentioned in bid documents and / or the drawings, following order of preference shall be observed.
  - i) Scope of work/Additional specifications given in bid documents or CPWD specifications mentioned in schedule A to F of bid documents whichever is stringent.
  - ii) Enclosed drawings.
  - iii) NBC-2016.
  - iv) Indian standard specifications of BIS.
  - v) Manufacturer's standard practice/Specifications
  - vi) International Standards.
  - vii) As per sound engineering practice as approved by the Engineer-In-Charge.
4. All the equipment shall be delivered with (i) Manufacturer's Test certificate, (ii) Manufacturer's technical catalogues (iii) Installation/ Instruction manuals (iv) O& M manual. The bidder shall submit three sets of these documents and list of equipment's installed stating make, model, serial number etc. as required.
5. The design layout plans/drawings/ other documents pertaining to E & M services shall have to be submitted for evaluation & approval, within timeline defined in the Milestone of work.
6. Scaffoldings & all T & P required for execution, testing and commissioning of work shall have to be arranged by the contractor at his own cost. Nothing shall be paid extra on this account.

**7. Undertaking from OEM for specialized E&M works:**

**The specialized associate agency shall submit an undertaking from the OEM regarding.**

- a) **That OEM will unconditionally support technically throughout the execution of contract as well as for Maintenance/ Comprehensive Maintenance Contract for the useful life of the system.**
- b) **The OEM will provide all the spares required for healthy functioning of the equipment for at least useful life of the system from the date of completion of the project.**

**Note:** In case of OEM directly engaged for the work, above undertaking shall be given by them to the department through the main firm. The agency should possess valid electrical contractor license or associate registered contractor of CPWD in appropriate class having valid electrical license for execution of EI, as applicable having required experience as mentioned in bid documents. The bidder will have to submit supporting documents for prior approval from Engineer-in-Charge.

8. The bidder shall also submit three sets of "As-Built drawings" of all E&M works as per directions of Engineer-in-Charge. All such "Completion/ As Built" drawings of all services shall have a unique ERP generated identified number (called the ERP Drawing/Document Number or EDN) through the Collaboration Tool of CPWD ERP. This EDN shall be in addition to the drawing/document number presently being written on drawings/documents and will be written/ stamped/ embedded clearly on the drawing/ document by the drawing/ document approving authority. All such "Completion/ As Built" drawings of services shall be uploaded in pdf format only on the Collaboration Tool for issue and transmittal along

with unique EDN as issued by ERP unit. The “Completion/ As Built” drawings of all services shall not be considered valid without EDN and without uploading and transmittal on ERP Collaboration Tool.

#### **9. Procedure for approval of materials, shop floor drawings and commencement of work:**

Within the time specified in the table of milestone of the contract, the contractor shall submit following documents for approval of the Engineer in charge:

- (i) List of makes & model numbers of all items of equipments and accessories of each sub head of work to be used. Sample of materials wherever desired by Engineer in charge or required.
- (ii) Technical data sheet of the equipments to be supplied.
- (iii) Three copies Shop floor drawings of each package/sub work separately for approval.
- (iv) Prepare LOD 350 drawings for the complete system before start of work. Agency shall submit 01 set of all types of E&M services design and drawings of Electrical work to the Engineer-in-Charge for necessary scrutiny and getting necessary observations/ corrections/ approval through Collaboration Tool of CPWD ERP. After final approval, these structural design, E&M services design and drawings shall be authenticated as “Good for Construction” by concerned Engineer-in-Charge. All such “Good for Construction” Drawings/Design/Documents shall have a unique ERP generated identifier number called the ERP Drawing/Document Number or EDN through Collaboration Tool of CPWD ERP. The “Good for Construction” Drawings/ Design/ Documents shall not be considered valid without EDN and without uploading and transmittal on ERP Collaboration Tool. The access shall be given to the EPC agency on the ERP Collaboration Tool of CPWD for needful.

It is the responsibility of the tenderer to get the makes, models, technical specifications and shop floor drawings approved from the department before placing of order.

#### **10. Inspection before dispatch:**

No equipment shall be dispatched out from the manufactures premises before such tests are conducted and test result recorded. These test certificates shall be given along the supply of equipment's. The Engineer In-charge shall, if he so desires inspect and witness the pre-delivery tests. For this purpose, the contractor shall give the 15 days' advance notice and arrange for such inspection of the department. Department shall bear the expenses of boarding and lodging including fare its officials for inspection. However, the inspection shall be done at the discretion of the department without any cost implication. All routine tests as per CPWD specifications shall be conducted before dispatch of equipment's and ROUTINE TEST & TYPE TEST Certificates for equipment's shall have to be submitted by the Contractor. The following equipments at least shall be offered for inspection before dispatch:

- a) All major equipments such as Transformer, DG set, HT Panel, LT Panel with incomer as ACB or MCCB more than 200amp., APFC Panel, rising mains/ bus duct, poles (if quantity is more than 100 nos.) Wires, Cables.
- b) Ventilation/ pressurization fan.
- c) Pumps, Fire fighting pumps, STP etc.

- d) AC system, Lift etc. or any such material/ item/ equipment as directed by Engineer-in-Charge shall be tested at manufacturers premises.

Prior to dispatch, all equipments shall be adequately protected & insured for the whole period of transit, storage and erection against corrosion and incidental damages etc. from the effect of vermin, sunlight, rain, heat and humid climate.

#### **11. Quality of material and workmanship:**

All parts of the equipment shall be of such design, size and material so as to function satisfactorily under all rated conditions of operation. All components of the equipments shall have adequate factor of safety. The work of fabrication and assembly shall conform to sound engineering practice and on the basis of "Fail Safe Design". The mechanical parts subject to wear and tear shall be easily replaceable type. The construction of the equipments shall be such as to facilitate easy operation, inspection, maintenance and repairs. All connections and contacts shall be designed to minimize risk of accidental short circuits caused by animals, birds and vermin etc. All identical items and their component parts should be completely interchangeable including spare parts.

#### **12. Inspection and testing at site:**

- (i) The installation shall be subject to necessary inspection during every stage of erection, by the Engineer In-charge or his authorized representative. The successful bidder shall provide all facilities and assistance for the purpose.
- (ii) Testing shall be carried out for the completed installation, in the presence of and to the satisfaction of the Engineer-in charge by the contractor. All required test results shall be recorded and submitted to the department. All instruments and facilities necessary for the tests shall be provided by the agency without any extra cost.

#### **13. Completeness of work:**

- i) The installations shall be completed in all respects and put in to operation even where certain details have not been mentioned / left out in these specifications. Any discrepancy may be brought out in pre-bid meeting.
- ii) All E&M services such as Internal and External Electrical installations, Lifts, fire fighting systems (Wet riser and sprinkler system etc.), Intelligent Addressable Fire Alarm System, Substation Equipments, DG Sets, UPS, Drinking/ Domestic, Flushing Water Supply Pump Set, CCTV System, VRF/ VRV, Split Air conditioning, Solar Photo Voltaic Power Generation System, Sewage Treatment Plant, Organic Waste Converter, Centralized Intercom System, Exit sign Board i/c electric signage, EPABX system etc. shall be declared as completed after completion of trial run of 1 month or completion of whole work whichever is later. However, maintenance of these installations during the **DLP period of 36 months shall be carried out by the agency at his own cost. DLP / Warranty period of all works /machines/ equipment shall commence from date of completion of complete work (project).**

- iii) All electrical & mechanical fittings / fixture / appliances to be provided for the work should have 5- star rating of BEE, where BEE certification is available.
- iv) CPWD specifications are available on CPWD website “cpwd.gov.in”. The department shall not be responsible for the lack of knowledge and also the consequences thereof to the Contractor. The information and data mentioned in the tender document have been furnished in good faith and for general information and guidance only. If the data or information furnished in tender document is different from data/ drawing after Preparation of architectural drawings, design approved for construction, The Engineer-in-Charge in no case shall be held responsible for the accuracy there of and/ or interpretations or conclusion drawn there from by the Contractor. All consequences in this regard shall be borne by the Contractor and no claim from the contractor, whatsoever, shall be entertained by the Department. It is presumed that the Contractor has satisfied himself for all possible contingencies, situations, bottlenecks and acts of coordination, which may be required between different agencies.

**14. Incidental charges:**

All incidental charges of any kind including insurance, cartage, storage, wastage and safe custody of material etc. shall be borne by the Contractor.

**15. Quality assurance:**

The Contractor shall make available, on request from the Department, for record, copies of invoices, challans, cash memos, receipts and other certificates, if any, vouchers towards the quantity and quality of various materials procured and the same shall be kept on record. These shall also provide information on the name of the manufacturer, manufacturer's product identification, manufacturer's instructions, warning, date of manufacturing and test certificates from manufacturers for the product for each consignment delivered at site, shelf life, if any, for the department to ensure that the material have been procured from the approved source and of the approved quality, as directed by the Engineer-in-Charge. Day to day account of receipt of such material shall be maintained at site of work. Nothing extra shall be payable on this account.

**16. Storage of materials:**

Storage and safe custody of all materials shall be the sole responsibility of the Contractor. Nothing extra shall be payable on this account. The arrangement of storage space shall be the responsibility of the contractor.

**17. Quality control and testing of materials:**

- (i) None of the material/ items/ equipment etc supplied shall be more than six months old from date of supply at site. Copy of GST Gate Pass/ Invoice/ Shipment/ Custom Clearance certificate/ details (in case of imported equipment) shall be submitted to prove the date of manufacture & genuineness of the equipment/ machines supplied.
- (ii) 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 in this tender document. In case ISI mark material or the materials mentioned in the tender documents are not available, decision of Engineer-in-charge, which shall be final and binding, the material to be used shall conform to CPWD specifications applicable for this tender or IS Code. In such cases Engineer-in-charge shall satisfy himself about the quality of such material and give his approval in writing. All

- materials to be used on the site of work should be got approved from Engineer-in-charge before its use on work.
- (iii) If the department desires to send any samples of materials for testing in an accredited laboratory, the Contractor at his own expense shall supply all materials, labour for preparing and testing samples as required by the Engineer-in-Charge. The testing shall be carried out in the presence of the representative of the Engineer-in-Charge. The transportation and testing charges shall also be borne by the contractor. The Engineer in charge may waive the condition regarding testing if the quantity of the materials required for the work is small, subject to submission of related test certificates from the OEM. In all cases proof of procurement of materials from authentic manufacturers shall be provided by the contractor to the entire satisfaction of Engineer-in-charge. All materials equivalent to the one specified should be got approved by the Engineer-in-charge before using the said materials in the work.
  - (iv) The testing plan for quality control for material/equipment shall be as per CPWD Quality Assurance Policy and checklist for E&M services-2016 (Details are in "**Quality Assurance Manual**" listed below).
18. No foreign exchange shall be made available by the department for importing (purchase) of equipments, plants, machinery, materials of any kind. No delay and no claim of any kind shall be entertained from the Contractor on account of variation in the foreign exchange rate and/or any Custom duties/charges or any other levies.
  19. The contractor shall take into account the element of wastage(s) those are likely to be there in all elements of the work and quote his rate, taking that into account. The contractor shall study all the items from the point of view of wastage(s), which are likely to take place.
  20. Water and power supply required for construction, testing & commissioning shall have to be arranged by the contractor at his own cost.
  21. The description of E & M service & specifications is given in general but they are not exhaustive i.e. does not mention all the incidental works required to be carried out for complete execution of the work. The work shall be carried out in accordance with true intent and meaning of the specifications and the drawings taken together, regardless of whether the same may or may not be particularly shown on the drawings and/ or described in the specifications, provided that the same can be reasonably inferred there from. There may be several incidental works, which are not mentioned in the contract document/specifications but will be necessary to complete the item in all respect. All these incidental works which are not mentioned, but are necessary to complete the work shall be deemed to have been included in the overall amount quoted by the contractor for various components of work. No adjustment of rates shall be made for any variation in quantum of incidental works due to variation/ change in actual working drawings. Also, no adjustment of rates shall be made due to any change in incidental works or any other deviation in such element of work (which is incidental to the items of work and are necessary to complete such items in all respects) on account of the directions of Engineer-in-charge. Nothing extra shall be payable on this account.
  22. The scope of works also covers the preparation of layout plans, drawings for E&M schemes and approval of the same from the respective local bodies Fire Officer/Lift

Inspector etc. before the commencement of work. During execution, if the local bodies etc. require a modification, the same shall be executed without any extra cost. Finally, after execution, approvals/NOCs/clearances from local bodies etc. shall be there's possibility of successful bidder for which nothing extra is payable. In case any modification/extra work is required by the local bodies necessary for approvals/NOCs/clearances, the same shall be got executed and nothing extra shall be paid on this account. All statutory fees / charges required for obtaining clearances from Fire Officer/Lift Inspector/CEA / Local Bodies shall be paid by the contractor.

**23. Supervision of work:**

The Contractor shall depute Site Engineers & skilled/qualified workers as required for the work as per the documents required in NIT. The contractor shall submit organization chart along with details of engineers and supervisory staff. It shall be ensured that all decision-making powers shall be available to the representatives of the Contractor at site itself to avoid any likely delays on this account. The Contractor shall also furnish list of persons for specialized works to be executed for various items of work. The Contractor shall identify and deploy key persons having qualifications and experience in the similar and other major works, as per the field of their expertise. If during the course of execution of work, the Engineer-in-Charge is of the opinion that the deployed staff is not sufficient or not well experienced, the Contractor shall deploy more staff or better experienced staff at site to complete the work in desired quality and in stipulated time limit.

**24. Defect Liability Period:**

DLP / Warranty period for all equipments shall be guaranteed for a period of 3 (Three) years from the date of complete of total work (project) 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 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 attending the defect / fault removed, 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. The firm will be required to attend to the breakdowns calls as and when required from RBI authority. However, the RBI authority shall carry out daily routine maintenance and operation after handing over the site to RBI authority in working conditions.

**25. Indemnity:**

The successful tenderer shall at all times indemnify the department, consequent upon this contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the contractor shall be responsible for any accident or damage incurred or claims arising thereof on the department during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the Contractor in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the Contractor on account of the above.

**26. Co-operation With Other Agencies:**

The successful tenderer shall ensure proper coordination between various associate contractor executing the work of different E&M services in the construction of buildings, if any, and exchange freely all technical information so as to make the execution of this work/contract smooth. No remuneration should be claimed from the department for such technical cooperation. If any unreasonable hindrance is caused to other agencies and any completed portion of the work has to be dismantled and re-done for want of cooperation

and coordination by the tenderer during the course of work, such expenditure incurred will be recovered from the successful tenderer if the restoration work to the original condition or specification of the dismantled portion of the work was not undertaken by the tenderer himself.

**27. Approval from local authorities:**

- a) The contractor assists the consultant shall submit all details and carryout liaison/ coordination work with respective agencies for obtaining NOC/ approval for 33 kV electric substation and DG sets/ approval of electrical load/ release of load/ load sanction for each flat/ premises/ net metering for grid connected roof top solar PV power plant from local electric supply agency. Similarly, the contractor shall obtain NOC/ approval from pollution control board or any other authority as reqd.
- b) The contractor shall coordinate with service provider such as BSNL/AIRTEL/Jio for providing telephones/ broad bands connection.
- c) All payments required for these approvals from local authorities such as GMDA/GMC/ CEA/APDCL/CGWB etc shall be made by the Engineer-in-charge. However, if paid by the agency for saving of time, amount shall be reimbursed by the department on production of relevant documents. Department's role shall be limited only to sign the application/ drawings/ documents on behalf of owner for submission to these authorities for their approval.

**28. Care of the Building:**

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

- 29. Foundation of all equipment's as per recommendations of OEM, Anti vibration isolators etc as required shall be provided.
- 30. Tables and chairs etc. required for installing/placing any Hardware like computer/software including providing any facility for operation of such devices shall be provided by the contractor free of cost.
- 31. Minor building works necessary for installation of equipment's, foundation, trench for fuel line & cable, making of opening/ core cutting in walls or in floors and restoring them to their original condition/finish and necessary grouting etc. as required shall be done by the agency free of cost.
- 32. All support for exhaust & water pipes, chimney, bus trunking, cables, anti- vibration pads etc. as required shall be provided necessary.
- 33. All electrical work and neutral earthing, body earthing, control and instrument wiring, required for any E&M equipment shall be as per good engineering practice, CPWD specifications and NEC 2023.

34. Scaffoldings & any other T&P required for execution, testing and commissioning of work shall be arranged by the contractor and is included in the cost of work tendered by the contractor.
35. Being high-rise building, fire compartmentation (horizontal and vertical) is very important. Hence contractor shall provide fire barriers/sealants of suitable fire rating by using foam concrete/chemicals to close all horizontal and vertical openings in shafts/walls after providing service lines.
36. After handed over the building/ campus day to day consumable materials such as HSD oil, Lub. Oil of DG set, Raw materials of STP & WTP etc. shall be borne by RBI authority.
37. Drawings/ documents to be furnished on completion of installation: Five sets of as built laminated drawings as detailed below in respect of each package shall be submitted by the Contractor while handing over the installation to the department. Out of these sets one set each in respect of work of electric substation, firefighting systems, D G Set, lift, external lighting, CCTV, LAN, Intercom system, Solar system etc. shall be laminated on a hard base for display in the respective control room/equipment room/machine room. These drawings shall have comprises:
- (i) Installation drawings giving complete details of all the equipment's including their foundation.
  - (ii) Single line diagram and layout of all electrical control panels giving switchgear ratings and their disposition, cable feeder sizes and their layout.
  - (iii) Control wiring drawings with all control components and sequence of operation to explain the operation of the control circuit.
  - (iv) Plumbing layout drawings giving sizes and length of all the pipe sand the size sand locations of all types of valves and accessories in case of firefighting systems and water supply pumping systems.
  - (v) Completion plans indicating general layout of the building, location of main switch board and distribution boards, indicating the circuit numbers controlled by distribution boards, position of all points and their controls, types of fittings etc. in respect of internal and external electrical installation.
  - (vi) Manufacturer's technical catalogues of all equipment's and accessories.
  - (vii) Operation and maintenance manual of all major equipment's, detailing all adjustments, operation and maintenance procedure.

In addition, soft copy of all above drawings shall also be submitted by the contractor.

**The work has to be carried out as per GFC drawings in conjunction with additional conditions given herein on the basis of “Whichever is Richer(Stronger)”**

## The Similar Work Experience of E&M Services

1. The similar work experience for determining the eligibility of Associate agencies as prescribed at Bid Documents – “Information and Instructions for Bidders for e-bidding” is as given below:
2. For Each E&M Works, the composite contractor shall have to associate with other agency, who fulfils the following requirements. Joint ventures for associate agencies are not accepted. Should have satisfactorily completed the works as mentioned below during last 7 years ending previous day of last date of submission of bid:

S.No.	Components of Specialized Works	Approx. Cost & Eligibility Criteria	Definition of similar work
i	<p><b><u>PACKAGE-1</u></b>            Internal Electrical &amp; External Installation            ECPT= Rs 33,63,99,827.00</p>	CPWD Enlisted Contractor in composite category having valid electric license. Otherwise, the agency have to be associate an agency having valid electrical contractor license and full fill following criteria. 3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar work, each of value not less than @ 80% of ECPT of this Package	Supply, Installation, Testing & Commissioning of Internal Electrical Installation in the buildings.
ii	<p><b><u>PACKAGE-2</u></b>            Fire fighting , Sprinkler and Fire Extinguisher system            ECPT= Rs. 8,75,95,921.00</p>	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar work, each of value not less than @ 80% of ECPT of this Package	Providing, Installation, Testing & Commissioning of water based Firefighting system in the buildings.
iii	<p><b><u>PACKAGE-3</u></b>            Manual Fire Alarm System, PA system and signage ECPT= Rs. 1,04,13,457.00</p>	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar work, each of value not less than @ 80% of ECPT of this Package	Providing, Installation, Testing & Commissioning of Automatic fire alarm system and public address system.

iv	<b><u>PACKAGE-4</u></b> Lifts ECPT= Rs 6,65,67,362.00	Eligibility criteria for Original Equipment Manufacturer as per CPWD Lift Works OM dated 28.09.2020 enclosed in Lift subhead under part C (Revision-3)	Providing, Installation, Testing& Commissioning of Lifts.
v	<b><u>PACKAGE - 5</u></b> Sub-Station ECPT= Rs. 4,04,67,848.00	3 similar works, each of value not less than @ 40% of ECPT of this Package with 1600KVA of individual capacity of Sub-station.  OR 2 similar works, each of value not less than @ 60% of ECPT of this Package with 1600 KVA of individual capacity of Sub-station.  OR 1 similar work, each of value not less than @ 80% of ECPT of this Package with 1600 KVA of individual capacity of Sub-station.	Providing, Installation, Testing & Commissioning of Sub-Station Equipment's.
vi	<b><u>PACKAGE-6</u></b> Diesel Engine Driven Generating Set and UPS. ECPT= Rs. 73,81,743.00	3 similar works, each of value not less than @ 40% of ECPT of this Package with 400 KVA of the individual capacity of DG Set.  OR 2 similar works, each of value not less than @ 60% of ECPT of this Package with 400 KVA of individual capacity of DG Set.  OR 1 similar works, each of value not less than @ 80% of ECPT of this Package with 400 KVA of individual capacity of DG Set.	Supplying installation testing and commissioning of DG set/ UPS System
vii	<b><u>PACKAGE – 7</u></b> CCTV & SURVEILLANC E SYSTEM ECPT= Rs.80,27,238.00	3 similar works, each of value not less than @ 40% of ECPT of this Package  OR 2 similar works, each of value not less than @ 60% of ECPT of this Package  OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Providing, installation, Testing & Commissioning of CCTV System.

viii	<b>PACKAGE-8</b> Centralized Intercom System, Intercom ECPT= Rs.1,75,20,074.00	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Providing, Installation, Testing & Commissioning of Centralized Intercom System with EPBAX system
ix	<b>Package- 9</b> SOLAR PHOTO VOLTAIC POWER GENERATION ECPT= Rs.1,84,87,062.00	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Providing, Installation, Testing & Commissioning of Solar Photo Voltaic Power Generation system.
x	<b>PACKAGE – 10</b> DOMESTIC AND FLUSHING WATER PUMP SETS ECPT= Rs.32,59,370.00	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Supplying installation testing and Commissioning of water supply pump system
xi	<b>PACKAGE-11</b> Sewage Treatment Plant ECPT= Rs.1,43,32,363.00	3 similar works, each of value not less than @ 40% of ECPT of this Package with 80% of individual capacity of STP (rounded off next available higher capacity) OR 2 similar works, each of value not less than @ 60% of ECPT of this Package with 80% of individual capacity of STP (rounded off next available higher capacity) OR 1 similar works, each of value not less than @ 80% of ECPT of this Package with 80% of individual capacity of STP (rounded off next available higher capacity)	Providing, Installation, Testing & Commissioning of Sewage Treatment Plant (MBR Type)
xii	<b>PACKAGE – 12</b> Boom Barrier ECPT= Rs.3,92,872.00	3 similar works, each of value not less than @ 40% of ECPT of this Package OR 2 similar works, each of value not less than @ 60% of ECPT of this Package	Supplying, Installation, Testing and

		OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Commissioning Boom Barrier
xiii	<b><u>PACKAGE – 13</u></b>  HVAC System ECPT= Rs.1,57,77,065.00	3 similar works, each of value not less than @ 40% of ECPT of this Package  OR 2 similar works, each of value not less than @ 60% of ECPT of this Package  OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Supplying, Installation, Testing and Commissioning of VRF/ pressurization System
xiv	<b><u>PACKAGE – 14</u></b>  Water Treatment Plant ECPT= Rs.31,51,176.00	3 similar works, each of value not less than @ 40% of ECPT of this Package  OR 2 similar works, each of value not less than @ 60% of ECPT of this Package  OR 1 similar works, each of value not less than @ 80% of ECPT of this Package	Providing, Installation, Testing & Commissioning of Water Treatment Plant
xv	<b><u>PACKAGE – 15</u></b>	Comprehensive Annual Maintenance of Comprehensive Annual Maintenance Contract (CAMC) for Fire Alarm System, Lifts, Centralized intercom System including EPBAX and Video door phone, Solar Power system and heating system , Air Condition system, IPCCTV system and UPS system, STP etc.	OEM/SYSTEM INTEGRATOR WHO HAVE EXECUTED WORKS

3. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to previous day of last date of submission of bid. The composite category contractor is also eligible to carry out himself/herself any or all of these works without associating any specialized agency provided: -

a) The firm fulfils the prescribed eligibility criteria respectively for these work(s).

**Or**

b) The firm directly procures the equipment of approved make from manufacturer and get it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in NIT.

The composite contractor and the associated agencies shall give required affidavit to confirm their association. Tender accepting authority may approve change of associate in case it is required during the currency of the contract.

**Note:** The main contractor/agency has to submit details of such agency to be associated/manufacturer or their authorized service provider to the Engineer-in-charge within prescribed time. The associated agency shall be approved by Engineer-in-charge. In case the main contractor intends to change associated agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge. The new agency/agencies shall

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

4. Approval of the specialized agencies for each specialized work shall be obtained from the Engineer-in-Charge within prescribed time. Even if, such specialized items of work shall be executed by the specialized agencies at later date the work shall be deemed to be executed by the tenderer for all purposes and the responsibility of the quality of items of works executed etc. shall continue to be that of the tenderer only.
5. The associate agency shall submit the willingness to get associated with the main contractor for execution of the E&M 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 associate eligible electrical contractor/ manufacturer or their authorized service provider. (Format of willingness and MOU is given below)
6. 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 duly attested by Main contractor shall be submitted to the Engineer-in-Charge for deciding the eligibility. Such associate electrical contractor will certify that they are not debarred as on the day of application for sale of tender.
7. In the 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 fulfils 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 shall meet all the guarantee for the equipment 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 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 Engineer-in-Charge.
8. The main contractor shall be responsible and liable for proper and complete execution of the E&M works and ensure coordination and completion of both civil and electrical work.
9. The associate agency shall attend the inspection of the work by the Engineer-in-Charge as and when required.
10. The agencies executing the electrical work should have valid license for LT/HT as applicable.

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## Quality Assurance Plan & Checklist for E&M Services

Main contractor/ Associate Agency shall submit the required quantity of material as sample for testing from Govt./ Approved Private Laboratory.

The decision on testing shall be as per E&M quality checklist of CPWD vide OM no. 51(4)/CE(E) /CSQ/2016/293(H) dated 31/03/2016 as applicable or as per direction of E-in-C and shall be binding on contractor.

Contractor shall submit the required size and quantity of samples for the testing.

Department shall send the samples to the testing laboratory & the test results shall directly come to department however, the cost of all testing shall be borne by the Contractor.

### Annexure- A

A- Internal EI							Location of Test	
Stage / SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty ( each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size		
1	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	100%	Y	N
			Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
2	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	>10	Y	Y	2	Y	N
			Length upto 500 mtr	Y	Y	10% length and fittings	N	N
			Length > 500 mtr	Y	Y	10% length and fittings	Y	N
3	Rising Main and Bus Trunking	CPWD specs part IV/QA Plan	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece of 1 mtr for every 1000 mtr	N	Y
4	Rigid MS Conduit	IS 9537 Pt I &2						

Stage / Sl no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty ( each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required		Manufacturer's test certificates required	Location of Test	
				Whether	Whether		At manufacturer works	At third Party Lab.
5	Rigid PVC Conduit	IS 3419 :1989	up to 2500 mtr	Y	N		N	N
			>2500 mtr	Y	Y	1 piece of 1 mtr for every 1000 mtr	N	Y
6	Cable Tray	CPWD Spec. Part I/II: Check for perforation area, paint/Galvanising thickness and Material Composition	Length upto 500 mtr	Y	Y		N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
7	DWC/ Corrugated HDPE Pipe	IS 14930 , Check for thickness, material, Mechanical Strength and smoothness	Length upto 500 mtr	Y	N		N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
8	Wire	IS 694:1990	up to 10000 mtr	Y	N		N	N
			>10000 mtr	Y	Y	1 piece for every 10000 mtr or less	N	Y

Y Stands Yes

N Stands No

**B- Street /Compound Lighting**

<b>Stage / Sl no</b>	<b>Material / Process</b>	<b>Standard Applicable/ Test Required to be Done</b>	<b>Total Qty ( each type) reqd. in agreement or lot size whichever is less</b>	<b>Whether Proof of Dispatch required</b>	<b>Whether Manufacturer's test certificates required</b>	<b>Sample Size</b>		<b>Location of Test</b>	
						<b>At manufacture works</b>	<b>At third Party Lab.</b>	<b>At manufacture works</b>	<b>At third Party Lab.</b>
1	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	100%	Y	N	
2	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N	
			>2 and < 10	Y	Y	1	Y	N	
			>10	Y	Y	2	Y	N	
3	Poles	Whether in conformity with tender specs	up to 100	Y	Y	N	N	N	N
			>100	Y	Y	2%	Y	N	
4	LT Cable	IS 1554 Part I	up to 2500 mtr	Y	N	N	N	N	N
			>2500 mtr	Y	Y	1 piece for every 2500 mtr	N	Y	
5	DWC/ Corrugated HDPE Pipe	IS 14930 , Check for thickness, material, Mechanical Strength and smoothness	Length upto 500 mtr	Y	N	N	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y	
6	Fittings	Whether in conformity with tender specs	>100	Y	Y	NA	N	N	

### C- Sub Station, DG Set, UPS

Stage / SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty ( each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufac- turing works	At third Party Lab
1	HT Panel	CPWD specs part IV/QA Plan: CT ratio and accuracy Class should be invariably checked	Any	Y	Y	1	Y	N
2	HT Panel: metering and protection devices	Check CT ratio and accuracy Class , Relays and Meters	Any	Y	Y	1	Y	N
3	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	1	Y	N
4	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			>10	Y	Y	2	Y	N
5	Capacitor Panel	CPWD specs part IV/QA Plan: Check for type of capacitors used, operation of relay, settings. Change the load and its type and check functionality	Any	Y	Y	1	Y	N
6	Rising Main and Bus Trunking	CPWD specs part IV/QA Plan.	Length upto 500 mtr	Y	Y	10% length and fittings	N	N
			Length > 500 mtr	Y	Y	10% length and fittings	Y	N

Stage / SI no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty ( each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test
7	Cable Tray	CPWD Specs. Part I/II: Check for perforation area, paint/Galvanising thickness and Material Composition	Length upto 500 mtr	Y	Y	N	N N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N Y
8	DWC/ Corrugated HDPE Pipe	IS 14930 , Check for thickness, material, Mechanical Strength and smoothness	Length upto 500 mtr	Y	N	N	N N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N Y
9	Transformer	CPWD Specs. Part IV/QA Plan:	Any	Y	Y	100%	Y N
		Physical verification of accessories as per agreement and Routine tests as per IS:2026/IS 11171:1985(whichever applicable), with particular attention to losses meeting ECBC norms / as per agreement, Type test certificate for exact same design for impulse withstand and short circuit withstand shall be made available by Manufacturer, Temperature rise test of one transformer of each design shall be done. Copies of the certificate for pressure test,test for bushings shall be supplied to the department.					

Stage / Sl no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty ( each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size		Location of Test	
						At manufac- turing works	At third Party Lab	At Lab	At third Party
10	DG set	Load testing as per CPWD specs	Any	Y	Y	100%	Y	N	
11	UPS	Load testing and operation logic as per CPWD specs , Check for input and output power quality as per agreement	Any	Y	Y	100%	Y	N	
12	HT Cable	IS 1554 Part II	Up to 500 mtr.	Y	Y	1	N	N	
			>500 mtr	Y	Y	1 Piece for every 500 mtr	N	Y	
13	LT Cable	IS 1554 Part I	up to 2500 mtr	Y	N	N	N	N	
			>2500 mtr	Y	Y	1 piece for every 2500 mtr	N	Y	

Y\* Tested for its capacity at AHRI Certified test bed (either at manufacturer's work or at Third Party)

## QUALITY ASSURANCE PLANS

### Internal Electrical Installations:

- i) The detailed instructions on safety procedures given in BIS code no. 5216:1982 “Code of safety Procedures and Practices in Electrical works” shall be strictly followed.
- ii) Safety procedures given in Chapter 10 of CPWD General Specifications for Electrical works Part-1(Internal) shall be followed.
- iii) Safety recommendation as per IE rules 1956 as per Appendix “C”.
- iv) The materials shall be tested from 3rd Party laboratories are conduit, wires, cables etc.
- v) Providing and fixing of conduit work as per CPWD Specifications
- vi) No. of wires in one conduit shall be ensure as per CPWD Specifications.
- vii) Colour coding of the wires are to be ensured.

- viii) Lugs and thimbles at cable/ wire ends in switch boxes as per CPWD Specifications.
- ix) Labeling of switch boxes shall be ensured.
- x) Termination of earth terminals in earth pits, switch box, DBs and accessories to be ensured. Earth chamber to be constructed and proper marking to be done.
- xi) A comprehensive schematic diagram is prepared starting from the main board up to the final DBs. All such boards are duly marked and numbered.
- xii) The pre-commissioning testing of the installation shall be carried out such as Insulation resistance test.  
Polarity test of switch.  
Earth continuity test.  
Earth electrode resistance test.
- xiii) All the tests at site shall be carried out for the completed installations, in the presence of and to the satisfaction of the Engineer in Charge by the contractor. All the test results shall be recorded and copy of the same shall also be submitted to the Department.
- xiv) On completion of an electrical installation (or an extension to an installation), a certificate shall be furnished by the electrical contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix "E" of CPWD General Specifications for Electrical Works Part-1(Internal) in addition to the test certificate required by the local electric supply authorities.
- xv) Contractor shall keep constant liaison with the local municipal authority, Fire service Department of Assam, Central Electricity authority, National Green Tribunal, Assam Power Distribution Company Limited (APDCL), Pollution Control Board, Assam and all other statutory authorities etc, whose approvals and permissions are required before, during course of execution and after execution of the work. Contractor shall make all expenses related to these approvals and shall be responsible for time bound approvals. No extension of time shall be given if the approvals are delayed on the side of the contractor. Any payment made by contractor to statutory authorities shall be reimbursed on production of the vouchers.

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**MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN Main CONTRACTOR  
AND ASSOCIATE CONTRACTOR  
(Separate for each specialize work)**

1] M/S [Name of the firm with full address]

Enlistment Status (if applicable)

Valid upto:

[Henceforth called the main contractor]

And

2] M/S [Name of the firm with full address]

Enlistment Status (if applicable)

Valid upto:

[Henceforth, called Associate eligible electrical contractor/ manufacturer or their authorized service provider]

Name of Work:-Specify the E&M Services.

We state that M.O.U. between us will be treated as an agreement and has legality as per Indian Contract Act (amended up to date) and the department (CPWD) can enforce all the terms and conditions of the agreement for execution of the above work. Both of us shall be responsible for the execution of work as per the agreement to the extent of this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits.

We have agreed as under:

- (i) The associate eligible electrical contractor/ manufacturer or their authorized service provider shall be liable for disciplinary action if he failed to discharge the action(s) and other legal action as per agreement besides forfeiture of the security deposit.
- (ii) All the material, machinery and equipment's, tools and tackles required for execution of the electrical works as per agreement shall be the responsibility of the associate eligible electrical contractor/ manufacturer or their authorized service provider.
- (iii) The site staff required for the electrical work shall be arranged by the associated contractor as per terms and conditions of the agreement.
- (iv) The associate eligible electrical contractor/ manufacturer or their authorized service provider shall sign the supplementary agreement with RBI for the useful life defined in CAMC package.
- (v) All the material, machinery and equipment's, tools and tackles required for CAMC of the electrical works as per agreement shall be the responsibility of the manufacturer or OEM or their authorized service provider.
- (vi) The site staff required for the CAMC work shall be arranged by the associated contractor as per terms and conditions of the agreement.

Signature of main contractor

Signature of associate  
eligible electrical contractor/  
manufacturer or their authorized service provider

Date: date:

Place: Place:

Countersigned by Executive Engineer

**WILLINGNESS CERTIFICATE**  
**(Separate for each specialize work)**

**Name of Work:** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis].

I hereby give my willingness to work as associate eligible electrical contractor/ manufacturer or their authorized service provider 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. I shall also sign the supplementary agreement for CAMC with RBI for providing the CAMC services for the prescribed period.

Date:

Signature  
of associate eligible electrical  
contractor/ manufacturer or  
their authorized service provider

## **PACKAGE C-1**

### **INTERNAL & EXTERNAL ELECTRICAL INSTALLATION**

#### 1.1    **Scope of work:-**

- 1.1.1 It includes planning and electrification of entire internal Electrical as well as external Electrical installation as per enclosed marked drawings attached with bid documents including all materials, manpower, testing, inspections, obtain approval from competent authority central, state ,local bodies and commissioning in all respects for successful operation/ utilization in true sense and handed over to end user in complete shape and to be maintained up to defect liability period as mentioned in the bid documents. However, bidder has to be check the drawings and design and got corrected if any and take approval of drawings and materials from Engineer-in-charge of E&M components before execution of work.
- 1.1.2 The wiring of all the buildings proposed in this works i/c lift shaft, machine room wirings and entire external electrifications i/c power distribution to each blocks/ buildings/ utilities complete as required as manner mentioned in respective specification of package and as per Drawing enclosed along with Bid document.
- 1.1.3 All wiring shall be carried in recessed Heavy duty PVC conduit (ISI marked) having **Cross- Linked Halogen Free Flame Retardant (HFFR) Copper conductor (class-2) wires / cables (ISI marked) wires / cables (ISI marked)** of suitable size i/c earthing wire. The wiring shall be carried out loop-in system. The switch-socket, and other accessories shall be modular type and to be installed on G.I. modular boxes of required modules.
- 1.1.4 TV wiring (RG-6) Cable, Cat-6/ 6A Cable /telephone cable shall also be Cross- Linked Halogen Free Flame Retardant Copper conductor (class-2) as required for EPABX / Data networking cable shall be drawn in suitable size heavy duty PVC conduit. Wherever required, hot Dip Galvanized GI Cable trays (perforated) cable tray / DLP truncking may also to be used.
- 1.1.5 All internal as well as external light shall be LED type, based on required lux level and design and specification mentioned in the respective package. Ceiling fans, exhaust fans etc. should be of highest star rating, wherever available. However, Ceiling fans should be regulator type BLDC, 5 star rating and ISI marked.
- 1.1.6 Normal power from metering panel to each Quarter, shall be brought by suitable size copper conductor submain wiring to respective Double Door TPN MCB distribution boards of required size.
- 1.1.7 Service connection to each buildings/ block shall be provided by using suitable size aluminium conductor Cross- Linked Halogen Free Flame Retardant armoured cable of 1.1 kV grade and terminated in cubical type panel board as per requirement. Power supply to each panel provided at each block shall be fed directly from substation main LT panel / Feeder Pillar.
- 1.1.8 In each residential building/blocks, power to each quarter shall be distributed through suitable size **Cross- Linked Halogen Free Flame Retardant (HFFR) Copper conductor (class-2) wires / cables (ISI marked)** through Meter panel.

- 1.1.9 In each block, there shall be one cubical type metering panel board, for normal power supply having required size/capacity switchgears, and space for installed pre-paid energy meter according to numbers of quarters in each block/tower, **the energy meter for normal power shall provide by APDCL.**
- 1.1.10 In each block, there shall be another cubical type panel board having required size/capacity switchgears, for essential power supply to common area lighting such as corridor, lift lobby, stair case, lifts etc. and DB for UPS power supply. Common area lighting and lifts power consumption shall be metered separately.
- 1.1.11 The bidder shall submit the design of street light to achieve the lux level and uniformity as per standards. Street Lighting shall be done by using minimum 60 W LED fittings on 6 Mtrs. long GI Octagonal pole, power shall be fed from nearest essential feeder pillar by using suitable size armoured cable of 1.1 kV grade having Cross- Linked Halogen Free Flame Retardant aluminium conductor. 20% of street light shall be of hybrid type solar street light.
- 1.1.12 Garden/landscape lighting shall be provided by using LED bollard light / compound light on marked location on LOP. All out-door pole shall be of Hot deep galvanizing.
- 1.1.13 Stage lighting shall be done by using LED fitting i/c cable, cable tray, cat walk, controlling system as per requirements. No special lighting arrangement has not considered for stage lighting.
- 1.1.14 Façade lighting shall be provided on both Club House. Design should be done through professional light designer. The façade lighting shall be done to highlight the architectural features of building and illuminate the façade. The expert designer shall prepare simulation or any other method to prepare the design for approval of the competent authority. In all cases, lux level shall be maintained.
- 1.1.15 10% of the cost of LED fittings as per purchase bill / GST invoice will be kept with the department as guarantee money and will be released after guarantee period of 05 years is over including defect liability period.
- 1.1.16 Lightening protection device/ system shall be provided on required location as per design and shall be grounded by suitable size and type earth electrode.
- 1.1.17 All electrical installation (internal as well as outdoor, equipment's) shall be earthed by suitable size earthing electrode.
- 1.1.18 All external power distribution shall be done by using suitable size Cross- Linked Halogen Free Flame Retardant aluminium conductor cable of 1.1 kV grade from LT panel or feeder pillar. The cable shall be drawn through underground DWC HDPE pipe and should be provisions of cable chamber in suitable location as per design and drawing.
- 1.1.19 All common area lighting in stilt and other areas shall have Astronomical timer and day light / occupancy sensor as deemed fit for saving of energy.
- 1.1.20 The scope also included guaranty/warranty of entire installation and equipment's/ accessories supply by them as per OEM. It is also included provision of submission all test reports of materials, packing materials of all green products used in the projects.

- 1.1.21 For installation of A.C. unit (split) in each quarter, insulated copper pipe of suitable diameter and UPVC pipe of suitable diameter for drain of water shall be laid in recessed at appropriate location.

## 1.2 Internal electrical installation: -

The work shall be carried out as per CPWD General Specifications of Electrical Works Part- I (Internal) 2023, Part-II (External) 2023, Part-IV (Sub-station) 2013 as amended upto date, relevant IE rules.

- 1.2.1. Amenities (Electrical) and Light point /Fan point, Fittings etc. shall be as per inventory and marked drawings.

CLASS - III , FLAT-2BHK														
	Description		1200MM CEILING	900MM CEILING	EXHAUST FAN	20W WALL TUBE LIGHT	18W LED CEILING LIGHT	15W LED CEILING LIGHT	40W LED	10W WALL	15W SURFACE LIGHT (BALCONY)	10W WARDROBE LIGHT	10W BULK HEAD LED LIGHT IN LIFT	70W LED
1	MASTER BEDROOM + BALCONY	1			1					1				2
2	TOILET-1			1		1		1						1
3	BEDROOM-I + BALCONY	1			1				1	1	1	1		2
4	COMMON TOILET			1		1		1						1
5	DINNING + BALCONY	2							2	2				1
6	LIVING + BALCONY	1			1				1	2				2
7	KITCHEN + UTILITY BALCONY		1	1		2				2			1	1
Total Qty. for One Unit		5	1	3	3	4	0	2	5	8	2	0	0	10
Load in Watt		70	70	70	20	18	15	10	10	15	10	10	70	100
Total Load in KW . for One No. Unit		0.35	0.07	0.21	0.06	0.072	0	0.02	0.05	0.12	0.02	0	0	0.33
Total Load in KW . for 80 Nos. Unit														0.03

CLASS III (S+10) COMMON AREA																	
S.No.	Description	1200MM CEILING FAN	BULK HEAD	2X6A POINT (200W)	6A POINT (100W)	16A POINT (500W)	15W LED CEILING LIGHT (STAIRCASE)	18W LED CEILING	28W LED BATTEN/TUBE	38W LED BATTEN/TUBE LIGHT FIXTURE	TOTAL LIGHT & POWER LOAD	TELEPHONE OUTLET	DATA OUTLET	TV OUTLET	USB POINT	CCTV DOME CAMERA	BUZZER
1	STAIR CASE-1						2										
1	STAIR CASE-2							2									
2	CORRIDOR/LOBB Y					16											
3	LIFT -1	1			1												
4	LIFT -2	1			1												
Total for One Floor		0	2	0	0	2	20	0	0	0	0	0	0	0	0	0	
TOTAL @ 9 FLOOR		0	18	0	0	18	180	0	0	0	0	0	0	0	0	0	
1	STILT FLOOR	1	4	1	1	6	20	4	84			1	1			8	
2	PODIUM		6			6	20		92	48						6	
3	TERRACE		70			4	16										
4	MUMMITY PLAN						22										
Total Qty.		1	80	1	1	16	78	4	176	48	0	1	1	0	0	14	
Load in Watt		70	10	200	100	250	15	18	28	38							
COMMON AREA LOAD OF (S+P+T FLOOR)		0.07	0.80	0.20	0.10	2.00	1.17	0.07	4.93	1.82	11.16						
TOTAL QTY. OF CLASS III(2 TOWERS)		1	116	1	1	52	438	4	176	48		1	1	0	0	14	
TOTAL COMMON AREA LOAD OF CLASS III(2										21.4						0	

TOWERS)												
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CLASS - III , FLAT-2BHK												
1												6A SOCKET (FOR TV)
												6/16A SWITCH SOCKET OUTLET
1												16A SWITCH SOCKET OUTLET
												16A SWITCH SOCKET OUTLET (FOR FRIDGE)
1												16A SOCKET OUTLET WITH 20A SP MCB (FOR EXCEDED)
												16A SWITCH SOCKET OUTLET (FOR MICROWAVE)
2	0	8	0	3	1	1	1	1	1	1	1	16A SWITCH SOCKET OUTLET (FOR HOT PLATE)
100	250	250	250	250	250	250	250	250	250	250	1	16A SWITCH SOCKET OUTLET (FOR WASHING MACHINE)
0.07	0	1	0	0	0.125	0.125	0.125	0.125	0.125	0.125	1	20A SOCKET FOR AC WITH 20A SP MCB
												TOTAL LIGHT & POWER LOAD
												DATA OUTLE T
												TELEPHO NF OUTLET
												TV OUTLET
												USB POINT
												BELL PUSH POINT
												BUZZER
												CALL BELL
												VIDEO DOOR PHONE
												ONT BOX WITH 6A SWITCH SOCKET
												DISTRIB UTION BOX

CLASS III (S+10) COMMON AREA												
0	0	0	0	0	0	0	0	0	0	0	0	VIDEO DOOR PHONE
0	0	0	0	0	0	0	0	0	0	0	0	BELOW SMOKE DETECTOR
												ABOVE SMOKE DETECTOR
												HEAT DETECTOR
0	2	0	0	4	4	4	1					HOOFTER
												TELEPHONE JACK
												MANUAL CALL POINT
												CEILING SPEAKER
												EXHAUST FAN
												20W WALL TUBE LIGHT
												18W LED CEILING LIGHT
												15W LED CEILING LIGHT (STAIRCASE)
												10W LED MIRROR LIGHT
												10W WALL BRACKET LIGHT
												15W SURFACE LIGHT (BALCONY)
												10W WARDROBE LIGHT
												10W BULK HEAD LED LIGHTIN LIFT
												70W LED CEILING LIGHT
												6A SWITCH SOCKET
												6A SWITCH SOCKET
												6A SWITCH SOCKET
												6A SWITCH SOCKET

CLASS - IV , FLAT-2BHK												
1	D	e	s	r	p	i	o					
1	MASTER BEDROOM + BALCONY											
2	TOILET-1					1		1				
3	BEDROOM-1 + BALCONY	1				1			1			
4	COMMON TOILET					1		1				
5	DINNIG + BALCONY	2							2			
6	LIVING + BALCONY	1				1			1			
7	KITCHEN + UTILITY BALCONY		1	1		2			2			
	Total Qty. for One Unit	5	1	3	3	4	0	2	5	8	2	0
												0 10
												1 1 1 1
CLASS IV (S+10) COMMON AREA												

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

S.No.	Description	1200MM CEILING FAN	BULK HEAD	2X6A POINT (200W)	6A POINT (100W)	16A POINT (500W)	15W LED CEILING LIGHT (STAIRCASE)	18W LED CEILING LIGHT	28W LED BATTEN/ TUBE LIGHT FIXTURE	38WLED BATTEN/ TUBE LIGHT FIXTURE	TOTAL LIGHT & POWER LOAD	TELEPHONE OUTLET	DATA OUTLET	TV OUTLET	USB POINT	CCTV DOME CAMERA	BUZZER
1	STAIR CASE-1					2											
1	STAIR CASE-2					2											
2	CORRIDOR/LOBBY					16											
3	LIFT -1	1			1												
4	LIFT -2	1			1												
<b>Total for One Floor</b>		<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL @ 9 FLOOR</b>		<b>0</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>180</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
1	STILT FLOOR	38				9	20		82								7
2	PODIUM	36				4	20		75	49							5
3	TERRACE	70				4	16										
4	MUMMY PLAN						22										
<b>Total Qty.</b>		<b>0</b>	<b>144</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>78</b>	<b>0</b>	<b>157</b>	<b>49</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>0</b>
<b>Load in Watt</b>		<b>70</b>	<b>10</b>	<b>200</b>	<b>100</b>	<b>250</b>	<b>15</b>	<b>18</b>	<b>28</b>	<b>38</b>							
<b>TOTAL QTY. OF CLASS IV(2 TOWERS)</b>		<b>0</b>	<b>180</b>	<b>0</b>	<b>0</b>	<b>53</b>	<b>438</b>	<b>0</b>	<b>157</b>	<b>49</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>0</b>

GRADE A ,FLAT-2BHK										
	S.No.	Description								
1	MASTER BEDROOM + BALCONY	1		1						4
2	TOILET-1 + DRESS		2							2
3	BEDROOM-1 + BALCONY	1		1						1
4	COMMON TOILET		1		1					1
5	DINNIG + BALCONY	2								
6	LIVING + BALCONY	1		1						
7	KITCHEN + UTILITY BALCONY		1	1		2				1
Total Qty. for One Unit		5	1	4	3	5	0	2	5	12
								1	0	0
									14	1
										1
										1

GRADE A (S+6) COMMON AREA										
	S.No.	Description								
1	PODIUM /FIRST FLOOR		2		2	20				4
2	STAIR CASE-1					2				
3	STAIR CASE-2					2				
4	CORRIDOR/LOBBY					14				
5	LIFT -1		1		1					
6	LIFT -2		1		1					
Total for One Floor		0	2	0	0	2	18	0	0	0
TOTAL @ 6 FLOOR+PODIUM		0	12	0	0	12	108	0	0	0
Total Qty.		0	14	0	0	14	128	0	0	0
1	STILT FLOOR		19			11	20	160		7
2	TERRACE		33			2	6			
3	MUMMTY PLAN					12				
Total Qty.		0	52	0	0	2	29	20	160	0
										7
										0
TOTAL QTY. OF GRADE A(2 TOWERS)		0	80	0	0	30	285	20	160	0
										0
										7
										0

GRADE A ,FLAT-2BHK										
	S.No.	Description								
1	6A SOCKET (FOR TV)									
1	6/16A SWITCH SOCKET OUTLET	3								
	16A SWITCH SOCKET OUTLET		1							
	16A SWITCH SOCKET OUTLET (FOR FRIDGE)									
	16A SOCKET OUTLET WITH 20A SP MCB (FOR GEYSER)									
	16A SWITCH SOCKET OUTLET (FOR MICROWAVE)									
	16A SWITCH SOCKET OUTLET (FOR MIX)									
	16A SWITCH SOCKET OUTLET (FOR TOASTER)									
	16A SWITCH SOCKET OUTLET (FOR HOT PLATE)									
	16A SWITCH SOCKET OUTLET (FOR WASHING MACHINE)									
	20A SOCKET FOR AC WITH 20A SP MCB									
	TOTAL LIGHT & POWER LOAD									
	TELEPHONE OUTLET									
	DATA OUTLET T									
	TV OUTLET									
	USB POINT									
	BELL PUSH POINT									
	BUZZER									
	CALL BELL									
	VIDEO DOOR PHONE									
	ON BOX WITH 6A SWITCH SOCKET									
	DISTRIB UTION BOX									



Load in Watt		70	10	200	100	250	15	18	28	38				
<b>TYPICAL COMMON AREA LOAD OF GRADE D(1 TOWER)</b>		0.84	0	0	0	1.5	1.08	0	0	0	3.42			
1 STILT FLOOR			2		1		5	2	75					2
2 TERRACE			25			2	6							
3 MUMMTY PLAN						6								
<b>Total Qty.</b>		0	27	0	1	2	17	2	75	0	0	0	0	2
<b>Load in Watt</b>		70	10	200	100	250	15	18	28	38				
<b>COMMON AREA LOAD OF (S+F+T FLOOR)</b>		0.00	0.27	0.00	0.10	0.25	0.26	0.04	2.10	0.00	3.01			
<b>TOTAL QTY. OF GRADE D</b>		12	27	0	1	14	89	2	75	0	6.43	0	0	0

GRADE D ,FLAT-3BHK + STUDY															
6A SOCKET (FOR TV)		6/16A SWITCH SOCKET OUTLET		16A SWITCH SOCKET OUTLET		16A SWITCH SOCKET OUTLET (FOR Geyser)		16A SWITCH SOCKET OUTLET (FOR MICROWAVE)		16A SWITCH SOCKET OUTLET (FOR M/N)		16A SWITCH SOCKET OUTLET (FOR TOAST)		16A SWITCH SOCKET OUTLET (FOR HOT PLATE)	
1		2													
			1												
1		3		1											
			3												
				1											
					1										
1		2													
1		1													
		2		1	1	1	1	1	1	1	1	1	1	1	
4	0	14	0	5	1	1	1	1	1	6	5	1	4	0	
100	250	250	250		250	250	250	250	250	1500			1	1	
0.13	0	1.75	0	0	0.125	0.125	0.125	0.125	0.125	9	14.26			0	
										199.57					

GRADE B & C, FLAT-2BHK + STUDY								
S.No.	Description	1200MM CEILING FAN	900MM CEILING FAN	EXHAUST FAN	20W WALL TUBE LIGHT	18W LED CEILING LIGHT	15W LED CEILING LIGHT (STAIRCASE)	10W LED MIRROR LIGHT
1	MASTER BEDROOM + BALCONY	1		1				1
2	TOILET + DRESS			1	2	1		1
								2
								5
								2
								6A SOCKET OUTLET (FOR CHIMNEY)
								6A SWITCH SOCKET OUTLET (FOR RO)
								6A SWITCH SOCKET OUTLET (FOR HOB)

GRADE B & C (S+10) COMMON AREA																
S.No.	Description	1200MM CEILING FAN	BULK HEAD	2N6A POINT (200W)	6A POINT (100W)	16A POINT (500W)	15W LED CEILING LIGHT (STAIRCASE)	18W LED CEILING LIGHT	28W LED BATTE/TUBE LIGHT FIXTURE	38W LED BATTEN/ TOTAL LIGHT & POWER LOAD	TELEPHONE OUTLET	DATA OUTLET	TV OUTLET	USB POINT	CCTV DOME CAMERA	BUZZER
1	STAIR CASE-1															
2	STAIR CASE-2						2									
3	CORRIDOR/LOBBY					7										
4	LIFT -1	1		1												
5	LIFT -2	1		1												
<b>Total for One Floor</b>		<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>TOTAL @ 10 FLOOR+PODIUM</b>		<b>0</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>110</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
1	STILT FLOOR		4				12	10	155						6	
2	TERRACE		30			2	4	4								
3	MUMMY PLAN						5									
<b>Total Qty.</b>		<b>0</b>	<b>34</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>21</b>	<b>14</b>	<b>155</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>
<b>TOTAL QTY. OF CLASS III(2 TOWERS)</b>		<b>0</b>	<b>74</b>	<b>0</b>	<b>0</b>	<b>42</b>	<b>241</b>	<b>14</b>	<b>155</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>
<b>TOTAL COMMON AREA LOAD OF CLASS III(2 TOWERS)</b>										14.2						

GRADE B & C (S+10) COMMON AREA																																									
6A SOCKET (FOR TV)		6/16A SWITCH SOCKET OUTLET		16A SWITCH SOCKET OUTLET (FOR FRIDGE)		16A SOCKET OUTLET WITH 20A SP MCB (FOR GEYSER)		16A SWITCH SOCKET OUTLET (FOR MICROWAVE)		16A SWITCH SOCKET OUTLET (FOR RMX)		16A SWITCH SOCKET OUTLET (FOR TOAST)		16A SWITCH SOCKET OUTLET (FOR HO PLATE)		16A SWITCH SOCKET OUTLET (FOR WASHING MACHINE)		20A SOCKET FOR AC WITH 20A SP MCB		TOTAL LIGHT & POWER LOAD		TELEPHO NF OUTLET		DATA OUTLET		TV OUTLET		USB POINT		BELL PUSH POINT		BUZZER		CALL BELL		VIDEO DOOR PHONE		ONTBOX WITH 6A SWITCH SOCKET		DISTRIB UTION BOX	
1		2																																							
1		2																																							
1		2																																							
		2																																							
1		2																																							
		2																																							
<b>3</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>										
<b>100</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>0</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>1500</b>																										
<b>0.10</b>	<b>0</b>	<b>1.25</b>	<b>0</b>	<b>0</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>0.125</b>	<b>6</b>	<b>10.23</b>																									
				</																																					

GRADE B & C (S-10) COMMON AREA									
VIDEO DOOR PHONE	0	0	BELLOW SMOKE DETECTOR	ABOVE SMOKE DETECTOR	0	0	HEAT DETECTOR	0	0
0	0	0	0	0	0	0	0	0	0
1				2	2	2			
0	1	0	0	2	2	2	0		
0	1	0	0	2	2	2	0		

CARETAKER-1													
	S.No.	Description											
1	CARETAKER -1		5	4	0	18	20	9	2	2	5	2	0
	Total Qty.		5	4	0	18	20	9	2	2	5	2	0
CARETAKER-2													
	S.No.	Description											
1	CARETAKER -2		6	3	14		18	7	9	2	2	5	0
	Total Qty.		6	3	14	0	18	7	9	2	2	5	0

CLUBHOUSE 1													
	S.No.	Description											
1	GROUND FLOOR	1200MM CEILING FAN	7	3	1	7	2	98	2	6	12	1	32
2	FIRST FLOOR	900MM CEILING FAN			1			47	2	4	22	14	
	Total Qty.		19	3	1	8	2	145	4	6	16	15	32
	Load in Watt		70	70	70	70	20	18	15	16	10	11	100
	Total Load in KW		1.33	0.21	0.07	0.56	0.04	2.61	0.06	0.096	0.16	0.242	0.15
CLUBHOUSE 2													
	S.No.	Description											
1	GROUND FLOOR	1200MM CEILING FAN	7	3	2	10	2	57	2	6	7	1	30
2	FIRST FLOOR	900MM CEILING FAN			2			43	2		4	22	1
	Total Qty.		16	3	2	12	2	100	4	6	11	22	2
	Load in Watt		70	70	70	70	20	18	15	16	10	11	100
	Total Load in KW		1.12	0.21	0.14	0.84	0.04	1.8	0.06	0.096	0.11	0.242	0.02
	Total Qty.(FOR CLUBHOUSE 1 & 2)		35	6	3	20	4	245	8	12	27	44	17
	Total Load in KW(FOR CLUBHOUSE 1 & 2)		2.45	0.42	0.21	1.4	0.08	4.41	0.12	0.192	0.27	0.484	0.17

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil  $\Delta E(C)$   $\Delta E(E)$   $E(E)$

CLUBHOUSE 1															
		TOTAL LIGHT & POWER LOAD		TELEPHONE OUTLET		DATA OUTLET		TV OUTLET		CCTV		HEAT DETECTOR		ABOVE DETECTOR	
		3	9		6	1	1		12	1		1	14	5	
				1		7		18	1		1	1	14		
<b>0</b>	<b>3</b>	<b>9</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>8</b>	<b>30</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>28</b>	<b>5</b>	<b>0</b>		
<b>35.378</b>															
CLUBHOUSE 2															
		3	9		7	1	2	11				12	5		
				1		4	17					17			
<b>0</b>	<b>3</b>	<b>9</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>6</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>	<b>5</b>	<b>0</b>		
<b>21.9896667</b>															
<b>0</b>	<b>6</b>	<b>18</b>	<b>0</b>	<b>15</b>	<b>2</b>	<b>14</b>	<b>58</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>57</b>	<b>10</b>	<b>0</b>		
<b>58.70</b>															

RG BUNGALOW														
S.No.	Description													
1	GROUND FLOOR	7	1	8	9	28	2	6	6		1		25	2
2	FIRST FLOOR	3		2	3	11	2	2	3		14		13	
	Total Qty. for One Unit	<b>10</b>	<b>1</b>	<b>10</b>	<b>12</b>	<b>39</b>	<b>4</b>	<b>8</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>14</b>	<b>0</b>	<b>38</b>
	Load in Watt	<b>70</b>	<b>70</b>	<b>70</b>	<b>20</b>	<b>18</b>	<b>15</b>	<b>10</b>	<b>10</b>	<b>15</b>	<b>10</b>	<b>10</b>	<b>70</b>	<b>100</b>
	Total Load in KW . for One No. Unit	0.7	0.07	0.7	0.24	0.702	0.06	0.08	0.09	0	0.01	0.14	0	1.27
														0.07
														0.20

\*\* In addition to above inventory, 2 Nos plug point for modem and router at height but control switch at convenient height at central location of each flat.

**Note :** The light point /Power point / Data Point /TV Point given in the above inventory shall be minimum it can be increased as per site / functional requirement and the contractor has to execute accordingly nothing extra will be paid on this account.

### **1.2.2 Scale of Amenities (Electrical):**

In each lift Shafts and Electrical Shaft in each buildings/ tower)

SN	Description	Location	Qty.
1	Power Points (15-amp, 6 pins socket)	In each floor level of in each lift shaft in suitable location and Electrical shaft	1 No.
2	10 Watt Bulk Head	In each floor level of in each lift shaft in suitable location and Electrical shaft.	1 No.
3	Power Points (15 amp, 6pins)	In each Lift Machine Room of each lift.	1 No.
4	18/20 W LED Industrial type box type(retrofit) fitting with LED tube having PVC body and aluminium heatsink.	In each Lift Machine Room of each lift.	4 Nos.
5	Wiring of lift shaft	It should be done with 3x4 sq mm copper wire, loop in system in surface heavy duty PVC conduit for maintenance purposes.	Lot
6	Heavy duty Exhaust	In each Lift Machine Room of each lift shaft.	4 Nos.

**Note:** The above list indicates minimum amenities to be provided. However, while execution of work the agency shall follow the quantity as per approved drawings.

### 1.2.3 Scale of all Electrical Amenities: -

In common area, Conference Hall, Podium, silt floor, lift lobby and passage etc as per marked drawings and as required to achieve the desired lux level. Similarly, landscape lighting, compound lighting, street lighting, flood lighting, façade lighting etc also as per marked drawings and as required to achieve the desired lux level.

### 1.3 VALUES OF ILLUMINATION AND TYPE OF LIGHTING FIXTURE

Sr. No.	Area / Space	Range of Average Illumination in Lux	Type of Lamps/ Luminaries preferred
1	Lift Lobby	150-200-300	Surface / recessed type LED Down lighter
2	Lifts	50-100-150	Surface / recessed LED Down lighters
3	Lift machine room	200	4 ft Industrial retrofit type LED batten and Tube
4	Corridor, Passage way, Stairs	50-100-150	Surface / recessed LED Down lighters
5	Escape lighting	As per NBC requirement	Surface / recessed type LED fixtures
6	Service/ Utility Areas such as Electrical Power Supply & Distribution Room, Pump Room etc.	100-150-200	4 ft Industrial retrofit type LED batten and Tube
7	Store Room	50-100-150	4 ft Industrial retrofit type LED batten and Tube
8	Car Parking Area	40	4 ft Industrial retrofit type LED batten and Tube
9	Ramp and corners	40	4 ft Industrial retrofit type LED batten and Tube & Outdoor pathway light in recess
10	Entrance and exits of car parking	50-100-150	LED post top lantern
11	Road / Street / Jogging track	25	LED type street light fittings
12	Compound lighting	15	LED post top lantern
13	Garden, Water Bodies & Landscape lighting	As per Aesthetical Consideration	LED post top lantern, bollard as aesthetically required
14	Badminton court	300-500	Surface / recessed type LED Sports Lighting
15	Gymnastic room	150-200	Surface / recessed type LED Profile Light

#### **1.4 Specifications for wiring :**

- 1.4.1 The wiring shall be carried out in recessed heavy duty PVC conduit (ISI marked) of suitable size, in loop in system.
- 1.4.2 **Cross Linked polyethylene (XLPE)HFFR Fire Grade (Halogen-Free Flame Retardant)** insulated Copper conductor multi-stranded single core cables 650 V grade will be used for points, circuit & sub-main wiring. All flexible copper wires used shall have Class 2 copper conductor satisfying the resistance requirements of NEC 2023 Part 1 Section 17, Annex B.  
Minimum size of wiring:  
  - a) Light Wiring: 1.5sq. mm.
  - b) Power Wiring: 4.0 sq mm.
  - c) Power circuit rated: More than 1KW, size as per calculation.
- 1.4.3 In multi standard cables shall be terminated on the ends with copper lugs/ thimbles of suitable size.
- 1.4.4 Earth wire as per CPWD specification for electrical work, part-I(Internal-2023), shall be drawn along with other wire in recessed/ surface heavy duty PVC conduit system.
- 1.4.5 ‘Power’ wiring shall be kept separate and distinct from light wiring, from the level of circuits, i.e., beyond the branch distribution boards. Conduits for light/power wiring shall be separate.
- 1.4.6 Conduit carrying submain will not carry circuit/point wiring. Similarly, conduit carrying circuit wiring will not carry submain/point wiring. Conduit carrying point wiring will not carry submain/circuit wiring.
- 1.4.7 Essential/non-essential/UPS distribution each will have a completely independent and separate distribution system starting from the main, switchboard upto final wiring for each system. As for example, conduit carrying non-essential wiring shall not have essential or UPS wiring.
- 1.4.8 Wiring for essential and UPS supply will have their own conduit system. No mixing of wiring is allowed.
- 1.4.9 No switchboard will have more than one source of incoming supply. More than one incoming supply will be allowed only at main board with proper safety and interlocking so that only one source can be switched on at a time.

#### **1.5 Capacity of Circuits: -**

- 1.5.1 Lighting circuit shall feed light/fan/call bell points. Each circuit shall not have more than 800 W connected load or more than 20 points whichever is less as because of introduction of LED lights, load on lighting circuit gets reduced drastically.
- 1.5.2 Power circuit in non-residential building will have only one outlet per circuit. However, in non-residential building for computer points 3 nos. 6A outlet sockets can be feed through power circuit.
- 1.5.3 Each power circuit in residential building can feed following outlets:
  - (a) Not more than 2 Nos. 16A outlets.
  - (b) Not more than 3 Nos. 6A outlets.
  - (c) Not more than 1 No.16A and 2 Nos. 6A outlets.
  - (d) Independent circuit each to feed Geyser, AC Outlet and Kitchen oven, washing machine outlets.

1.5.4 Heavy Duty PVC conduit wire(s) carrying capacity.

Maximum Number of PVC Insulated 650/1100 V grade Aluminium/ Copper Conductor Cable conforming to IS 694:2018													
Nominal cross sectional area of conductor in sq.mm	20 mm		25 mm		32 mm		38 mm		51 mm		64 mm		
	S	B	S	B	S	B	S	B	S	B	S	B	
1	2	3	4	5	6	7	8	9	10	11	12	13	
1.50	5	4	10	8	18	12	-	-	-	-	-	-	
2.50	5	3	8	6	12	10	-	-	-	-	-	-	
4	3	2	6	5	10	8	-	-	-	-	-	-	
6	2	-	5	4	8	7	-	-	-	-	-	-	
10	2	-	4	3	6	5	8	6	-	-	-	-	
16	-	-	2	2	3	3	6	5	10	7	12	8	
25	-	-	-	-	3	2	5	3	8	6	9	7	
35	-	-	-	-	-	-	3	2	6	5	8	6	
50	-	-	-	-	-	-	-	-	5	3	6	5	
70	-	-	-	-	-	-	-	-	4	3	5	4	
<b>Note:</b>													
(1) The above table shows the maximum capacity of conduits for a simultaneous drawing in of cables.													
(2) The columns headed 'S' apply to runs of conduits which have distance not exceeding 4.25 m between draw in boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns headed 'B' apply to runs of conduit, which deflect from the straight by an angle of more than 15 degrees.													
3) Conduit sizes are the nominal external diameters.													

1.5.5 Fire Survival (FS) cables shall be used where integrity of electric supply is important especially to save human life and where electric supply is required for evacuation operation during the fire instances. These cables are designed to withstand temperatures from 650°C to 950°C and for period upto 180 min along with additional protection against mechanical shock and water splash. The fire survival cable shall be used at following location as given below and additional requirement, if any as mentioned in NBC 2016 as amended up to date, CEA Regulation 2010 as amended up to date and NEC 2023: -

<u><b>Application of FS cable</b></u>			
<b>For more details, refer Annex A of IS 17505(Part 1) : 2020</b>			
<b>Sl No.</b>	<b>System Description</b>	<b>Cable Fire Rating Required (°C)</b>	<b>Time for which System should Withstand (Minutes)</b>
(i)	Fire pumps FS	FS (950/FWS)	180
(ii)	Pressurization	FS (950/FWS)	180
(iii)	Smoke venting including its ancillary systems, such as dampers and actuators	950	60
(iv)	Fire-fighting shaft (staircase, lift, lift lobby)	FS (950/FWS)	180
(v)	Fireman's lifts (including all lifts)	FS (950/FWS)	180
(vi)	Exit signage lighting	950	120
(vii)	Emergency lighting	950	120
(viii)	Fire alarm system		
(a)	Conventional (zone-based system)	650	60
(b)	Intelligent addressable system	650	60
(ix)	Public address (PA)system (related to emergency voice evacuation and annunciation)	650	60
(x)	Magnetic door hold-open devices	650	60
(xi)	Lighting in fire command center and security room	FS (950/FWS)	180

- 1.5.6 All switches, sockets, AC point with MCB connected Socket outlets, phone socket, Data sockets, stepped type electronic fan regulators (two module), bell push and accessories shall be of modular type. The mounting boxes shall be of G.I. 16 SWG thick matching with modular products. **Mounting boxes and accessories shall be of the same make as that of the plate type switches and accessories.** The modular switch, socket etc should have metallic plate, should be shrouded and should produce low sound on switching.
- 1.5.7 **Intercom/Telephone:** Wiring for Intercom/telephone inside the quarters, shall be terminated in suitable size of G.I. Junction box and telephone/intercom socket, according to inventory/ marked drawings enclosed with this bid, other end of wiring shall be terminated in krone box installed at ground floor/Stilt floor of service shaft of each block/ building and main armoured telephone cable shall be drawn from the EPBAX room to the Krone box of each building. The wiring shall be suitably tagged/marketed mentioning the location. The wiring of telephone cable shall be done with surface/recess 25 mm dia. heavy duty PVC conduit and with 1 pair telephone cable. The drawing of incoming telephone cables from outside of boundary up to EPBAX room is not covered in the scope of this tender. However,

provision of R.C.C. HUME pipe/ DWC HDPE pipe not less than 300 mm diameter shall be laid underground from entry gate to control/ EPBAX room.

- 1.5.8 **T.V and Data :** Modulator Socket for TV and data shall be provided in GI of box of suitable location as per inventory and marked drawings. Data and cable TV wiring will be done with CAT-6A cable in heavy duty 25 mm PVC conduit and brought to the box at central location inside the flat/ Buildings, Officers / Staff Amenities buildings and other locations as required during execution at site, to house modem and splitter with 2 Nos. 6A socket outlet at suitable height with control switch at convenient accessible location. 1 No. PVC conduit will be laid from the box inside flat to ELV shaft and then upto ONT/FTTH box at stilt floor/Ground floor. CAT-6A cable for data and Coaxial cable for TV will be laid from the box in the flat up to MDF box by EPC contractor, however, optical fibre cable up to ONT/FTTH box and up to will be provided by the service provider of “FTTH”. In shaft sufficient nos of blank conduits shall be laid, so that at least 4 Nos FTTH service provider can be provided their services according to occupant's choices.
- 1.5.9 Provision of DWC HDPE pipe not less than 300 mm diameter shall be laid underground from entry gate to each blocks/ building so that different service provider can draw their cable easily. There should have suitable size under R.C.C. chamber of suitable size within 10 Mtr distance, however, in front of each block/ building so that FTTH can be drawn easily.

#### 1.5.10 Specification of Modular Switches and socket: -

- Suitable for 240V, AC, with normal gap constructions, Flush type, Screw type terminal, IP20.
- Current carrying plastic parts of Nylon (PA6) with glass fibres up to 16A.
- Non-Flammable insulating parts & very high Insulating resistance after Humidity test.
- Marked with IS 3854:1997.
- Snap fit with Modular Plates very easy to install.
- Arrow marking for correct orientation with plate.
- Double rocker mechanism to prevent visible spark.
- Bimetal Silver contact tips for less spark & longer life.
- Fire retardant and UV stabilized.

The modular sockets shall be as per following/ have features mentioned below: -

- 240V, AC, Flush type, Screw type terminal, Shuttered.
- Polycarbonate material thickness ~1.5 mm to 2.5 mm.
- Non-Flammable insulating parts & very high Insulating resistance after Humidity test.
- 6A, 6/16A Socket market with ISI, as per IS1293:2019.
- Snap fit with Modular Plates easy to install.
- Brass current carrying parts.
- Fire retardant and UV stabilized.

#### Minimum Warranty: -

- i. Electro Mechanical Wiring Device: 10 (Ten) Years.
- ii. Cable Management Solution (uPVC products): 10 (Ten) Years.

While laying conduits for fire alarm system, sufficient junction outlets for detectors as required are to be provided as per approved drawing and direction of the Engineer-in-Charge.

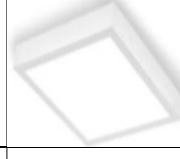
### 1.6 Internal Luminaries: -

- 1.6.1 All LED indoor lighting fixtures (IP20 or better and IK02) in metallic housing should have following parameters and shall be selected as per minimum illumination requirement as per NBC-2016 (amended up to date) and lux level mentioned above.
- 1.6.2 Wherever light fittings are proposed to be provided on the false ceiling, the respective light/fan point wiring will have to be brought up to the terminal of the light fittings / fans by the contractor.

**Note:** The firm will be required to provide items/material as per the specifications indicated herein. The department reserves the right to accept items/materials with richer specifications as available in the market/ with manufacturer due to technological upgradations/ model updation, without any extra cost implication with the approval of Engineer in charge. The model shown below are indicative only. The bidder should get the approval of luminaires before placing order.

### 1.7 Technical Specification for LED Luminaires.

#### 1.7.1 Technical Specification for downlighter, panel light & Bulkhead

Sl. No	Technical parameters	LED Down Light Surface/recess Square/Circular Downlighter. (Integral)	Surface/ recess LED panel (2"X2") down light (Integral)	LED bulkhead fittings (Integral)
				
i	Wattage	12 to 18W	30-32 W	9-10 W
ii	Luminaire Housing	Die-Cast Aluminum/ extruded aluminum with high quality frosted / anti glare diffuser	Powder coated CRCA / aluminum housing with high quality frosted / anti-glare diffuser	Die-Cast Aluminum with optical poly carbonate diffuser
iii	Light Source	SMD LED Chip	SMD LED Chip	SMD LED Chip
iv	Operating Voltage	180 – 260 V	180 – 260 V	180 – 260 V

	Range			
v	Power Factor	$\geq 0.95$	$\geq 0.95$	$\geq 0.95$
vi	Rated Voltage	220V-240V	220V-240V	220V-240V
vii	Surge Voltage	Up to 2kV.	Up to 2kV	Up to 2kV.
viii	LED Life span& Luminaire photometric Data	IESLM79 and IESLM80 respectively	IESLM79 and IESLM80 respectively	IESLM79 and IESLM80 respectively
ix	LED chip efficiency	Minimum 120 Lm/W	Minimum 120 Lm/W	Minimum 120 Lm/W
x	Luminaire efficacy	Not less than 100lumen/W	Not less than 100 lumen/W	Not less than 100 lumen/W
xi	Lumen Maintenance	Minimum 70% up to 50000 hrs. (indoor application)	Minimum 70% up to 50000 hrs. (indoor application)	Minimum 70% up to 50000 hrs. (indoor application)
xii	Driver efficiency	$\geq 85 \%$	$\geq 85 \%$	$\geq 85 \%$
xiii	Beam Angle	Not less than 120 degree (indoor application)	Not less than 120 degree (indoor application)	Not less than 120 degree (indoor application)
xiv	IP Protection Level	minimum IP-20	minimum IP-20	minimum IP-20
xv	Harmonic Distortion (THD)	For indoor application $\leq 10\%$ ,	For indoor application $\leq 10\%$	$\leq 10\%$
xvi	LED make	NICHIA/OSRAM /SEOUL/PHILIPS LUMILEDS/LEDNIMUM /CREE/BRIDGELUX	NICHIA/OSRAM /SEOUL/PHILIPS LUMILEDS/LEDNIUM/CREE/ BRIDGELUX	NICHIA/OSRAM /SEOUL/PHILIPS LUMILEDS/LEDNIUM /CREE/BRIDGELUX
xvii	Colour temperature	As per site requirement	As per site requirement	As per site requirement
xviii	CRI	$\geq 80$	$\geq 80$	$\geq 80$
xix	Junction temperature	Maximum 85° C	Maximum 85° C	Maximum 85° C

xx	Environment consideration	OHS Compliant	OHS Compliant	OHS Compliant
xxi	Safety	Should pass High Voltage Dielectric test of 1.5 KV as per IS:10322	Should pass High Voltage Dielectric test of 1.5 KV as per IS:10322	Should pass High Voltage Dielectric test of 1.5 KV as per IS:10322
xxii	Test Certificate	LM79	LM79	LM79
xxiii	Standard Warranty	5years	5years	5 years

### 1.7.2 Technical Specifications of Indoor and Outdoor lights proposed in this work :

i	LED industrial type box fittings (Retrofit) with tube.	1 x 18/22 W 2 x 18/22 W	<p>Industrial box type fitting made out of powder coated CRCA sheet steel, pre-coated CRCA sheet steel cover plate, End cap, Slide on T8 tube holder, PVC insulated single strand copper wire, IP20 Protection suitable for one no LED tube (retrofit type) of 18-22 Watt.</p> <p>Industrial box type fitting made out of powder coated CRCA sheet steel, pre-coated CRCA sheet steel cover plate, End cap, Slide on T8 tube holder, PVC insulated single strand copper wire, IP20 Protection suitable for two nos LED tube (retrofit type) of 18-22 Watt.</p>	
			<p>LED Tube having integrates light source with frosted polycarbonate housing with aluminium heat shrink 1200 mm long, lux level not less than 2100 lumens, 6500 K, CRI 70, System efficacy not less than 110, Driver efficacy 85%, life 25000 burning hours, surge protection 2.5 KV, IP 20, suitable for 220-240 Volts, 50-60 Hz single phase A.C. Supply</p>	
ii	Mirror light	9W	<p>Energy efficient 6 watts LED tube, warm white, made out of premium material is used for longer life, reliability and adjustable multiple angles.</p> <p>Water proof moisture anti-fog Anti-corrosion anti-rust.</p> <p>Operating Voltage: 220-240, 50 Hz,</p>	

			single A.C. supply.	
iii	LED Step Light (Outdoor)	7-10 Watt	Housing Die cast Aluminium, IP66. (Integral)	
iv	LED Step Light (Indoor)	2 Watt	Housing cast Aluminium, IP20,(Integral type) Warm White; 30 lumens. Senses movement within 55 degrees of each side of the sensor; Senses movement upto 3 meters, Switches off after 60 seconds of inactivity.	
v	Wall bracket (Staff Qtrs Rooms)	9 Watt (B22)	Wall mounted decorative indoor luminaries housing made up of Poly Carbonate materials with white finish, Diffuser (Globe) made up of Opal White Polycarbonate for soothing and glare free effect, B 22 lamp holder, 9 w LED lamp (retrofit type) with electrical wiring upto terminal point.	
vi	Wall bracket (For Grade -A,B, & C)	9 Watt (B22)	Wall mounted decorative indoor luminaries housing made up of MS with brushed nickel finish, Diffuser made up of Opal White Polypropylene Copolymer for soothing and glare free effect, Lamp holder made up of Glass filled engineering plastic B22 , 9 w LED lamp with electrical grade brass i/c wiring upto terminal point.	
vi	Wall bracket (For Grade - D and above)	9 Watt (E27)	Wall mounted double decorative indoor luminaries, housing made up out of aluminum, matt gold and black finish, Lamp holder E-27, 2 x 9 w LED lamp i/c wiring upto terminal point.	

xiii	Video Door Phone (Standalon e) (Officers' Quarters only)	<ul style="list-style-type: none"> <li>• Indoor: In-build power supply.</li> <li>• 7 colour LCD Hi definition.</li> <li>• 12 polyphonic ringtones.</li> <li>• Automatic image capturing with internal flash.</li> <li>• Monitor to monitor calling facility.</li> <li>• Outdoor: Hi-Cleaner CMOS colour camera.</li> <li>• 4-wires connectors.</li> <li>• Support lock control.</li> <li>• 56 degree viewing angle.</li> <li>• Metal Housing.</li> <li>• Automatic Image Capturing with internal flash memory card, water &amp; vandal proof.</li> </ul>	
ix	Aviation obstruction light (LED)	<ul style="list-style-type: none"> <li>• Die-cast aluminum housing with red polycarbonate dome for better illumination.</li> <li>• Integral driver.</li> <li>• Supper flux 5mm 302 nos LEDs incorporated.</li> <li>• Ingress Protection: IP65</li> <li>• Protection against short-circuit.</li> <li>• Protection against surge.</li> <li>• Wide operating input voltage range 100 – 270 VAC</li> <li>• 80% energy saves compared to conventional aviation light.</li> <li>• Longer life time 50,000Hrs.</li> </ul>	

**1.7.3 Provisions for following equipments should be kept for installation in future as per requirements:**

i	Electric geyser 25 Ltrs capacity suitable for 230 V, 50 Hz, A.C. Supply.	<p>Suitable size recess wiring directly from MCB DB to locations indicated in marked drawings for Geyser shall be provided and shall also be terminated in modular type socket duly controlled by MCB in each quarter and guest house/ other location etc as required.</p> <p>Necessary plumbing work shall be carried out by civil contractor.</p> <p>This NIT does not have provisions of Geyser, however it shall be installed latter on.</p>
ii	Electric Kitchen Chimney suitable for 230 V, 50 Hz, A.C. Supply.	<p>Suitable size recess wiring directly from MCB DB to locations indicated in marked drawing in kitchen shall be provided for Electric Kitchen Chimney and shall also be terminated at modular type socket duly controlled by MCB.</p> <p>This NIT does not have provision of Electric Kitchen Chimney, however the same shall be installed latter on.</p>

iii	Domestic Water purifier suitable for 230 V, 50 Hz, A.C. Supply.	Suitable size recess wiring and modular type switch socket (6/16A) shall be provided to kitchen of each quarter/other locations indicated in marked drawings for domestic water filter. Necessary plumbing work shall be carried out by civil contractor. This NIT does not have provisions of Water purifier, however it shall be installed latter on.
iv	LED type decorative Chandlier fitting suitable for 230 V, 50 Hz, A.C. Supply.	Electrical point wiring shall be provided location provided in marked drawing for LED type Decorative Chandlier fittings. This NIT does not have provisions of LED type Decorative Chandlier fittings, however it shall be installed latter on.

All lighting fixtures shall be LED type with colour temperature of 3000/ 4000/ 4500/ 6000 K as per site requirement as approved by the Engineer-In-Charge.

In addition to the drawing all lights of staircase, parking area, street and compound shall be controlled by astronomical time switch. There shall be arrangement of bypass switch so that in case of failure of time switch, the lights can be operated after bypassing the same.

#### 1.7.4 Technical Specifications of different type fans to be used in this project according to marked drawings:

<b><u>TECHNICAL SPECIFICATION OF BLDC FAN</u></b>			
<b>Sl. No.</b>	<b>Parameters</b>	<b>Specification</b>	
i	Sweep	<b>1200 mm</b>	<b>900 mm</b>
ii	Rated Voltage	220-240V, a.c.	220-240V, a.c.
iii	Rated Frequency	50 Hz	50 Hz
iv	Full Load Wattage	Not more than 28 Watt	Not more than 28 W
v	Full Load Speed	350 RPM (Tolerance as IS : 374-2019)	380 RPM
vi	Air Delivery	Not less than 210 m <sup>3</sup> /min.	Not less than 118 m <sup>3</sup> /min.
vii	Power Factor	Not less than 0.90.	Not less than 0.90.
viii	Motor Type	BLDC	
ix	Wiring materials	Copper	Copper
x	Winding Temperature Rise	Not more than 75°C	
xi	Class of Insulation	Class B	Class B
xii	Insulation Resistance	More than 2 M Ohms	
xiii	Service Value	Not less than 7.0 m <sup>3</sup> /min/w	
xiv	Bearing Type	Double ball bearing	Double ball bearing

xv	Total Harmonic Distortion	Less than 10%	
xvi	High Voltage Protection	Shall withstand 1.5 Kv, 50 Hx AC between current carrying and non current carrying metal parts without any flash over for 1 minute.	
xvii	Speed Control	Remote or Electronic regulator.	Regulator or remote
xviii	Star rating	BEE 5 Star rating.	BEE 5 star rating
xix	ISI marking	IS : 374: 2019 + A1 : 2022.	ISI marked
xx	Surge Protection	Upto 4 KV.	
xxi	Nos blade	3 Nos.	3 Nos.
xxii	Materials of blade	Metallic (Aluminium)	Metallic (Aluminium)
xxiii	Degree of protection	IPX0	

All Type Exhaust Fan should be high star rated and conforming to relevant BIS. Provision of Exhaust fans as per marked drawing and inventory.

### 1.7.5 MCB DB :

- 1.7.5.1 All distribution boards shall be double door type, having IK 9 protection. Essential & non-essential MCB DBs shall be separate and MCB of suitable capacity shall be provided. Sufficient no. of spares MCB shall also be provided.
- 1.7.5.2 The rupturing capacity of the MCB's shall be 10 KA. The MCB's shall be ISI marked. The make of MCB, RCCB/ ELCB (100 M/amp)/ SPD etc. shall of the same as that of MCB DB.
- 1.7.5.3 In vertical DBs used for power distribution, the main incomer shall be MCCB (breaking capacity 16 KA up to 125 A and 25 KA for more than 125 A to 250 A with thermal magnetic release). All MCCBs shall be with Ics =100% of Icu rating only.

### 1.7.6 Cable :

- 1.7.6.1 Power supply to lift equipment, lift machine and shaft lighting shall be feed using suitable **Cross Linked polyethylene (XLPE)HFFR Fire Grade aluminium conductor cable of 1.1 KV grade.**
- 1.7.6.2 Cable tray shall be horizontal/vertical type and made of perforated hot dipped Galvanized Iron of suitable sizes (galvanization thickness i.e. average mass of zinc coating shall not be less than 65 microns for 2 mm thick & 50 microns for 1.6 mm thick as per IS standard) 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. Suitable size as per site conditions shall be used with thickness 1.6 mm for cable trays with width≤ 300 mm & thickness 2 mm for cable trays with width > 300mm.
- 1.7.6.3 The breaking capacity of MCCB for all types of panel boards except DBs shall be as per CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date and substation sub head of this bid documents.
- 1.7.6.4 For details of LT panels, feeder pillar, Meter panels etc. please refer substation sub head of this bid documents.
- 1.8 Meter boards (meter cubicles) with suitable MCB/ MCCB as incomer, outgoing SPN / TPN MCBs, connections, interconnections with suitable size copper conductor cables as mentioned above shall be provided. Pre-paid/Postpaid (preferably) smart electric meter shall be installed by the APDCL.

### 1.9 Earthing

Earthing system comprising of earth electrode, earth conductor, earth bus, protective conductor etc. for buildings shall be carried out as per provision laid down in CPWD General Specifications for Electrical Works Part-I (Internal), 2013 corrected up to date. The earthing system should be designed such as to maintain earth resistance as specified in above specifications. Earth resistance shall be checked / tested in harsh climatic conditions. Following types of earth electrode shall be used in this works (tentative):

Sl. No.	Type of installation / Equipment's	Earth Electrode	Earth Strip from earth Electrode to Equipment's/ body.
i.	2000 KVA (For Neutral earthing)	Copper Plate 2 sets for each transformer.	32 mm x 5 mm copper strip.
ii.	2000 KVA (Body Earthing of Transformer)	Copper Plate 2 sets for each transformer.	32 mm x 5 mm copper strip.
iii.	H.T. Panel (Body Earthing)	Copper Plate 2 sets for each transformer.	32 mm x 5 mm copper strip.
iv.	D.G. Set (Neutral earthing)	Copper Plate 2 sets for each transformer.	25 mm x 5 mm copper strip.
v.	D.G. Set (Body earthing)	G.I. Plate 2 sets for each D.G. Set.	25 mm x 5 mm G.I. strip.
vi.	Main L.T. panel (Essential and Non-essential) Body Earthing.	G.I. Plate 2 sets for each D.G. Set.	25 mm x 5 mm G.I. strip.
vii.	Out Door Power Distribution Feeder Pillar	G.I. Plate 2 sets for each Feeder Pillar.	25 mm x 5 mm G.I. strip.
viii.	L.T. Panel/Rising Main end feed Earthing.	G.I. Plate 2 sets for each.	25 mm x 5 mm G.I. strip.
ix.	STP Panel	G.I. Plate 2 sets for STP Panel	25 mm x 5 mm G.I. strip.
x.	Water Filtration Plant	G.I. Plate 2 sets for WTP Panel	25 mm x 5 mm G.I. strip.
xi.	Fire Pump House	G.I. Plate 2 sets for Fire pump house Panel.	25 mm x 5 mm G.I. strip.
xii.	Water supply Panel	G.I. Plate 2 sets for each D.G. Set.	25 mm x 5 mm G.I. strip.
xiii.	Solar PV Generation	G.I. Plate 2 sets for each blocks/ Buildings where are Solar PV Panel to be installed.	25 mm x 5 mm G.I. strip.
xiv.	Lifts	G.I. Plate 2 sets for each lift.	25 mm x 5 mm G.I. strip.
xv.	HT metering Panel	G.I. Plate 2 sets.	25 mm x 5 mm G.I. strip.
xvi.	Lightening arrestor	Not less than 6 Sets G.I. Plate for each block.	25 mm x 5 mm G.I. strip.
xvii.	Street lighting/ Compound/ landscape lighting/façade lighting.	Not less than 4 Sets G.I. Pipe earthing per KM cable laying or fraction thereof according to laid cable length.	25 mm x 5 mm G.I. strip.

Metallic body of all the equipments shall be earthed confirming CPWD specifications for Electrical works (Part-I), Internal 2023 corrected up to date.

Armoring of cables shall be connected to equipments and panel at both the ends. 2 Nos. 50 mm X 5 mm GI strips shall be provided in requirement room for body earthing.

After completing the work, necessary test results as envisaged in CPWD General Specifications Part-I (Internal)- 2023 corrected up to date, CPWD General Specifications Part-II (External)- 2023 corrected up to date & Indian Electricity Rules 2005, shall be recorded and submitted to the department. The results shall be within the permissible limits. Test report forms duly signed by authorized person along with completion layout drawing for obtaining electric connections (energy meters) from Power Distribution Company by the contractor shall be given to the allottee on demand.

#### **1.10 Lightening Arrestor:**

- 1.10.1 Lightening conductor shall be provided for building as per CPWD General Specifications for Electrical Works Part-I (Internal)- 2023 as amendment up to date.
- 1.10.2 Lightening arrestor system comprising of Air terminations, Down Conductors, Joint and bonds, testing joints, Earth termination, and earth electrode for buildings shall be carried out as per provision laid down in CPWD General Specifications for Electrical Works Part-I (Internal), 2013 corrected up to date.
- 1.10.3 Lightening arrestor system should be designed considering different principles, parameter mentioned in CPWD specifications, frequency of lightening/thunder storms on those particular areas in past, local data's, height of nearest buildings, trees, Overhead tanks etc.

#### **1.11. External electrical installation:**

- 1.11.1 Service Connection to each building (i/c pump house/ STP room/ Guard house/ Director Residence/Club House and other installation) / street lighting/ compound / garden lighting shall be provided underground cable of 1.1 KV grade aluminium conductor cable laying of various sizes of UG cables incoming to the building, GI /DWC HDPE pipe of following sizes shall be provided. Brick masonry chambers of suitable size with suitable cover shall be provided wherever required and at suitable intervals.
- 1.11.2 Underground cables of size up to size of 35 sq.mm (up to 2 run of cables)- 100 mm dia.  
Underground cables of size exceeding 35 sq.mm but not exceeding 120 sq.mm (up to 2 run of cables) - 150 mm dia.
- 1.11.3 Underground cables of size exceeding 120 sq.mm but not exceeding 300 sq.mm (up to 2 run of cables) - 200 mm dia.
- 1.11.4 The street lighting/ compound / garden lighting shall be done as per marked drawing enclosed with this bid documents.
- 1.11.5 Service connection cable entry in Building/Block should be done through RCC pipe of suitable size and road crossing of cable should be done through suitable size "C" class G.I. pipe.

#### **1.12 Street Lighting:**

- 1.12.1 LED Street light fittings shall be provided on 6 Mtr long GI Octagonal pole by 1 Mtr long GI over hang bracket wire shall be done copper wire of size 3 x 1.5 sq.mm up to loop box provided inside the pole.
- 1.12.2 Power to street light shall be feed from nearest essential feeder pillar through UG cable and terminated loop box MCB. Location Street lighting is provided on tender drawings.
- 1.12.3 20% of total LED street light shall be hybrid type solar light.
- 1.12.4 The photo, model and other parameter are indicative only but the bidder to design to achieve the lux level, functional requirements and aesthetic of the building/campus. Details of Pole and LED street light is tabulated below:

DATASHEET FOR OCTAGONAL POLE		
i.	OCTAGONAL POLE	
Material construction of Shaft	Hot Rolled Steel Plate as per IS 2062/BS EN 10025 or Equivalent.	
Grade of Steel	Hot Rolled Steel Plate as per IS 2062/BS EN 10025 Or Equivalent.	
Thickness	To be decided as per height of pole and site condition, however, not less than 3 mm thick.	
No. of longitudinal welds/section	One. They shall be continuously tapered with single longitudinal welding. There shall not be any circumferential welding. The welding of pole shaft shall be done by Submerged Arc Welding (SAW) process. The base plate shall be fillet welded to the pole shaft at two locations i.e. from inside and outside.	
Length of pole	6000 mm.	7000 mm.
Cross section of Pole	Octagonal (8-sided polygon)	
Base diameter and top diameter (A/F)	As per structural design calculations, however, not less than 70 mm x 135 mm.	As per structural design calculations, however, not less than 100 mm x 200 mm.
Metal protection treatment for Pole Section	Hot Dipped Galvanized, as per BS EN ISO 1461	
Height of door	500 mm (approximate) height at the elevation of 500 mm from the base plate. The pole shall be adequately strengthened at the location of door to compensate for the loss in section. Height of the door may be decided considering site conditions and length of pole.	
Door type	The door shall be hinged type and shall be flush with the exterior surface and shall have suitable locking arrangement. There shall also be suitable arrangement for the purpose of earthing.	
Mounting switchgears of	Provision should be provided in the bottom compartment to mount PVC /Bakelite sheet along with connectors for cable looping and single pole MCB to isolate individual luminaire.	

	Dimension of base plate	As per structural design calculations, however, not less 200 mm x 200 mm.	As per structural design calculations, however, not less 275 mm x 275 mm.
	Thickness of base plate	As per structural design calculations, however, not less than 12 mm.	As per structural design calculations, however, not less than 16 mm.
	Grade of Steel for Base Plate	As per IS 2062	
	Luminaries mounting bracket	The galvanized over hang Luminaries mounting bracket of 1000 mm long suitable diameter shall be provided along with the Octagonal Poles of 6000 mm. for installation of the luminaries.	The galvanized frame made out from GI channel of suitable size to accommodate 4 nos Flood light Luminaries. The frame work should be adjustable in different angle according requirement to obtain maximum illuminations and easy for maintenance.
ii.	<b>FOUNDATION BOLTS</b>		
	Number of foundation bolts	As per structural design calculations, however, not less than 4 Nos in both poles. (M16)	As per structural design calculations, however, not less than 4 Nos in both poles. (M20)
	PCD of foundation bolts	As per structural design calculations however, not less than 200 mm.	As per structural design calculations however, not less than 275 mm.
	Bolt length	As per structural design calculations with J-Bolt, however, not less than 600 mm.	As per structural design calculations with J-Bolt, however, not less than 700 mm.
iii.	<b>MATERIALS PROTECTION</b>		
	Metal protection treatment for Pole	Sigle Hot Dop Galvanized.	
	Thickness of Galvanization	As per BS-1461 (Average- 70 microns to 85 Microns)	
	Applicable Standards	Design of Poles is as per BSEN-40-N	
iv.	<b>FOUNDATIONS</b>		
	Foundation	Suitable size RCC foundation shall be provided as per conditions and as per manufacturer recommendations.	

<b><u>LED STREET LIGHT DATA SHEET</u></b>		
Sr. No.	Parameters	LED Street light
i.	Wattage/Type	Minimum 60 W LED Luminaire 

ii.	Luminaire Housing	Die Cast Aluminum housing with high quality antiglare diffuser.
iii.	Light Source	SMD LED Chip
iv.	Operating Voltage Range	140–270V
v.	Power Factor	$\geq 0.95$
vi.	Rated Voltage	220V-240V
vii.	Surge Voltage	Up to 10kV
viii.	LED Life span & Luminaire photometric data	IES LM 79 and IES LM 80
ix.	Luminous flux	7200
x.	Luminaire efficacy	Not less than 120 lumen/W.
xi.	Lumen Maintenance	Minimum 70% up to 50000 hrs. IEC complaint.
xii.	Driver efficiency	$\geq 85\%$
xiii.	Beam Angle	Not less than 120 degrees
xiv.	IP Protection Level	minimum IP-66
xv.	Harmonic Distortion(THD)	$\leq 15\%$
xvi.	LED make	NICHIA/OSRAM /SEOUL/ PHILIPS LUMILEDS/ LEDNIUM /CREE/ BRIDGELUX
xvii.	Colour temperature	5700 K
xviii.	CRI	$\geq 80$
xix.	Junction temperature	Maximum 85° C
xx.	Environment considerations	ROHS Compliant
xxi.	Safety	Should pass High Voltage Dielectric test of 1.5 KV as per IS:10322
xxii.	Test Certificate	LM79
xxiii.	IK	Not less than IK07.
xxiv.	Standard Warranty	5 years
xxv.	Installation	Fitting Shall be installed on 6 Mtrs. long GI octagonal pole with 1Mtrs. long over hang GI bracket.

#### **SOLAR LED STREET LIGHT DATA SHEET**

Sr. No.	Parameters	All in one Hybrid Solar Street light (Hybrid).
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i.	Type	Minimum 60W Solar LED Street light Luminaire, having fixed diming profile.  
ii.	Luminaire Housing	The luminaire shall have excellent heat dissipation and also Lens for efficient light distribution. The front cover is composed of weather resistant, UV stabilized polycarbonate. The front cover is tightly secured with the housing to ensure that the luminaire has an ingress protection of IP65. The luminaire shall have a smart self-diagnosis feature with LED indicators for battery charging, deep discharge and Load cut off indication visible from ground in day light.
iii.	Light Source	SMD LED Chip
iv.	Operating Voltage Range	180–260V
v.	Power Factor	$\geq 0.95$
vi.	Rated Voltage	220V-240V
vii.	Surge Voltage	Up to 10kV
viii.	LED Life span & Luminaire photometric data	IES LM 79 and IES LM 80
ix.	Wattage	Not more than 60 Watt.
x.	Luminaire efficacy	Not less than 180 Lm/W (Lumen output not less than lumens).
xi.	Lumen Maintenance	Minimum 70% up to 50000 hrs. (indoor application)
xii.	Driver efficiency	$\geq 85\%$
xiii.	Beam Angle	Not less than 120 degrees
xiv.	IP Protection Level	minimum IP-65
xv.	Harmonic Distortion (THD)	$\leq 15\%$
xvi.	LED make	NICHIA/OSRAM /SEOUL/PHILIPS LUMILEDS /LEDNIUM /CREE/BRIDGELUX
xvii.	Colour temperature	5700 K
xviii.	CRI	$\geq 80$
xix.	Junction temperature	Maximum 85° C
xx.	Environment considerations	ROHS Compliant
xxi.	Safety	Should pass High Voltage Dielectric test of 1.5 KV as per IS:10322
xxii.	Test Certificate	LM79
xxiii.	IK	Not less than IK 08
xxiv.	Standard Warranty	5years

xxv.	Battery life	2000 Cycle
xxvi.	Charge Controller	The luminaire shall have a highly efficient, integrated microprocessor based MPPT charge controller with driver mounted on the same board to minimize power loss. This intelligent power management system shall maximize the overall system efficacy to Minimum 140
xxvii.	Diming Profile	The charge controller shall be supplied with a preconfigured dimming profile that shall dim the luminaires late at night to further increase the autonomy of the system. Dusk to Dawn Dimming Profile should be for first one hour on motion at 100 % , without motion at 25 % , next 4 hours on motion 40 % & without motion 25 %. Next 6 hours 25 % Fix , rest of night on motion 40 % without motion 25 % Dusk and dawn detection shall be through voltage generated from the solar panel, and it should be configurable.
xxviii.	Controller Efficiency	The Controller Efficiency shall be > 90%. The Controller shall meet the relevant IEC codes.
xxix.	Protection	The controller shall have inbuilt protection features: protection against battery overcharge and deep discharge condition, protection should be provided against battery and Panel reverse polarity, over current protection, Protection for reverse flow of current through the PV module(s) should be provided, ON/OFF switch to be provided to prevent discharge of battery during storage / before Installation.
xxx.	SOLAR MODULE	The Solar Cell shall be made of Premium grade mono crystalline silicon Cell. The Solar Module Power shall be minimum 50 Wp at 18 Vmpp. for better uniformity of light. The Solar Module Construction shall be of Low iron tempered glass with low reflection characteristics and with rated IP 65. The Compliance Standards shall be IEC 61215 For Design; & IEC 61730 (Safety Class I & II).
xxxi.	Compliance Standards	The Compliance Standards shall be IEC 61215 For Design; & IEC 61730 (Safety Class I & II).
xxxii.	Life Cycle	The Life Cycle shall be > than 25 Years. The Solar module shall meet the relevant IEC codes mentioned - IEC60598-2-3, IEC 62109-1, EN 50530, IEC 61547, CISPR 15, IEC 62133 & UL1642.
xxxiii.	BATTERY	The Battery shall be minimum 18 AH,12.8 VDC Rechargeable Lithium Ferro Phosphate (LiFePo4) Battery Pack. The Battery Pack should have Inbuilt Battery management system Module with following safety features - accidental short circuit, over discharge, over charge, over temperature, Low Temperature
xxxiv.	Battery life	2000 Cycle.
xxxv.	Battery Back-up	24 Hrs.
xxxvi.	Installation	Fitting Shall be installed on 6 Mtrs. long GI

	octagonal pole directly with bracket.
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**FACADE LIGHTING (The Facade Lighting shall be provided on Club House I & II)**

Façade light shall be designed and drawing through professional lighting designer by proving high energy efficient luminaries. The design shall be done to highlight the architectural features of building and façade of the building. The design and drawing should be got approved before purchasing materials and execution at site.

**GATE LIGHT TECHNICAL DATA SHEET**

<b>Gate light</b>		<ul style="list-style-type: none"> <li>• Decorative Gate light for 3600 indirect light having high-grade Aluminium Alloy, Powder Coated, Bright Anodized Aluminium with Sand Blasting Finish reflector, Clear Frosted Polycarbonate for uniform light distribution diffuser.</li> <li>• Wattage not more than 40, Luminous Efficacy not less than, 100 lm/W, 5700K (Cool Daylight).</li> <li>• Rated Voltage: 240V AC (Operating Range: 120V - 270V), Frequency: 50 Hz, Power Factor: <math>\geq</math> 0.95. Total Harmonic Distortion (THD) &lt; 10%.</li> <li>• Ingress Protection: IP65</li> <li>• Internal Wiring: PVC Coated Multistrand Copper Wire</li> <li>• Mains Terminal: 3-Way, 10A terminal block (Supports 2.5 sq. mm cable)</li> <li>• Surge Protection: Integrated Surge Arrestor (10KV, 440V rating)</li> <li>• 5700K (Cool Daylight).</li> <li>• Warranty: - 5 Years.</li> </ul>
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**TECHNICAL DATA SHEET OF LANDSCAPE LIGHTING**

<b>Bollard</b>		<ul style="list-style-type: none"> <li>• Cylindrical bollard luminaire is made in parts comprising of :             <ol style="list-style-type: none"> <li>Spun aluminium dome shaped top cover.</li> <li>Cylindrical opal acrylic diffuser for pleasant light output.</li> <li>Seamless GI pipe bottom housing the control gear for 9W LEDs.</li> </ol> </li> <li>• Luminaire is available with color temperature: Warm White (WW): 3000K <math>\pm</math>250K.</li> <li>• Lux level should not be less than 900 lux.</li> <li>• CRI &gt; 70.</li> </ul>
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			<ul style="list-style-type: none"> <li>• Luminaire is provided with a die-cast base plate and fixing holes for directly mounting on the concrete pedestal.</li> <li>• Luminaire is wired with inbuilt driver with 4.5kV surge protection.</li> <li>• Finish: Powder coated.</li> <li>• IP : 66 and IK : 10.</li> <li>• Operation voltage : 220-240, 50 Hz.</li> <li>• Minimum height not less than 500 mm, pipe outer diameter not less than 80 mm and base dia not less than 130 mm.</li> <li>• Warranty: - 5 Years.</li> </ul>
	<b>LED Spike light</b>		<ul style="list-style-type: none"> <li>• LED Spike light for tree uplighting, 7W, 3000K, 360 lumen, powder coated integral aluminium housing.</li> <li>• Die-cast aluminium housing comprises Warm White (WW) COB LED and reflector.</li> <li>• COB LED color temperature: 3000K ±250K</li> <li>• COB LED housing covered with die-cast aluminium ring with weatherproof gasket and toughened glass.</li> <li>• Adjustable mounting bracket with spike is provided for easy to focus the object.</li> <li>• 2 nos., holes also provided on adjustable mounting bracket for surface mounting.</li> <li>• Constant current LED driver.</li> <li>• Degree of protection: IP65</li> </ul>

#### **SPORTS AREA LIGHTING (Outdoor Basket Ball Court)**

Sl. No.	Description	Image	Specification
i.	<b>Sports Lighting</b>		<ul style="list-style-type: none"> <li>• High-quality integrated LED Flood Light with a minimum system lumen of 25000 Lm and system wattage not exceeding 175W with a nominal efficiency 145 lumen/watt.</li> <li>• CCT of 5700K with SDCM of &lt; 5 ,CRI : 70.</li> <li>• The housing of flood lighting should be of non-corrosive high-pressure single piece die-cast aluminum to withstand extreme environments.</li> <li>• It should have PF&gt; 0.95. Lifetime of 50K hours @L70 at 35deg C ambient temperature.</li> <li>• The Ingress protection should be minimum IP 66 with an IK rating of 10.</li> <li>• Optical and control gear compartments shall be maintainable/ replaceable without impacting the LED units.</li> </ul>

			<ul style="list-style-type: none"> <li>• The access to the optical and the gear compartment should be separate. While accessing the gear compartment, the optical compartment should not be accessible.</li> <li>• The luminaire should have choice of Narrow beam, symmetrical mid, asymmetrical mid, symmetrical wide and asymmetrical wide beam suiting various applications with exposed PC optic lens.</li> <li>• The Luminaire should have a 10KV SPD duly bolted in the Luminaire and 4KV internal surge protection and range of operating voltage will be 120-270V AC.</li> <li>• The Luminaire should have a breather to ensure that air balance inside and outside of the Compartment The luminaire should be of Class B Serviceability.</li> <li>• The wattage of each LED should be greater than 1 watt and less than 4 Watt. Only high power Single white LED chip with ceramic based suitable for outdoor use is allowed. Multi Chip, array multi die, mid power, Integrated arrays and COB's are not permitted.</li> <li>• The LED used in the luminaire shall be SMD type only of make LG, Lumileds, Osram, Nichia, and CREE.</li> <li>• The luminaire should be capable of withstanding voltage stress of 440V for 8 Hrs., should have an auto shutdown @ 325V and have an auto recovery feature.</li> <li>• The Drivers should be a potted driver not a printed circuit board without casing, mounted inside the luminaire &amp; it should be of same make. The fitting should have a breather ensuring a stable optical and thermal management.</li> <li>• Both luminaire and driver should be of same make and both of them should have BIS approval.</li> <li>• The LED fitting shall be installed on a Galvanized Iron Bracket as mentioned above on 7 Mtr. Pole.</li> <li>• In each pole, there shall be minimum 4 Nos Flood light fitting in each pole to maintain required lux level.</li> <li>• There shall be 4 nos 7 Mtr. Long pole for outdoor basketball court.</li> </ul> <p>The minimum lux level should not be less than of 200-300 lux. Numbers of luminaries, as mentioned above, should not be less than 16 nos fittings.</p> <p><b>SPORTS AREA LIGHTING (Indoor Badminton Court)</b></p>
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ii.	<b>Sports Lighting</b>		<ul style="list-style-type: none"> <li>• High-quality integrated LED Flood Light with a minimum system lumen of 25000 Lm and system wattage not exceeding 175W with a nominal efficiency 145 lumen/watt.</li> <li>• CCT of 5700K with SDCM of &lt; 5 ,CRI : 70.</li> <li>• The housing of flood lighting should be of non-corrosive high-pressure single piece die-cast aluminum to withstand extreme environments.</li> <li>• It should have PF&gt; 0.95. Lifetime of 50K hours @L70 at 35deg C ambient temperature.</li> <li>• The Ingress protection should be minimum IP 66 with an IK rating of 10.</li> <li>• Optical and control gear compartments shall be maintainable/ replaceable without impacting the LED units.</li> <li>• The access to the optical and the gear compartment should be separate. While accessing the gear compartment, the optical compartment should not be accessible.</li> <li>• The luminaire should have choice of Narrow beam, symmetrical mid, asymmetrical mid, symmetrical wide and asymmetrical wide beam suiting various applications with exposed PC optic lens.</li> <li>• The Luminaire should have a 10KV SPD duly bolted in the Luminaire and 4KV internal surge protection and range of operating voltage will be 120-270V AC.</li> <li>• The Luminaire should have a breather to ensure that air balance inside and outside of the Compartment The luminaire should be of Class B Serviceability.</li> <li>• The wattage of each LED should be greater than 1 watt and less than 4 Watt. Only high power Single white LED chip with ceramic based suitable for outdoor use is allowed. Multi Chip, array multi die, mid power, Integrated arrays and COB's are not permitted.</li> <li>• The LED used in the luminaire shall be SMD type only of make LG, Lumileds, Osram, Nichia, and CREE.</li> <li>• The luminaire should be capable of withstanding voltage stress of 440V for 8 Hrs., should have an auto shutdown @ 325V and have an auto recovery feature.</li> <li>• The Drivers should be a potted driver not a printed circuit board without casing, mounted inside the luminaire &amp; it should be of same</li> </ul>
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			<p>make. The fitting should have a breather ensuring a stable optical and thermal management.</p> <ul style="list-style-type: none"> <li>• Both luminaire and driver should be of same make and both of them should have BIS approval.</li> <li>• The Flood light fitting shall be installed on bottom side of Galvanized Iron cable tray with suitable angle so that required lux level can be obtained.</li> <li>• Nos of flood light fittings in each indoor Badminton Court, however, should not less than 8 Nos.</li> </ul> <p>The minimum lux level should not be less than of 200 -300lux. Numbers of luminaries, as mentioned above, should not be less than 8 (2 x 4) Nos fittings in indoor badminton court.</p>
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Provisions for Electrical Vehicles Charging facilities should be kept for installation in future as per requirements at the RBI colony. However, Power infrastructure, such as electrical panel, DB's, cables etc should be provided at indicated locations on drawing, so that, in future Electrical Vehicles Charging stationed can be installed as and when required. The cost of electrical infrastructure is included in the scope of this contract. Nothing extra on this account shall be payable to the contractor.

**During design of power distributions (Cable size), volage drop for feeders shall not excessed 2% at design load. Volage drop for branch circuit should not be exceed 3% at design load (As per ECBC requirements).**

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**PACKAGE C-2**  
**FIRE FIGHTING, SPRINKLER, FIRE EXTINGUISHER SYSTEMS**

- 2. Fire Fighting System: -**
- 2.1** The work shall be carried out as per CPWD General Specifications for Wet riser & Sprinkler System (Part-V) 2020 as amended and corrected up to date, CPWD General Specifications of Electrical Works Part-I 2023 as amended and corrected up to date, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard, NBC 2016 amended and corrected up to date, NFPA 2013, IBC (International Building Code). Contractor will enable the consultant for obtaining fire NOC, rectify the defects and shortcomings, if any, pointed by the CFO and arrange inspection/ testing of the scheme as required for this purpose. The contractor shall follow the following guidelines while designing and executing the work:
- NBC 2016 (India), Part 4 (Fire and Life Safety)
  - NFPA 13 (Sections 11.3.3.1, 8.15.4.3.2)
  - IBC 705.8.2 (International Building Code)
- 2.2 Scope of work** include design , drawing, fabrication of system i/c supply of different motor pump set having higher efficiency highest BEE star rating, Electrical fire pump, Diesel Engine for fire pump, Sprinkler pump, piping networks and its necessary accessories, valves, hydrant (Internal & external),Hose pipe, Hose reel, GM Branch pipe, nozzle, fire service inlet, fire service connections, fire brigade draw out collecting head, Air vessels, orifice plate, pressure gauge, pressure meter, automatic sprinkler system i/c piping, nozzle, sprinkler piping of required diameter as per drawing, alarm system for wet riser as well as for sprinkler system, control system, Electrical Panel, cabling, earthing etc. complete as required to make the system fully functional, testing & commissioning, approval from state fire department, handing over to client department in working conditions.
- In addition to above, portable fire extinguisher (ABC and CO<sup>2</sup>) type is also included in scope of work.
- 2.3** As per suggestion of Fire & Emergency Service station Govt. of Assam, Chandmari vide letter date 28/10/2024 firefighting system are proposed.
- 2.4 Provisions of automatic sprinkler system has been proposed at the following locations:**

Sl. No.	Name of Building/ Block	Nos. of floor	Sprinkler System proposed

<b>2.5</b>	i. <b>D</b>	Residential Tower – 1	2S+P+9	2 Stilt floor area
	e. ii. <b>t</b>	Residential Tower – 2	2S+P+9	2 Stilt floor area
	a. iii. <b>f</b>	Residential Tower – 3	2S+P+9	2 Stilt floor area
	i. iv. <b>s</b>	Residential Tower – 4	2S+P+9	2 Stilt floor area
	<b>o.</b> <b>f</b>	Residential Tower - 5	S+P+6	1 Stilt floor area
	vii. <b>F</b>	Residential Tower - 6	S+P+7	1 Stilt floor area
	i. viii. <b>r</b>	Residential Tower - 7	S+P+9	1 Stilt floor area
	e. ix. <b>F</b>	Residential Tower - 8	S+P+5	1 Stilt floor area
	<b>g.</b> <b>h.</b> <b>t</b>	Residential Tower - 9	S+P+9	1 Stilt floor area
		Club – 2	2S+P+1	All Stilt floor area

ing system to be installed at different blocks (indicative):

<b>Sl. No.</b>	<b>Name of Building/ Block</b>	<b>Nos. of floor</b>	<b>System proposed</b>		<b>Terrace Tank (Ltrs.)</b>		<b>Terrace Pump (LPM) (1 W +1 S)</b>	<b>Fire Service inlet</b>
			<b>Wet riser cum downcomer system</b>	<b>Downcome r system</b>	<b>5000</b>	<b>25000</b>		
i.	Residentia l Tower - 1	2S+P+9 1	-	1			1	1
ii.	Residentia l Tower - 2	2S+P+9 1	-	1			1	1
iii.	Residentia l Tower - 3	2S+P+9 1	-	1			1	1
iv.	Residentia l Tower - 4	2S+P+9 1	-	1			1	1
v.	Residentia l Tower - 5	S+P+6 -	1		1		1	1
vi	Residentia l Tower - 6	S+P+7 1	-		1	1	1	1

			480							
vii	Residentia 1 Tower - 7	S+P+9	1	-	1		1	1	1	1
viii .	Residentia 1 Tower - 8	S+P+5		1		1	1	1	1	
ix.	Residentia 1 Tower - 9	S+P+9	1	-	1		1	1	1	
x.	Regional Director	G+1		1	1		1	1	1	
xi.	Club – 1	G+1		1		1	1	1	1	
xii.	Club – 2	2S+P+1		1		1	1	1	1	

## 2.6 Details of pump (indicative) to be installed for firefighting and sprinkler system:

Sl. No.	Description of the Pump	Qty	Discharge (in lpm)	Head (in Meters) *
i.	Main electric driven fire pump shall be horizontal split casing for Wet Riser system.	1	2280	110
ii.	Main electric driven fire pump shall be horizontal split casing for sprinkler system.	1	1620	Suitable head
iii.	Standby Diesel Engine Driven Pump shall be horizontal split casing for wet riser and sprinkler system.	1	2280	110
iv.	Jockey/Pressurization Pump for hydrant system shall be electric Driven Horizontal Type, multi stage.	1	180	110
v.	Jockey/Pressurization Pump for sprinkler system shall be electric Driven Horizontal Type, multi stage.	1	180	Suitable head
vi.	Terrace Pump shall be electric Driven Horizontal split casing Type (1w + 1s)	12	900	Suitable head
vii.	Dewatering pump	1	Suitable discharge	Suitable head

**Note: Quantity and capacity mentioned above are tentative and minimum, it may be very as per actual design.**

- 2.7** The distribution pipe and range pipe in the sprinkler system be laid as per the relevant IS code and CPWD Specification Part V (Wet Riser & Sprinkler system) 2020 as amended and corrected up to date.
- 2.8** The provision of sleeves in the beams shall be kept for running the distribution range pipe if required.

**2.9** The air Vessel for sprinkler and wet riser shall be provided as per specification.

**2.10** Each sprinkler zone shall have one flow switch.

**2.11** In each floor of buildings/ blocks (from Stilt/ podium to Terrace), there shall have internal fire hydrant and external hydrant shall be provided as per marked drawings.

**2.12 Internal Hydrant:**

Internal hydrant shall be connected with each riser (wet riser as well down comer) at every floor. Each internal hydrant should be consist following at every floor i/c terrace of each building/ block.

- i) 63 mm dia. Single-headed, cast-iron body, gun metal landing valve ISI marked conforming to IS 5290 (type A) with blank gun metal cap and chain as required – 2 nos.
- ii) First Aid hose reel along with drum and bracket, 1 no.20 mm nominal internal dia. water hose thermoplastic (textile reinforced type- as per IS: 12585), 30 M long, 20 mm nominal internal dia. gun metal globe valve and nozzle, Heavy duty G.I. pipe and socket to connect riser).
- iii) Hose pipe 63mm dia. 15 mtr. Long rubber lined woven jacketed hose pipe ISI marked type- A (Reinforced Rubber Lined) confirming to IS 636 having Male Female Gun metal coupling-2 Nos.
- iv) 63 mm dia. Gun metal Branch pipe with 20 mm (nominal internal dia.) Gun metal Nozzle conforming to IS: 903 suitable for instantaneous connection - 1 no.
- v) All above components shall be housed in Electrical shaft of each floor and should be covered with fire rated material door.

**2.13 External (Yard) Hydrant:- (As per marked drawings enclosed with bid documents).**

Each external hydrant should consist of the following:-

- i) 63 mm dia. Single-headed, cast-iron body, gun metal external valve ISI marked conforming to IS 5290 (type A) with blank gun metal cap and chain – 1 no.
- ii) Connection from ring main with 80mm dia. heavy duty GI pipe 1 Mtr. long.
- iii) Butterfly valve of PN 1.6 rating gun metal, ISI marked conforming to 13092, 80 mm dia.-1 No.
- iv) Hose pipe 63mm dia. 15 mtr. Long rubber lined woven jacketed hose pipe ISI marked type- A (Reinforced Rubber Lined) confirming to IS 636 having Male Female Gun metal coupling-2 Nos.

- v) 63 mm dia. Gun metal Branch pipe with 20 mm (nominal internal dia.) Gun metal Nozzle conforming to IS: 903- 1 no.
  - vi) All above components shall be housed in a suitable size MS cabinet made from 2 mm thick sheet with glass panel on front.
- 2.14** Components like landing valve, hose coupling, branch pipes, Fire Brigade Inlet Connection (FBIC) etc. shall be ISI marked and made of Gunmetal.
- 2.15 Fire Service inlet:** - In order to facilitate feeding of water in the system by fire service department, a 2/3-way 63 mm diameter collecting head shall be provided and connected with each riser/down comer and the ring main with non-return valve and butterfly/slue valve. This should be located at a place where fire brigade tender can reach easily.
- 2.16 Fire Service connection:** It is for feeding water to underground storage tank by fire tankers. The static water storage tank shall be provided with a fire brigade collecting head with 4 number 63 mm diameter instantaneous male inlets arranged in a valve box at a suitable point at street level. If tank is not approachable for the fire tenders, the fire brigade collecting head shall be connected to the static tank by a suitable fixed galvanized iron pipe (Heavy duty) not less than 150 mm in diameter to discharge water into the tank when required.
- 2.17 Fire Brigade draw out collecting head:** Each of the static water storage tanks shall also be provided with a fire brigade draw out collecting head with 63 mm diameter instantaneous male draw out arranged in a valve box at a suitable point at street level. This draw out shall be connected to galvanized iron pipe (Heavy duty) of 100 mm diameter with foot valve arrangement in the tank.
- 2.18 Air Vessel :**  
The air vessels shall be 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, pressure gauge and other required accessories and painting with synthetic enamel paint of approved shade. The air Vessel for sprinkler and wet riser shall be provided as per specification.
- 2.19 Pressure gauge :**  
100 mm dia. pressure gauge of range 0 - 10 kg/sq.cm conforming to IS - 3624 having Burdon tube of stainless steel 310 in cast aluminium, stove enameled, black weather proof case outer, screwed aluminium bezel and complete with necessary U type stainless steel siphon tube and cock including providing and fixing suitably painted angle iron support to the tube.
- 2.20 Level indicator:**  
Electronic type water level indicator with LED panel mounted specified complete with probes & all control wiring etc.
- 2.21 Auto Air vent:**

Auto Air vent shall be provided for risers, suitable for pressure not less than 15 Kg/Sq.cm.

## **2.22 Pipe Work:**

Pipes shall be of the following material.

- (i) 'C' Class Heavy Duty MS Pipe conforming to IS 1239/Class -II of IS: 3589.
- (ii) 'C' Class Heavy Duty MS Pipe conforming to IS 1239/Class -II of IS: 3589, for sizes greater than 200 mm. These pipes shall be factory rolled and fabricated from minimum 7 mm thick M S sheet for pipes up to 350 mm dia.
- (iii) MS / GI / Cadmium plated steel nuts, bolts, washers shall be used.
- (iv) All the MS / GI accessories such as tees / elbows / reducers / couplings / unions / bends / flanges etc. shall be heavy class. Fixing of pipes shall be as per CPWD specification as amended.
- (v) All riser pipe diameter shall not be less than 100 mm dia. and all ring main shall not be less than 150 mm dia.

## **2.23 Butterfly valve:**

Butterfly valves shall be Flanged Type of PN-1.6 with CI body & SG Iron disc duly ISI marked conforming to IS 13095 including rubber gasket, flanges, nuts, bolts and washers & other accessories complete as required. Butterfly valve shall be used for pipes of sizes 40 mm to 150 mm.

## **2.24 Sluice Valve:**

Sluice valve shall be double flanged of rating PN 16 with non-rising spindle, bronze / gun metal sheet, ISI marked complete with nuts, bolts, washers, gaskets, confirming to IS: 780. Sluice valves shall be used for pipes of sizes above 150 mm.

## **2.25 Non-return valve:**

- i. Non-return valves shall be dual plate type confirming to IS: 5312
- ii. The valve shall be PN 16 pressure rating.

## **2.26 Strainer:-**

'Y' / Pot Strainer shall be of PN-16, CI body, Flanged Type with bolted cover & strainer fabricated out of 1.6 mm thick stainless-steel sheet with 3 mm dia. Holes.

## **2.27 Main Fire Pump (Automatic):**

- i) Horizontal split casing, multistage, centrifugal pump shall be 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. (The pump should be capable of delivering 150 % rated discharge at a head not less than 65% of the rated head).
- ii) Suitable HP, SQ cage induction motor, TEFC, synchronous speed 1500 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 fitted and coupled on a common base frame along with coupling guard.
- iii) Foundation of Pumps & Electrical motor shall be constructed as per the requirement/ recommendation of manufacturer.

## **2.28 Main sprinkler Pump (Automatic):**

- i) Horizontal split casing, multistage, centrifugal pump shall be 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. (The pump should be capable of delivering 150 % rated discharge at a head not less than 65% of the rated head).
- ii) Suitable HP, SQ cage induction motor, TEFC, synchronous speed 1500 RPM, suitable for operation on 415 volts, 3 phase 50 Hz. AC with IP 55 protection for enclosure, horizontal footmounted type with Class-'F' insulation, conforming to IS-325 fitted and coupled on a commonbase frame along with coupling guard.
- iii) Foundation of Pumps & Electrical motor shall be constructed as per the requirement/ recommendation of manufacturer.

## **2.29 Diesel Engine Fire Pump (automatic):**

- i) Horizontal split casing, multistage, centrifugal pump of shall be 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. (The pump should be capable of delivering 150 % rated discharge at a head not less than 65% of the rated head).
- ii) The engine shall be multi-cylinder/vertical 4 stroke cycle, water cooled, developing suitable BHP at the operating speed of 1500 rpm to drive the fire pump. Continuous capacity available for the load shall be exclusive of the power requirement of auxiliaries of the diesel engine, and after correction for altitude, ambient temperature and humidity of Guwahati.
- iii) The Engine shall be complete with auto starting mechanism 12/24 Volts electric starting equipment, Diesel Tank, exhaust pipe extended up to 1m. outside pump house duly insulated with 50 mm. thick glass wool with 1.0 mm. thick aluminum sheet cladding, residential silencer,instruments and protection as per specification, stop solenoid for auto stop in the event of fault with audio indication, painted with post office red color etc. as required and coupled on a common base frame along with coupling guard.
- iv) The engine shall be suitable for cold starting for which suitable heaters shall be provided in lubricating oil.
- v) The engine shall develop full load within 15 seconds from the receipt of signal to start. The diesel engine shall conform to BS 649/IS 10002 amended up to date.
- vi) Engine Accessories- The engine shall be complete with all accessories as per CPWD specification.
- vii) The high torque D.C motor charged by battery shall initiate automatic start of diesel engine. The battery shall hold adequate retainable charge to provide the starting of the diesel engine.Starting power will be supplied from storage batteries. The battery capacity shall be adequatefor ten consecutive starts without recharging

with a cold engine under full compression. Battery shall be lead acid type of 12 V, 180 Ah capacities.

- viii) Foundation of Pumps & Electrical motor shall be constructed as per the requirement/recommendation of the manufacturer.
- ix) The fuel tank shall be of welded steel construction (3.0 mm thick) and capacity sufficient to allow the engine to run on full load for at least 8 hours.
- x) Engine instrumentation shall include the following:
  - a. Lub. Oil pressure gauge.
  - b. Lub. Oil temperature gauge.
  - c. Water temperature gauge.
  - d. Tachometer.
  - e. Hour meter.
- xi) Engine protection devices shall include the following:
  - a. Low Lub. Oil pressure.
  - b. High Lub. Oil temperature.
  - c. High cooling water temperature.
  - d. Over speed shut down.
- xii) Engine Exhaust Pipes shall be MS pipe and sized in accordance with the manufacturer's recommendations.
- xiii) A stainless-steel flexible connection shall be provided between the engine exhaust outlet and the exhaust pipe. An exhaust silencer shall be provided as required to satisfy the acoustic requirements.
- xiv) Necessary float and boost charger shall be incorporated in the control section of power and control panel, to keep the battery under trim condition. Voltmeter to indicate the state of charge of the batteries shall be provided.

### **2.30 Jokey / Pressurization pump (Automatic for wet riser system) :**

- i) Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal with flow and head as per NBC 2016 and CFO requirement conforming to IS:1520.
- ii) Suitable HP SQ cage induction motor TEFC type suitable for operation on 415 volts, 3phase 50 HZ. AC with IP 55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS: 325, fitted and coupled on a common base frame along with coupling guard.
- iii) Foundation of Pumps & Electrical motor shall be constructed as per the requirement/ recommendation of manufacturer.

### **2.31 Jokey / Pressurization pump (Automatic for Sprinkler system):**

- i) Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal with flow and head as per NBC 2016 and CFO requirement conforming to IS:1520.

- ii) Suitable HP SQ cage induction motor TEFC type suitable for operation on 415 volts, 3phase 50 HZ. AC with IP 55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS: 325, fitted and coupled on a common base frame along with coupling guard.
- iii) Foundation of Pumps & Electrical motor shall be constructed as per the requirement/ recommendation of manufacturer.

### **2.32 Terrace pump (Automatic):**

- i) Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal with flow and head as per NBC 2016 and CFO requirement conforming to IS:1520.
- ii) Suitable HP SQ cage induction motor TEFC type suitable for operation on 415 volts, 3phase 50 HZ. AC with IP 55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS: 325, fitted and coupled on a common base frame along with coupling guard.
- iii) Foundation of Pumps & Electrical motor shall be constructed as per the requirement/ recommendation of manufacturer.

### **2.33 All panel will be type tested as per standard IEC 61439- 1 & 2. All panel board shall have RS 485 port MODBUS, BAEKNET, LON compatible.**

### **2.34 Fire Fighting Pump Control Panel (Power to be fed from essential Panel Board):**

- i) The panel shall be cubicle type totally enclosed, fully compartmentalized with IP 42 degree of protection class and fabricated from CPRI approved manufacturer with 2 mm thick CRCA sheet powder coated with 7 tank process and shall be equipped with suitable rating of 4 pole MCCBs as incomer, Bus bars, digital type Multifunction meter with suitable CTs to measure parameters like current, voltage, frequency, wattage, power factor, KWH, KVA, etc. as per drawing approved by Engineer — in — charge. **This panel shall be fed from essential power supply panel (DG Set) according to suggestion of Assam Fire and Emergency Service Station, Assam.**
- ii) Suitable rating Out going MCCBs & starters, relays, Contactors of required rating, digital type ammeter, CTs, push buttons, LED type indicating lamps and control components shall be provided on each compartment of the pump control panel for the following pump
  - (a) Main Fire pump - 1 no. (for wet riser)
  - (b) Main Fire pump - 1 no. (for sprinkler)
  - (c) DG operate Fire Pump (for wet riser) – 1 No.
  - (d) Jockey pump (for ring main/wet riser system)-1 No.
  - (e) Jockey pump (for Sprinkler system)-1 No.

- (f) Terrace Pump- 2nos. for each buildings.
- (g) Dewatering pump- 1 No.
- iii) All MCCBs shall be provided with Rotary handle on the front door.
- iv) The breaking capacity of MCCB for all types of panel boards except DBs shall be as per CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 and specification provide in package- substation. The rated service breaking capacity should be equal to rated ultimate breaking capacities ( $I_{cs}=I_{cu}$ ). Where  $I_{cs}$  is service breaking capacity and  $I_{cu}$  is ultimate breaking capacity. MCCBs above 250A shall be provided with microprocessor release with suitable fault level with adjustable O/L, S/C, protection and up to 250A with Thermal Magnetic release of suitable fault level having adjustable settings for O/L and S/C.
- v) Detachable Gland Plates made of 3 mm thick CRCA sheet, complete with required number and sizes of knock out shall be provided at top & bottom of the panel board for incoming and outgoing cable as required.
- vi) The panels shall be manufactured with separate busbar chamber isolated from unit feeder chambers and cable alleys. The height of the panel shall be as per the drawing but not more than 2300 mm and operating levers, handle etc. of highest unit shall not be more than 1.7 meters. Depth of the panel shall not be less than 300 mm and width of the panel will be given in the particulars of panel specifications or as per actual site conditions. Shop drawings shall be prepared by agency and got approved from the Engineer-in-charge before fabrication is taken up.
- vii) The bus bars shall be of four strip Aluminium with a current density of 130A/sq.cm. The busbars will be insulated with heat shrinkable sleeves and properly supported. All live parts shall be shrouded by means of acrylic / steel /FRP sheets to ensure no accidental contact with live parts during maintenance and provide simultaneous inspection. The busbars will be adequately insulated and protected to prevent accidental contact during operation and maintenance.
- viii) Internal Wiring of the panel shall be with Cross- Linked HRFR copper conductor 1100- Volt grade with ISI marked stranded cables of approved make.
- ix) 2 Nos. 20x3 mm copper strip for LT panel up to 400 Amp. capacity or 2 Nos. 20x5 mm copper strip for LT panel of higher capacity shall be fixed all around the panel connected to 2 Nos. earth bus copper strips connected to incoming earth conductors.
- x) Earthing terminals shall be fitted to each enclosure, suitable for internal and external connection to enable the exposed conductive parts of the protective conductor.
- xi) Cable terminals shall be suitable for the number, size and type of cables as indicated. Adequate spacing shall be allowed for spreading of cable tails to avoid stress on the insulation or terminals; if necessary, extension boxes shall be fitted to standard enclosures. Terminals for neutral conductors for three phase and neutral circuits shall be the same size as for phase conductor, except where reduced section neutral cable cores are indicated.

#### **Control System:**

- i) The System shall be designed for operation automatically so that as and when water is drawn from the system through any hydrant/sprinkler/water curtain, the pumps will operate automatically and feed water into the system. However, once

- a Fire Pump start working, it will be stopped only manually (except jockey pump) or on account of any fault or non- availability of power supply to electrical pumps or low water level in UG/Terrace tank.
- ii) Facility shall also be provided for manual operation. A selector switch for auto/manual selection shall be provided in each pump.
- iii) The Control system shall be designed to provide the following sequence of operation:
- The Pressurization Pump shall maintain pressure in the system and shall operate only on account of slow pressure loss. In case of the sudden pressure loss the Pressurization Pump shall not operate. The pump shall start when the water pressure in the system falls to a pre-set value (about 0.35 kg/cm<sup>2</sup> below normal system pressure) and shut down when the system pressure reaches the set value. Both limits shall be adjustable.
  - Main Electric Fire Pump shall operate on account of sudden pressure loss. So long as Main Electric Fire Pump is working, other Fire Pumps will not operate. The pump shall start when the water pressure falls to a pre-set value in the system (about 1 kg/cm<sup>2</sup>)
  - The Diesel Fire Pump will start on sudden pressure loss, only in case supply to Main Electric Fire Pump is not available or within a pre-set time the Main Electric Fire Pump fails to start or fail during operation. No other pump will be working when Diesel Engine Fire Pump is in operation. Audio-Visual Alarm shall be available to indicate failure of Main Electric Fire Pump.
  - A three attempts starting facility will be provided for diesel pump.
  - If within a pre-set time, the standby pump also fails to start or fails to develop pressure, the standby pump shall also be shut down and locked out. An audio-visual alarm indication shall be given at the control panel.
- iv) The terrace pumps will start on sudden loss of pressure only when both the fire pumps have either failed to start or exhausted water.
- v) Only one pump will be working at a time. In manual mode more than one pump can be started.
- vi) Water level in UG and terrace tanks shall be monitored and in case of low water level, pumps connected with the tank shall not operate (even on manual mode) or stop operation as the case may be. An audio-visual alarm shall be given at the control panel.
- vii) The System Controller shall be designed to operate the fire pumps with interlocking and fault indication as brought out above Annunciation window provided in the panel shall indicate following faults:
- Low water level in UG Tank
  - Low water level in Terrace Tank
  - Main Pump failed to start
  - Main pump failed during operation
  - Diesel Pump failed to start
  - Diesel Pump failed during operation

- g. Supply to main pump failed
- h. Supply to pressurization pump failed
- i. Sprinkler Pump failed to start
- j. Sprinkler Pump failed during operation
- viii) Deluge Valve triggered by a detection device, at which point the valve opens to release the extinguishing agent.
- ix) Suitable sensors, differential pressure switches, monitors etc. shall be provided at respective location. The control system shall be operational on 24 Volt DC batteries of engine starting Battery chargers shall be provided to ensure that the batteries remain charged all the time. Batteries shall be sealed maintenance free type.

**2.35 Terrace Pump Control Panel (Power to be fed from essential Panel Board):**

- i) The panel shall be cubicle type totally enclosed, fully compartmentalized with IP 42 degree of protection class and fabricated from CPRI approved manufacturer with 2 mm thick CRCA sheet powder coated with 7 tank process and shall be equipped with suitable rating of 4 pole MCCBs as incomer, Bus bars, digital type Multifunction meter with suitable CTs to measure parameters like current, voltage, frequency, wattage, power factor, KWH, KVA, etc. as per drawing approved by Engineer -in-charge.
- ii) Suitable rating Out going MCCBs & starters, relays, Contactors of required rating, digital type ammeter, CTs, push buttons, LED type indicating lamps and control components shall be provided on each compartment of the pump control panel for the following pump
  - (a) Pump - 2 nos. (1 no. working + 1 standby).
  - (b) Flushing pump for solar panel flushing.
- iii) All MCCBs shall be provided with Rotary handle on the front door.
- iv) The breaking capacity of MCCB for all types of panel boards except DBs shall be as per CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 and specification provide in packge-Substation. The rated service breaking capacity should be equal to rated ultimate breaking capacities ( $I_{cs}=I_{cu}$ ). Where  $I_{cs}$  is service breaking capacity and  $I_{cu}$  is ultimate breaking capacity. MCCBs above 250A shall be provided with microprocessor release with suitable fault level with adjustable O/L, S/C, protection and up to 250A with Thermal Magnetic release of suitable fault level having adjustable settings for O/L and S/C.
- v) Detachable Gland Plates made of 3 mm thick CRCA sheet, complete with required number and sizes of knock out shall be provided at top & bottom of the panel board for incoming and outgoing cable as required.
- vi) The panels shall be manufactured with separate busbar chamber isolated from unit feeder chambers and cable alleys. The height of the panel shall be as per the drawing but not more than 2300 mm and operating levers, handle etc. of highest unit shall not be more than 1.7 meters. Depth of the panel shall not be less than 300 mm and width of the panel will be given in the particulars of panel specifications or as per actual site conditions. Shop drawings shall be prepared by agency and got approved from the Engineer-in-charge before fabrication is taken up.

- vii) The bus bars shall be of four strip Aluminium with a current density of 130A/sq.cm. The busbars will be insulated with heat shrinkable sleeves and properly supported. All live parts shall be shrouded by means of acrylic / steel /FRP sheets to ensure no accidental contact with live parts during maintenance and provide simultaneous inspection. The busbars will be adequately insulated and protected to prevent accidental contact during operation and maintenance.
- viii) Internal Wiring of the panel shall be with PVC insulated Cross- Linked HRFR copper conductor 1100- volt grade with ISI marked stranded cables of approved make.
- ix) 2 Nos. 20x3 mm copper strip for LT panel up to 400 Amp. capacity or 2 Nos. 20x5 mm copper strip for LT panel of higher capacity shall be fixed all around the panel connected to 2 Nos. earth bus copper strips connected to incoming earth conductors.
- x) Earthing terminals shall be fitted to each enclosure, suitable for internal and external connection to enable the exposed conductive parts of the protective conductor.
- xi) Cable terminals shall be suitable for the number, size and type of cables as indicated. Adequate spacing shall be allowed for spreading of cable tails to avoid stress on the insulation or terminals; if necessary, extension boxes shall be fitted to standard enclosures. Terminals for neutral conductors for three phase and neutral circuits shall be the same size as for phase conductor, except where reduced section neutral cable cores are indicated.

**Control System:**

- i) The System shall be designed for operation automatically so that as and when water is drawn from the system through any hydrant/First Aid Hose reel, the pumps will operate automatically and feed water into the system in case of down comer system.
- ii) Facility shall also be provided for manual operation. A selector switch for auto/manual selection shall be provided in each pump.
- iii) The terrace pumps will start on sudden loss of pressure only when both the fire pumps have either failed to start or exhausted water where wet riser cum down comer system provided.
- iv) Only one pump will be working at a time. In manual mode more than one pump can be started.
- v) A push button shall be provided at the entrance of building to stop terrace pump manually.
- vi) Water level in terrace tanks shall be monitored and in case of low water level, pumps connected with the tank shall not operate (even on manual mode) or stop operation as the case may be. An audio-visual alarm shall be given at the control panel.
- vii) The System Controller shall be designed to operate the fire pumps with interlocking and fault indication as brought out above Annunciation window provided in the panel shall indicate following faults:
  - a. Low water level in Terrace Tank

b. Supply to pressurization pump failed

- viii) Suitable sensors, differential pressure switches, monitors etc. shall be provided at respective location. The control system shall be operational on 24 Volt DC batteries of engine starting Battery chargers shall be provided to ensure that the batteries remain charged all the time. Batteries shall be sealed maintenance free type.

### **2.36 Orifice plate:**

Orifice plate shall be of 6 mm. thick stainless steel with orifice of required size in between flange and landing valve of external / internal hydrant to reduce pressure to working pressure of 3.5kg/cm complete as required.

### **2.37 Installation Control valve:**

Control Valve shall consists of cast iron body and brass/bronze working parts comprising of water motor alarm, bronze seat clapper, and clapper arm, hydraulically driven mechanical gong bell to sound continuous alarm when the wet riser, sprinkler system activates, pressure gauge, emergency releases, strainer, pressure switch, check valve complete with drain valve and bypass, test control box, ball valves, M S pipe of required size, flanges, orifice plate, gasket etc. of size 150 mm dia. complete as required.

### **2.38 Pressure Switch:**

The pressure switches shall be employed for starting and shutting down operation of pumps automatically. The Pressure switch shall be diaphragm type, it shall be suitable for line pressures up to 15 kg/cm<sup>2</sup>. The switch shall be suitable for consistent and repeated operations without change in values. The enclosure shall be of aluminum and pressure element and wetted parts shall be of stainless steel.

- 2.39 The area to be protected by sprinkler is divided into various zones. For detecting operation of sprinkler in a zone, flow switches are provided which are wired to an annunciation panel installed in the Fire Control Room. In the event of operation of sprinkler(s) in an affected area. The annunciation panel will give audio-visual alarm and indicate the affected zone. This arrangement will be independent of fire alarm system.

### **2.40 Flow switch:**

Flow switch shall have a paddle made of flexible material of the width to fit within the pipe bore. The terminal box shall be mounted over the paddle/pipe through a connecting socket. The switch shall be potential free in either N O or N C operation of a single sprinkler head. The terminal box shall have connections for wiring to the Annunciation panel. The seat shall be of stainless steel. The flow switch shall have IP: 55 Protection. It should operate even with the flow of one Sprinkler bursting.

### **2.41 Sprinkler Head :**

Sprinkler Head pendant / Upright or side wall shall be rated at 680 centigrade (minimum) with quartzoid bulb 15 mm dia. Complete with brackets, twin plate sliding rosette as per specification complete.

**2.42 Flexible drops of stainless-steel metallic pipe:**

Flexi drops shall be UL listed 25 mm dia. Stainless steel metallic pipe of length 1000 mm to 1500 mm (as per the requirement of site condition) long with accessories as required (Wherever required).

**2.43 Pipe Sizing and Design: - Sprinkler heads shall be connected with pipe lines** permanently charged with water. Depending upon location of sprinkler heads and site conditions, sprinkler heads may be connected with range and distribution pipes. The pipes connecting the sprinkler heads are to be sized depending upon number of sprinkler heads and arrangement of their connection Various pipes connecting the sprinkler heads are termed as below:

- (a) Range Pipe
- (b) Distribution Pipe
- (c) Main Distribution Pipe
- (d) Riser.

**2.44 Sizes of pipes are to be calculated from various tables and hydraulic calculations given in IS: 15105.**

- 2.44.1 The distribution pipe and range pipe in the sprinkler system shall be laid as per the relevant Ecode and CPWD Specification Part V (Wet Riser & Sprinkler system) 2020 as amended and corrected up to date.
- 2.44.2 The provision of sleeves in the beams shall be kept for running the distribution range pipe if required.

**TABLE-A**

**RANGE PIPE NOMINAL SIZES FOR VARIOUS PIPE LAYOUTS IN  
MODERATE/ORDINARY HAZARD INSTALLATIONS**

	Range Pipe Layout	Pipe Nominal Bore (mm)	Maximum Number of Sprinklers to be fed by Pipe of size listed
A	(1) Range(s) at remote end of each distribution pipe spur in end feed layout:		
	(i) Last two ranges in two end-side layout	25	1
		32	2
	(ii) Last three ranges in three end-side layout	25	2
		32	3
	(2) Last range in all other layout	25	2
		32	3
		40	4
B	All other ranges in case of 1(i), 1(ii) & (2) above	25	3
		32	4
		40	6

**TABLE-B**

DISTRIBUTION PIPE NOMINAL SIZE  
INMODERATE/ORDINARY HAZARD INSTALLATIONS AND  
MAXIMUM NUMBER OF SPRINKLERS

Distribution pipes Pipe Layout	Type of Layout	Distribution Pipe Nominal (mm)	Maximum Number of Sprinklers to be fed by Pipe of size listed
(a) At extremities of the installation	Two end side layouts	32	2
		40	4
		50	8
		65	16
(b) Last three ranges	All other layouts	32	3
		40	6
		50	9
		65	18
Between design points and the Installation Control Valve	All	To be calculated as per 10.4.4 (b) of IS 15105	

**2.45 Components of Sprinkler System:-** The following types of valves are used in the installations:

- (a) Stop Valves
- (b) Test Valves
- (c) Drain Valves
- (d) Flushing Valves
- (e) Check Valves
- (f) Installation Control Valves
- (g) Pre action valves
- (h) Subsidiary valves

The location of the above valves shall be as under:

**2.45.1 Test Valve:** - For testing the hydraulic alarm or electric alarm by drawing water from the downstream side, the test valve shall be connected downstream of the water flow alarm.

**2.45.2 Drain Valve:** - For drainage of the system, a drain valve 50 mm diameter shall be provided downstream of the Installation Control Valve or any subsidiary stop valve. A common valve can perform the functions of test and drain. The outlet shall be connected with a 50 mm diameter G.I. drain pipe along with riser pipes.

**2.45.3 Flushing Valve:** - If the water used for sprinkler is not potable, flushing valves shall be provided at the end of a distribution pipe. The valve size shall be the same as the distribution pipe. Valve outlet shall be fitted with a brass plug and extended to not more than 3 m above floor.

**2.45.4 Check Valve:** - A Check valve shall be provided where more than one water supply is available, and the same shall be fitted on each water supply pipe.

**2.45.5 Subsidiary Stop Valve:** - A subsidiary stop valve, which shall be of the same diameter as the pipeline in which they are fitted, shall be provided to control water supply to sprinklers of highly sensitive areas like computer rooms.

**2.45.6 Installation Control Valve (ICV):** - A sprinkler installation shall be fitted with a suitable Installation Control Valve to control the water supply to the installation. The valve set shall comprise of:

- (a) a main stop valve.
- (b) an alarm valve.
- (c) a water motor alarm.

The alarm valve shall be fitted immediately downstream of the main stop valve of each building/block and before any connection is taken off to supply any part of the installation.

The Installation Control Valve shall be placed externally in the vicinity of the main entrance of the building protected at an easily accessible place so that the alarm bell sound is heard by the inhabitants/passer-by. The valve shall be secured open by a pad locked or riveted strap and protected against impact damage.

If there are genuine constraints in locating the Installation Control Valve outside the buildings, this may be located inside the building in the vicinity of main entrance (subject to approval of authorities concerned). Installation Control Valve in such cases, shall be located away from any exposure to damage and personnel shall be normally available in the vicinity of the location to get alerted by alarm operation. Also, electrically operated sirens interfaced with the opening of the alarm valve of ICV, shall be provided outside the building. In no case, Installation Control Valve shall be provided inside basement or inside pump room.

A plan of the risk with the position of Installation Control Valve shall be placed in a conspicuous location. A location plate shall be fixed near the Installation Control Valve bearing the following words in raised letters:

#### **2.46 SPRINKLER ALARM VALVE: -**

Water motor alarm: Water motor alarm shall be provided very close to the alarm valve. Strainer shall be fitted between the alarm valve and the motor nozzle connection. The water outlet shall be positioned so that any flow of water can be seen. The alarm device shall provide audibility level of 85 dB above the back ground noise level.

#### **2.47 Pressure Gauges: -**

Pressure gauges shall be provided immediately after and below each fire alarm valve.

#### **2.48 SPRINKLER ANNUNCIATION PANEL AND ALARM: -**

Electrically operated alarm shall be provided for indication of operation of the sprinkler in an area. Water flow switches shall be installed in main distribution pipes which shall be wired to the sprinkler annunciation panel. In the event of operation of a sprinkler, the flow switch will operate and give a signal to the annunciation panel to indicate the operation of the sprinkler in the area. This will initiate an electrically operated alarm. The system shall be independent of the fire alarm system and compatible with BMS. Necessary potential-free contacts for use in BMS should be provided.

#### **2.49 Spare Sprinklers to be kept in Stock: -**

A stock of spare sprinklers shall be maintained in the premises so that prompt replacement is possible after the operation/damage of sprinkler heads. The spares shall be kept in an easily accessible location under conditions where the temperature does not exceed 38°C.

In respect of stocking spare sprinkler heads, the guidelines of CPWD specification shall be followed.

Spanners or wrenches for the sprinklers shall also be kept along with the spare sprinklers in readiness.

#### **2.50 Test assembly: -**

Test assembly complete with test valve, sight glass sectional drain valve, union; necessary piping, threading, jointing & with corrosion resistant orifice all complete shall be provided as per drawing.

#### **2.51 Testing: As per CPWD specifications as amended upto date.**

#### **2.52 Portable Fire Extinguishers:**

Type of Portable Fire Extinguisher to be used: -

2.52.1 CO<sub>2</sub> type Fire extinguisher IS: 15683–2006 –4.5Kg.

2.52.2 ABC Dry Powder fire extinguisher IS: 15683–2006-6Kg & 9kg capacity.

2.52.3 Details of minimum numbers Portable Fire Extinguisher to be installed at different blocks/ bldgs:

Sl. No.	Name of Building/ Block	Nos. of floor	Each floor*		Each Block/ Bldg.*		
			Dry Powder type		CO <sub>2</sub> type	Dry Powder type	
			6 Kg	9 Kg	4.5 kg	6 Kg	9 Kg
a.	Tower - 1	2S+P+9	2	-	2	26	0
b.	Tower - 2	2S+P+9	2	-	2	26	0
c.	Tower - 3	2S+P+9	2	-	2	26	0
d.	Tower - 4	2S+P+9	2	-	2	26	0
e.	Tower - 5	S+P+6	2	-	2	16	0
f.	Tower - 6	S+P+7	2	-	2	18	0
g.	Tower - 7	S+P+9	2	-	2	22	0
h.	Tower - 8	S+P+5	2	-	2	14	0
i.	Tower - 9	S+P+9	2	-	2	22	0
j.	Director	G+1	1	-	1	2	0
k.	Club – 1 (Part A)	G+1	2	-	2	4	0
l.	Club – 2 (Part B)	2S+P+1	1	-	1	4	0
m.	Lift Machine Room (13 one & 20 one passenger in each block) 11 blocks		2	-	2	22	0
n.	Sub-station building i/c HT,LT, DG Set etc	1	-	6	6	6	4
o.	STP Room	1	1	-	1	1	1

p.	Fire Pump Room	1		1		1		1
q.	Water pump Room	1	1	-	1	1	-	1
r.	Water Filtration room	1	1			1		

\* Quantities mentioned above is tentative and may be varied according to design and as per requirement at site.

### 2.53 Specification for Fire Extinguishers:

Sl. No.	Type of Extinguisher	Capacity	Specification	Accessories
1.	CO2 type	4.5 Kg	Conforming to IS: 15683.	Complete with delivery hose horn, wheel type release valve, locking arrangement, operation manual and bracket. Operating Temperature:- 30°C to +60°C.
2.	Powder Fire Extinguisher (Gas Cartridge)	06 Kg & 09 Kg.	ISI marked conforming to IS: 15683:2006	Complete with squeeze grip release valve, discharge pipe, locking arrangement, operation manual and bracket. Operating Temperature: -30°C to + 60°C.
			IS 4308marked ABC powder	
			IS 4947 ISI marked Gas Cartridge.	
3.	Clean Agent (Stored Pressure) Ceiling mounted.	4 Kg	ISI marked IS: 15683	The extinguisher filled with HFC 236FAClean Agent Gas. Complete with squeeze grip release valve, locking arrangement, pressure gauge, operation manual and bracket. Complete in all respect. Operating Temperature: -30°C to + 60°C

### 2.54 Fire bucket with stand:

4 Nos. as per IS 2546 shall be installed at following places: -

- i) Sub-station Rooms.
- ii) L T Panel room, HT meter room, DG Set Room.

### 2.55 Highly Electric resistant insulated mat:

Insulated mat, 1 meter wide and 2mm thick rated for 3.3 KV capacity one side having antiskidas per IS: 15652/2006 (ISI marked) etc. as per specification complete as required.

2.55.1 Danger Plate – As per CPWD Specification.

2.55.2 Safety instruction chart in word duly framed and laminated (size not less than 1.20 sq.mm).

2.55.3 First Aid Box as approved by St. John Ambulance Brigade/ Indian Red Cross conforming to IS 2217: 1963.

### 2.56 Power Cable: -

2.56.1 All the incoming cables to Fire-fighting control panel & outgoing cables to equipment's shall be in the scope of work.

- i) The Power cable shall be **Cross-linked XLPE insulated armored aluminum conductor cable of 1.1 KV grade**. Power cable shall be of 2 core for single phase,

4 core for size up to and including 25 sq mm and 3 ½ core for size higher than 25 sq mm for 3 phase.

- ii) The Power cable size shall be selected to meet the load of starting and running current of the equipment and shall be as approved by the engineer-in-charge.
- iii) Cable shall be installed on approved perforated GI cable tray in pump room.

**2.57 Earthing: :-**

2.57.1 Metallic body of all the equipments shall be connected by two separate earth conductors by two nos. 6mm dia. copper wire from the earth station of the installation confirming CPWD specifications for Electrical works (Part-I), Internal 2023 as amended and corrected up to date. For details of earthing please refer **package-IEI** of this bid. Armoring of cables shall be connected to equipments and panel at both the ends.

## **PACKAGE C-3**

### **3. Manual Fire alarm system and Public Address System**

- 3.1 The work shall be carried out as per CPWD General Specifications for Fire Detection and Alarm System (Part-VI) 2018 as amended and corrected up to date, CPWD General Specifications of Electrical Works Part-I 2023 corrected up to date, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard, NFPA-72, NBC 2016 amended upto date and complete as required as per site and local by laws.
- 3.2 The Scope of work shall consist of Planning designing as enclosed drawing, supplying, installation, testing & commissioning of Manual fire detection & alarm system, LED Exit and Fire Signages with 2 hrs. battery back, public announcement and talk back system i/c wiring etc. The work shall also include getting the drawings approval from local fire authority, if require. The scope of work also includes to enable the consultant for obtaining fire NOC and arrange inspection/ testing of the scheme as required for this purpose. It also includes to rectify the defects or comply the observations if any given by CFO till the approval received from the CFO. System provided in following building and as per marked drawing attached with bid documents.

Sl. No.	Name of Building/ Block	Detectors to be provided in this Area
1	Residential Tower – 1	Electrical Shaft only
2	Residential Tower – 2	Electrical Shaft only
3	Residential Tower – 3	Electrical Shaft only
4	Residential Tower – 4	Electrical Shaft only
5	Residential Tower – 5	Electrical Shaft only
6	Residential Tower – 6	Electrical Shaft only
7	Residential Tower – 7	Electrical Shaft only
8	Residential Tower – 8	Electrical Shaft only
9	Residential Tower – 9	Electrical Shaft only
10	Regional Director	Common area only
11	Club – 1(G+1)	Entire area

12	Club – 2 (2S+P+1)	Entire area
13	Podium Parking Officer	Entire area
14	Podium Parking Officer	Entire area
15	Control Room	Entire control rooms in RBI campus

- 3.3 Power supply to fire detection and public address system equipment's shall be given through fire survival cables as mentioned in Package- IEI.

All major components of fire alarm system shall be product of a single manufacturer as per the list of approved make and shall conform to the requirement of EN54/ VDS/NFPA/ UL/ IS approved and designed according to Fire Alarm Systems CODE OF PRACTICE FOR SYSTEM DESIGN, INSTALLATION AND SERVICING.

Scope of work shall include FAS and PAS for 09 Nos. towers, RD residence, Club-I & II, and podium comprising of following:

- (i) Supplying, Installation, Testing and Commissioning of detectors, PA system, FFT, MCP, Hooter etc. as per CPWD specifications.
- (ii) Providing suitable compatibility in the Main Fire Alarm Control Panel for Integration of Public Address System.
- (iii) Providing Public Address System with Audio Amplifiers, speakers & required wiring. The system shall be used for public announcements, evacuation, playing music tower wise as a whole and floor wise independently. The system shall also be capable to use as car call system (for cars parked in basement, Podium and at stilt level).
- (iv) Background Music System.
- (v) There will be a public-address system for use from tower Control Rooms/ Reception lobby at Ground Floor to address all Basements, Podiums & specific areas like Drivers Room.
- (vi) Electrical works, including Cabling, Earthing etc. for the installation.
- (vii) The required PC and printers for monitoring the system.
- (viii) Integration of FAS with Smoke Ventilation & pressurization fans, Lifts, sprinkler monitoring panel, HVAC in club rooms, water levels of Fire water tanks and as required.
- (ix) **Safety Signages / Sign Boards:** Photo Luminescent Signages for Warning/Information/egress route guiding strip, Electrical Signages etc.
- (x) LED Exit and Fire Signages with 2 hrs. battery backup.
- (xi) Getting necessary approval from local fire officer after completion of work.
- (xii) Any other item required to make fire alarm and public address system as per approved plan/ scheme functional, but is not specifically mentioned in this scope.

### 3.4 Detail system requirements:

The work shall be carried out as per CPWD specification for Fire Alarm and Public Address System.

Detectors, manual call points, spot indicators and PA system shall be installed at locations as per requirement of local fire authority, NBC-2016 and CPWD specifications as required. The type of detector to be installed shall be decided as per the utility and as per direction of Engineer-in-charge based on requirements of local fire authority, NBC-2016 and CPWD specifications. Electrical rooms shall be provided with heat and smoke multi detectors.

- (i) The FAS shall be integrated to the following Mechanical, Electrical & Low Voltage Services for required at site functioning as required.
  - a. Air Conditioning-VRF System
  - b. Ventilation and/ or Pressurization System
  - c. Public address system/ Voice Evacuation System
  - d. Lifts
  - e. Fire-fighting system
  - f. Gas based flooding system in Sub Station & LT Panels
  - g. Any other service as per the directions of the Engineer-in-charge or RBI authorized persons and .
- (ii) In the event of a fire alarm, but not in a fault condition, in addition to other activities described in the CPWD Specifications, all lifts initiated through the system shall automatically be returned to Main landing or Ground Floor.
- (iii) FAS shall have an emergency voice alarm & communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported.
- (iv) FAS Panels shall be interconnected with each other suitably so that each FAS panel provide required information of other panels as well.
- (v) Microprocessor based modular intelligent manual fire alarm control panels shall be compatible with detectors used for connecting and monitoring the fire detectors and other devices. The panel shall have redundancy by providing additional CPU so that in case of failure of one CPU other takes over and system remain fully functional.

### 3.5 Description of items/ Particular Technical Specifications:

- (i) Intelligent Detectors: As per CPWD specification.
- (ii) Manual Call Points (Resetting Type): As per CPWD specification.
- (iii) Main Fire Alarm Control Panel compatible with detectors: As per CPWD specification.
- (iv) Low/High Intensity Hooters activated from the Panel: As per CPWD specification.
- (v) Fire Fighter's talk back system in each staircase.

### 3.6 The different component of fire alarm system shall be capable of functioning as per details below:

**3.6.1 Detailed Description of The System and Components of Fire Alarm Control Panel (FACP)**

**Main control and indicating panel (C & I Panel) including Public Address System:**

- (i) All the sectors/zones connected to this panel shall be continuously monitored.
- (ii) Audio-visual alarm shall be provided in this panel to show the ZONE affected by fault in its wiring system or by fire. Such an alarm should be separate for fault and fire conditions.
- (iii) This shall be complete with necessary circuitry for providing power supply to the entire FAS/AFAS drawing power from the mains/standby battery.
- (iv) This shall transmit to its repeater panel if any, signal of alarm of fault and of fire.
- (v) This shall be so designed that the audio alarm activation and silencing shall be as indicated in Section-5 (Part-A). SECTION - 4 CONTROL AND INDICATING PANELS & PA SYSTEM 19 FIRE DETECTION AND ALARM SYSTEM-2018
- (vi) Public Address System shall be provided to enable transmission of announcements and instructions to the occupants in each zone in the event of a fire.
- (vii) Fire alarm sounders in the premises shall be designed to function as loud speakers for the purpose. The microphone, necessary amplification equipment and control switches shall be provided as a part of the C&I panel.
- (viii) The power rating and frequency response shall be as per the requirements of the individual installation.

**Sector/zonal Panel:**

- (i) A sector panel shall be provided where there is more than one zone in a floor under the control of a C&I panel, and zonal panel is not required in that floor. A zonal panel shall be provided where there is only one zone in that floor.
- (ii) The sector/Zonal panel shall provide visual indication of the ZONE where a fault or fire has occurred. (See also 4.4.3) Audio alarm in this panel shall be provided, where specified in tender specifications.
- (iii) This panels shall transmit to the C&I panel, alarm signals from any of the trigger devices and the wiring connected to it.

**Repeater panel:**

A repeater panel where provided shall duplicate the alarm indications (audio as well as visual) of the C&I Panel

- (i) All indications, both visual and audio as shown on the C&I panel shall be indicated in the repeater panel, where provided.
- (ii) The power supply to operate the repeater panel shall be drawn from the C&I panel.

**The fire alarm panel shall operate 240V± 10% 50Hz.** The FACP shall also be provided with a dedicated standby power supply system (battery and charger) capable of maintaining the system for a period of not less than 24 hours after failure of ac power supply after which sufficient battery shall remain to provide full load operation for at least 30 minutes in line with IS 2189.

### 3.7 AUTOMATIC FIRE DETECTORS & DEVICES

General features common to all detectors:

- (i) The LED should be visible from a 360 deg view.
- (ii) **Maintenance:** All detectors shall be fitted either with plug-in system or bayonet type connections only, from the maintenance and compatibility point of view.
- (iii) **Construction:** The components of the detectors must not be damaged by static over voltage.
- (iv) Fault isolators shall be provided as per OEM requirements.

#### 3.7.1 Smoke, Temp, CO, Beam, Multi Criteria Detectors:

##### Governing Specifications:

- (i) Heat Detectors shall conform to IS-2175 - 1988 or BS-5445 ( EN 54) Part 5 – 1977(VdS/LPCB approved) or NFPA72 (UL/ULC/FM approved) amended upto date.
- (ii) Smoke Detectors shall conform to IS-11360-1985 or BS 5446 Part I-1977 & Part VII – 1985 (VdS/LPCB approved) or NFPA72 ( UL/ULC/FM approved) amended upto date.
- (iii) For other detectors/devices relevant IS or BS (EN 54) (VdS/LPCB approved) or NFPA 72 (UL/ULC/FM approved) amended upto date

#### 3.7.2 Manual Call Box:

Constructional requirements:

- (i) The call box shall be of 1.5mm thick welded sheet steel or 3mm thick cast aluminium. The front face shall have a glass area designed to break by a steady application of pressure or by impact. Suitable arrangement like scratching by a diamond bit shall be incorporated in the frangible element so that when it breaks upon application of pressure by a finger, it does not hurt the finger.
- (ii) The frangible element shall keep a push button pressed inside such that in the event of breaking of the frangible element, the push button is released to actuate an alarm in the control panel. The push button shall be partly depressed so as not to hinder breaking of the frangible element.

- (iii) The call box shall have suitable knock out for termination of a 20mm conduit. This shall also have suitable provision for being fixed on surface or semi recessed in wall.
- (iv) Where sheet steel is used for call box, this shall be thoroughly cleaned off dust, dirt, grease and rust if any and two coats of anti rust primer shall be given both inside and outside followed by two coat of synthetic enamel paint in signal red colour or epoxy or powder coated after seven tank process.
- (v) In the case cast aluminium body for a call box, the surface shall be neatly finished with red colour paint as in above.
- (vi) The words 'FIRE' shall be printed on the front of the call box in face of window.
- (vii) The glass surface shall be minimum 30 sqcm in area and glass thickness shall not exceed 2 mm.

**Installation requirement:-**

- (i) Manual call boxes shall be installed at a height of 1400mm above the floor level.
- (ii) They shall be installed at easily accessible, well illuminated and conspicuous position, preferably in a contrasting background so that they are easily noticed from either direction. They should be semi-recessed so as to project minimum 10mm from wall surface.
- (iii) They shall be installed free from obstructions and shall not themselves obstruct exit way.
- (iv) It shall be located on escape routes at (inside or outside) each floor to escape stairs preferably near entry to staircases at various level.
- (v) It shall be located such a way that, no person in the premises needs to travel more than 30 meters to reach a manual call point to give an alarm.
- (vi) Where necessary, the travel distance may be reduced to less than 30 meters e.g. where there is difficulty in access or in potentially dangerous risk areas.

### 3.7.3 Response Indicators

Remote Response Indicator shall be installed outside the areas normally kept closed to identify the detectors response even if the room is locked. These indicators shall be able to indicate the status of the corresponding detectors in these areas.

### 3.7.4 Sounders in a FAS/AFAS shall be of the following types:

- (i) Panel sounders.
- (ii) Fire alarm sounders. These in turn comprise of low intensity and high intensity Sounders. These shall be provided as specified in the schedule of work. The sounders for fire alarm should be electronic hooters/horns/electric bell

**Specification requirements:**

**Sounders:**

- (i) Hooter shall be provided for both panel sounders and fire alarm sounders. Bell may be provided as low intensity fire alarm sounders, only where so specified.
- (ii) The frequency of sound from sounders shall lie in the 500-1000 Hz band. The sound level shall be at least 65dB(A)or 5 dB (A) above any other noise likely persists

for a period longer than 30 second at any part of the building. Sounders with a level greater than 120 DB(A) shall not be provided.

(iii) The sound shall be continuous although the frequencies and amplitude may vary and of the same characteristics from the fire alarm sounders in a building. Coded fire alarm signalling from sounders shall not be provided which may cause hearing damage.

(iv) 'Fault alarm' and 'Fire alarm' in a panel sounder shall be distinctly different.

### **3.7.5 Silencing switches:**

(i) Silencing switch shall be in the form of a switch or push button.

(ii) This shall be located on the panel whose panel sounder is to be silenced.

(iii) Operation of a silencing switch shall not affect any visual indication nor the output of fire alarm sounders in the building.

(iv) Operation of a silencing switch shall not prevent the receipt of alarm from any sector/zone as the case may be, not already in an alarm condition.

### **Installation requirements:**

(i) Low intensity fire alarm sounders may be installed on surface of ceiling, suspended from ceiling or recessed in flush with the ceiling, depending on the construction of the sounder and ceiling height.

(ii) These shall be installed at a height not lower than 2.4m except when recessed in a false ceiling of lower height. In such cases the sounders shall be recessed at false ceiling level.

(iii) When installed flush with a false ceiling these shall match the ceiling surface. Necessary provisions for frame work to accommodate the sounders shall be made in the ceiling in advance.

(iv) High intensity sounders shall be mounted on substantial supports. Provisions for terminating the electrical wiring cables shall be such as not to permit entry of rain water through the wiring conduits or cable runs.

### **3.7.6 Signage's System:** Signage's play an important role in any public building for guidance of users for normal movement as well as for evacuation as per NBC and Indian standards.

1. Electrical signage shall be provided as per IS 9583. These shall be IP 65 rated, shall have an inbuilt maintenance free battery for 2hour backup along with charging arrangement. To provide further reliability such signages shall be connected/fed from UPS supply circuits. Independent circuit not required, looping from nearest UPS fed fitting etc. is allowed. These shall be provided in the egress route. These shall also be provided to guide location of each FHC, all stairs, lifts, floor and building exit, in complete basements as per fire requirement.
2. Photo luminescent Signs shall be provided with in staircase at every landing and mid landing and signage for identification/location of substation, electrical switch rooms, pump room, fire fighting pump house, ventilation rooms etc. as per direction of Engineer-in-Charge. Egress path shall also have photo luminescent path guiding strip of 50 mm wide on both sides of corridors/lobby and staircase. Floor Map for evacuation purpose (minimum 2 at each floor of minimum A1 size) shall also be of Photo luminescent type. Photo luminescent signages shall also be provided to depict safety instructions in Sub-stations. These shall be 1 mm thick and in conformity with BS ISO 3864-1 (2011). These

shall be Rigid photo luminescent based Glow-in the dark rigid sheet with high intensity luminous properties (glow visible for more than 12 hours in total darkness) enclosed in a transparent weatherproof UV stabilized coated sheet.

3. Size, color, design of Signage shall be as per IS:9457 (Safety Color and safety Sign) and IS 12349 (Fire Protection safety signs). Required no of signages of both types Electrical and Photo luminescent shall be provided.

**3.7.7 Fire Fighter's Phone system:** Complete in all respects shall be provided with phone at all landings of all staircase.

**a. Public Address/Voice Alarm System**

PA System shall be provided in residential and non-residential towers, podium, basements, all buildings site etc as required. Speakers in the Ceiling/Wall shall be provided in corridors, lift lobbies and other common areas, in outdoor areas speaker shall be installed on GI poles as per **NFPA/UL/NBC 2016**/relevant IS codes. Box type speaker shall be provided in the entrance lobby.

- (i) Horn type speaker shall be provided in the basement, outdoor and site areas.
- (ii) Recessed speakers in the false ceiling areas.
- (iii) Proper zoning is to be done considering the user requirement, critical areas & floor etc. Podium levels below each tower shall necessarily be connected to the respective tower zone.
- (iv) Control console shall be in each fire control room with gooseneck microphone.
- (v) System shall have the facility to make announcement on Buildings/Blocks and all outdoor areas simultaneously or on individual areas.
- (vi) Automatic as well as manual announcement system in fire affected Zone shall be provided.
- (vii) Prerecorded standard announcement messages shall be stored in memory for auto announcement. System shall be capable to record fresh messages also for future use.
- (viii) Media player shall be provided for playing content/music etc.
- (ix) Wiring shall be done using twin twisted tinned copper wire in the heavy duty PVC conduit.
- (x) The system shall be integrable with Fire alarm panel and with the BMS also.
- (xi) Standby amplifier shall be provided for PA System in the rack.
- (xii) Facility for Car hailer system shall be provided at podium floor or Ground floor.

**i. Digital Integrated System Manager/ controller**

Sr. No.	Minimum Specification
1	The system shall be fully IP-network based.

2	The system controller shall dynamically assign network audio channels for audio routing between system devices across multiple subnets.
3	It shall support >100 simultaneous High Definition audio channels (24-bit, 48 kHz) for music routing and making calls, with optional encryption and authentication to protect against eavesdropping and hacking.
4	The system Controller shall have capability to control up to 250 devices serving more than 500 zones.
5	The system controller shall provide an interface for control data and multi-channel digital audio over IP using an integrated 5-port Ethernet switch for redundant network connections, supporting RSTP and loop-through cabling.
6	The system controller shall have dual power supply inputs and power supplies.
7	The system controller shall manage all devices in the system to provide the configured system functions.
8	It shall incorporate a supervised storage for message and tone files with networked playback of up to eight streams simultaneously.
9	It shall keep an internal log of fault events and call events.
10	The system controller shall provide a secure TCP/IP open interface for remote control and diagnostics.
11	The system controller shall provide front-panel LED indications for the status of power supplies and the presence of faults in the system and provide additional software monitoring and fault reporting features.
12	Controller should have possibility to be connected in Hot Redundant architecture, i.e. in case of failure of working controller standby controller should take over the functionality of failed duty controller automatically. The redundant controller can be in same rack or can be distributed anywhere in <del>network</del> .
13	Controller should have built-in web server for configuration and file management using browser.
14	The system controller shall be rack mountable (1U).
15	The system controller shall be certified for EN 54-16 and ISO 7240-16, marked for CE and be compliant with the RoHS directive.
16	Technical Specifications:
17	Input voltage range :: 24 to 48 VDC
18	Input voltage tolerance :: 20 to 50 VDC
19	Ingress protection IP30
20	Ethernet : 100BASE-TX, 1000BASE-T
21	Protocol : TCP/IP
22	Redundancy : RSTP
23	Audio/control protocol : OMNEO

24	Network audio latency : 10 ms
25	Audio data encryption : AES128
26	Control data security: TLS
27	Ports : 5

**b. Power Amplifier**

Sr. No.	Minimum Specification
1	The 4-channel amplifier shall be fully and natively IP- networked based, not requiring external converters to connect to the system.
2	The amplifier shall adapt the maximum output power of each amplifier channel to its connected loudspeaker load, with free assignable output power per channel for a total maximum of 600 watt per amplifier, supporting 70V or 100V operation with direct drive capability and outputs that are galvanically insulated from ground.
3	The amplifier shall have a built-in independent spare amplifier channel for automatic failover.
4	The amplifier shall provide an interface for control data and multi-channel digital audio over IP using dual Ethernet ports for redundant network connection, supporting RSTP and loop-through cabling, with automatic failover to an analog lifeline input
5	The amplifier shall have dual power supply inputs and power supplies.
6	All amplifier channels shall have independent A/B zone outputs with support for class-A loudspeaker loops.
7	All amplifier channels shall supervise the integrity of connected loudspeaker lines without interruption of audio distribution.
8	The amplifier shall provide front-panel LED status indications for the network link, ground fault, power supplies and audio channels, and provide additional software monitoring and fault reporting features.
9	The amplifier shall be rack mountable (1U) and feature software-configurable signal processing including level control, parametric equalization, limiting and delay for each channel.
10	The amplifier shall be certified for EN 54-16 and ISO 7240-16, marked for CE and be compliant with the RoHS directive.
11	Warranty shall be three years minimum.
12	Loudspeaker load : 100 V /70 V mode : 600W/500/250/125W Max
13	Frequency response Rated power, +0.5 / -3 dB : 20 Hz to 20 kHz
14	Total Harmonic Distortion + Noise (THD+N) : Rated power, 20 Hz to 20 kHz : < 0.5 % 6 dB below rated power, 20 Hz to 20 kHz: < 0.1 %
15	Inter modulation Distortion (ID) : 6 dB below rated power, 19+20 kHz, 1:1 < 0.1 %

16	Signal to Noise Ratio (SNR) : 100 V mode, 20 Hz to 20 kHz : > 110 dBA 70 V mode, 20 Hz to 20 kHz : > 107 dBA
17	Crosstalk between channels : 100 Hz to 20 kHz : < -84 dBA
18	DC offset voltage : < 50 mV
19	Power supply input A/B : Input voltage : 48 VDC Input voltage tolerance : 44 to 50 VDC
20	Signal processing per channel : Audio equalization : 7- section parametric Level control : 0 to -60 dB, mute Level control resolution : 1 dB Audio delay : 0 to 60 s Audio delay resolution : 1 ms
21	Network Interface : Ethernet : 100BASE-TX, 1000BASE-T Protocol : TCP/IP Redundancy : RSTP Audio/control protocol : OMNEO Network audio latency : 10 ms Audio data encryption : AES128 Control data security: TLS Ports: 2
22	Fan air flow : Front to sides/rear
23	Enclosure Ingress protection : IP 30

c. **Desktop Call Station**

Sr. No.	Minimum Specification
1	The desktop call station shall provide an interface for control data and multi-channel digital audio over IP using dual Ethernet ports for redundant network connection, supporting RSTP and loop-through cabling.
2	It shall receive Power over Ethernet (PoE) via either one or both network connections.
3	The desktop call station shall accept optional call station extensions,
4	It shall provide control and routing of live speech calls, stored messages and music with volume control per zone.
5	The desktop call station shall have a gooseneck cardioid microphone for live calls and a 3.5 mm jack line level input for background music.
6	It shall provide software-configurable signal processing including sensitivity control, parametric equalization and limiting.
7	The desktop call station shall be certified for EN 54-16 and ISO 7240-16, marked for CE and be compliant with the RoHS directive.
	Technical Specifications:
8	Microphone: Nominal acoustic input level (configurable): 80 to 100 dB SPL Maximum acoustic input level: 120 dB SPL Signal to Noise Ratio (SNR): > 70 dBA Frequency response (+3 / -6 dB) : 100 Hz to 14 kHz Unidirectional
9	Line input: Signal to Noise Ratio (SNR): > 96 dBA Total Harmonic Distortion + Noise (THD+N) < 0.1 %
	Supervision: Microphone: Current Audio path: Pilot tone Controller continuity: Watchdog PoE (1-2): Voltage

10	Network Interface : Ethernet : 100BASE-TX, 1000BASE-T Protocol : TCP/IP Redundancy : RSTP Audio/control protocol : OMNEO Network audio latency : 10 ms Audio data encryption : AES128 Control data security: TLS
11	Ingress protection : IP 30

d. **Box speakers**

i. **Ceiling speaker**

- a. 6W Metal Ceiling Speaker with 6/3/1.5W taps.
- b. A flush mounting full range ceiling loudspeakers suitable for both speech and music reproduction. The speaker assembly consists of a single piece, 6 W loudspeaker and frame with a 100 V matching transformer mounted on the back. BS-5839-8, EN 54-24 and EN 60849 compliant.

Parameters	Values
Max power	9 W
Rated power	6 W
Power taps @ 100V	6W / 3W / 1.5W
Sound pressure level at 6W/1W (4kHz, 1m)	96dB / 88 dB
Frequency range (-10dB)	80 Hz -20 kHz
Dispersion angle(1kHz/-6dB)	160°
Rated input voltage	100 V / 70 V
Connection	Plastic terminal blocks/Push terminals

ii. **Horn Loudspeaker.**

15W Horn Loudspeaker with IP66 protection

A Wall Mount Horn loudspeaker High Efficiency Drivers with 22.5W (Max. Power) Wide Opening Angle, Excellent speech Reproduction, Simple Power Setting, Water-And Dust Protected to IP66, Versatile Mounting Bracket, comply with Inter Nation Installation and Safety Regulations. Horn loudspeaker should be circular horn loudspeaker made from ABS finished in light gray (RAL 7035) and a 100V line output.

Technical Specifications are as follows:

Parameters	Values
Maximum power	22.5 W
Rated power	15 W (15,7.5,375 W)
Sound pressure level at 15 W/ 1 W (1 kHz, 1 m)	103 dB
Effective frequency range (-10 dB)	500 Hz to 5 kHz

Rated voltage	100 V
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**Note:** The agency shall provide the following for the work related to the Integrated Building Management system.

- (i) The Manual Fire Alarm Panel shall be with inbuilt ethernet port and shall be mounted in a separate Panel having all necessary OFC infrastructure including ethernet to OFC convertor so as to connect the PLC Panel to the OFC network
- (ii) The Fire Alarm OEM shall provide access to Integrated Smart Platform Contractor of its proprietary/ open data base having all monitoring parameters as per the scope of work. Additionally in case the OEM is required to provide its own platform for web- based monitoring as per the tender terms and conditions, API too shall be made available to the Integrated Smart Platform Contractor.

#### e. EXIT SIGN BOARD I/C ELECTRIC SIGNAGE: -

- i. The work shall be carried out as per CPWD General Specifications for Wet riser & Sprinkler System (Part-V) 2020 as amended up to date, CPWD General Specifications of Electrical Works Part-I 2023, Part-II (External) 2023 as amended up to date, relevant IE rules.
- ii. **The signboards & signages shall be of following types: -**

##### 3.10.2.1 Photo luminescent type sign boards: -

These sign boards shall be made in compliance to the NBC-2016 and local fire authority requirements and shall be visible from the distance of 10 — 15 mtr. during darkness/ smoke in the building, so as to help the users to enable them to locate exits in the event of emergency evacuation, when the light goes off. It should glow strongly. These boards are to be placed on wall/ceiling suspended at all sections of stairs, lift lobbies and all possible places in all the floors in the building to facilitate evacuation at possible locations. The firm will submit the proposal for the complete complex including the buildings for approval of the Engineer-in-charge before procurement and installation.

##### 3.10.2.2 Self-contained Emergency light signage: -

This signage shall be made of LED of 3 watt with double LED lit laser etched acrylic sheet signage (with printing of logo and arrow), laser etching shall be on 6 mm transparent acrylic for single side signage and 12 mm sheet for both side signage as applicable. The size of the signage sheet shall be 390 mm x 175 mm and suitable for operating on 220 volt, 50Hz AC supply having built in battery backup for 5 hours with battery charging unit in suitable powder coated control gear box at all along the top of the signage as per approved make list. It shall be installed to indicate the important areas with logo & arrow like Fire Hydrant, Stair's ways, exit way, Lifts, Fire lift, way to refuge area, drinking water signage etc. and suitable for installation on wall / ceiling with suspension / mounting kit complete as required.

##### 3.10.2.3 Instruction and informative signage: -

- i) Fire safety instructions in Hindi, Assamese and English (separate three plates) in 2mm thick SS (grade:304) metal plates of size 600mmx400mm with inscription at each floor near lift lobby
- ii) DO, DON'T DO lift safety instruction in 2mm thick SS (grade:304) metal

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- plates of appropriate and approved size with inscription at each floor near lift lobby.
- iii) Electrical Safety Precaution plates in 2mm thick SS (grade:304) metal plates of appropriate and approved size with inscription at each floor near lift lobby.

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**PACKAGE C- 4**

**LIFT**

- 4      Passenger lift, Goods cum Passenger lift :**
- 4.1 The work shall be carried out as per CPWD General Specifications for Electrical Works Part-I (Internal) 2023 as amended and corrected up to date, Part-II (External) 2023 as amended and corrected up to date, Part-III (Lifts & Escalators)-2003 as amended and corrected up to date, and relevant IE rules.
- 4.2 The Scope of work includes drawings, designs, fabrications, testing, inspection as may be necessary before dispatch, dispatch, delivery at the site, installation, testing, commissioning, inspections from the competent authority and handing over to the client in fully working condition **and carrying out a comprehensive maintenance contract as mentioned in package No.15 (Maintenance Contract Package).**
- 4.3 The Contractor shall enable the consultant to obtain NOC for the erection of the lift before commencement of work and a license for operation of lifts on its completion from the Lift Inspector, Guwahati, Assam or any appropriate authority appointed by the Govt in this regard. The work shall be deemed to be completed only after receiving NOC from the Authority mentioned above. Statutory fee if any shall be paid by the contractor. Enabling all liaising work, arranging inspection of the local body shall be within the scope of the contractor.
- 4.4 The work will be executed as per the general arrangement drawing and detailed fabrication drawings as submitted by OEM, duly approved by the Engineer-in-charge. The equipment will be ordered only after approval of drawings from the Engineer in Charge.
- 4.5 Equipment will be inspected at the manufacturer's premises (within India) before dispatch to the site. The Engineer-in-Charge or his authorized representative may witness such inspection. The contractor shall give sufficient advance notice regarding the date of inspection to the department. The cost of the representative's visit to the factory will be borne by the department.
- 4.6 Lift shafts, Machine room wiring and power distribution, power supply cable shall be done as per CPWD General Specifications for Electrical Works Part -I (Internal) 2023 and local body requirements it shall be provided under Package – I of the tender.
- 4.7 Earthing and loop earthing as per CPWD General Specifications for Electrical Works Part-I Internal 2023 and Lifts & Escalators-2003 as amended and corrected up to date and provided under Package – I of the tender.
- 4.8 All the lifts shall be procured from one manufacturer only.**
- 4.9 All the lifts shall be :
- i) Regenerative Elevators
  - ii) Gearless traction Elevators
  - iii) With Machine – Room traction Elevators.
  - iv) Lift panel must be compatible with integrated B.M.S. The control system supports standard protocols used in building technology, including BACnet, OPC server/client, Modbus etc.

4.10 Following Lifts includes drawings, designs, fabrications, inspection as may be necessary before dispatch, dispatch, delivery at site, installation, testing, commissioning and handing over to client in fully working condition after NOC of Lift Inspector, Guwahati, Assam.

Sl. No.	Name of Building/ Block	Block	No. of Floor	Lift proposed	
				13 Passenger	20 Passenger cum Bed Lift
i.	Residential Tower (Class – III Qtr.)	01	2S+P+9 floors	01	01
ii.		02	2S+P+9 floors	01	01
iii.	Residential Tower (Class – IV Qtr.)	03	2S+P+9 floors	01	01
iv.		04	2S+P+9 floors	01	01
v.	Residential Qtr. (Grade – A)	05	S+P+6 floors	01	01
vi.		06	S+P+7 floors	01	01
vii.	Residential Tower (Grade – B & C)	07	S+P+9 floors	01	01
viii.		09	S+P+9 floors	01	01
ix.	Residential Qtr. (Grade – D & Above)	08	S+P+5 floors	01	01
x.	Club – 1	-----	G+1 floors	01	-----
xi.	Club – 2	-----	2S+P+1 floors	01	-----

4.11 The following minimum specifications are required for the machinery and equipment. These specifications are minimum indicative and shall be suitably enhanced to meet the requirements, and all lift shafts must be RCC (Reinforced Cement Concrete) of suitable fire rating.

#### 4.12. 13 Passenger Lift with machine room: (For Tower -1,2,3 & 4 Building)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift
2	<b>Number of lifts required</b>	4 Nos. (One in each tower)
3	<b>Load: number of Persons</b>	13 Passengers (884 Kg)
4	<b>Rated Speed</b>	1.5 mps
5	<b>Travel in meters</b>	39.30 mtrs appx. (2S+P+9 floors). (Covering all landings)
6	<b>Number of floors Served</b>	12 Nos. floors
7	<b>Inside size of lift well</b>	2600mm (width) x 1900 mm (Depth)
8	<b>Pit Depth</b>	1600 MM
9	<b>Over Head</b>	4800 MM
10	<b>Position of machinery</b>	Directly above lift well in Lift machine room
11	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency

	<b>ii) Type of operation</b>	Microprocessor based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 900 mm
(c)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have fire resistance rating of not less than 1 Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	1500 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of manufacturer's subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Shall be Stainless Steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness, the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be cross-flow blower with louvre.
<b>14</b>	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p>

		v. Battery-operated alarm bell and Emergency light
		vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom
		vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.
		viii. Firemen's switch at the ground floor
		ix. Floor announcement in the car.
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	12 Nos.
(c)	Size	2400 mm x 900 mm
(d)	Type of doors	Horizontal sliding centre-opening opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with a floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	<p>i) Power 400/415 volts, AC, 3-phase 50 Hz 4 wire system</p> <p>ii) Lighting 230 V AC 50 Hz</p> <p>iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage</p>
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	<p>i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system</p> <p>ii. An automatic rescue device in case of mains failure shall be provided.</p>
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a Suitable inbuilt ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	<p>i. All the lifts shall be used as a fire lift.</p>

		ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency
		iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.
22	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/security room. Note: The Intercom in the lift car shall be a press & speak type
23	<b>Hand Rail</b>	<p>i) Slip-resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall be able to bear a weight of 250 kg</p> <p>ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.</p> <p>iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</p>
24	<b>Automatic rescue device</b>	<p>i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor, the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD the elevator is automatically switched over to normal operations as soon as normal power supply resumes.</p> <p>ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing, it will automatically be switched to</p>

		normal power operation.
		iii. All the lift safeties shall remain active during the ARD mode of operation
		iv. The battery capacity should be adequate to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance-free with 3 3-year free replacement guarantee.
25	<b>CCTV System</b>	i) Provisions for the installation of 1 no. IP based Dome camera should be kept in the lift car and the lift machine room (Camera and cabling shall be provided by the CCTV provider under CCTV package).
26	<b>Mirror</b>	The provision of a mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.13. Bed Lift with machine room: (For Tower -1,2,3 & 4 Building)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift
2	<b>Number of lift required</b>	4 Nos. (One in Each Tower)
3	<b>Load: number of Persons</b>	20 Passengers cum Bed lift (1360 Kg)
4	<b>Rated Speed</b>	1.5 mps
5	<b>Travel in meters</b>	39.30 mtrs appx. (2S+P+9 floors).
6	<b>Number of floors Served</b>	12 Nos. floors
7	<b>Inside size of lift well</b>	3000mm (width) x 2300 mm (Depth)
8	<b>Pit Depth</b>	1600 MM
9	<b>Over Head</b>	4800 MM
10	<b>Position of machinery</b>	Directly above the lift well in the machine room.
11	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.

<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 1000 mm
(c)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof design, hairline finish with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1 Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	2000 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of the manufacturer's subject to NBC-2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be a cross-flow blower with louver.
<b>14</b>	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p> <p>v. Battery-operated alarm bell and Emergency light</p>

		vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom
		vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.
		viii. Firemen's switch at the ground floor
		ix. Floor announcement in the car.
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	12 Nos. doors
(c)	Size	2400 mm x 1000 mm
(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with the floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	<p>i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system</p> <p>ii) Lighting 230 V AC 50 Hz</p>
		<p>iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage</p>
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	<p>i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system</p> <p>ii. An automatic rescue device in case of mains failure shall be provided.</p>
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable stainless steel gauge, having a Suitable inbuilt ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	<p>i. All the lifts shall be used as a fire lift.</p> <p>ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency</p>

		iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.
22	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/security room. Note: The Intercom in the lift car shall be a <u>press &amp; speak type</u>
23	<b>Hand Rail</b>	i) Slip-resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg  ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.
		iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall
24	<b>Automatic rescue device</b>	i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor  ii. In case the normal supply resumes during ARD in operation the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.  iii. All the lift safeties shall remain active during the ARD mode of operation  iv. The battery capacity should be adequate so as to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance Free with 3 years free replacement guaranty.
25	<b>CCTV System</b>	i) Provisions for installation of 1 no. IP based Dome camera should be kept in lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under CCTV package).
26	<b>Mirror</b>	The provision of the mirror on the wall of the lift car opposite the lift door. The mirror should

		not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.
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#### 4.14. 13 Passenger Lift with machine room: (For Tower - 5 Building For Grade-A)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift
2	<b>Number of lift required</b>	1 No.
3	<b>Load: number of Persons</b>	13 Passengers (884 Kg)
4	<b>Rated Speed</b>	1.5 mps
5	<b>Travel in meters</b>	27.45 mtrs appx. (S+P+6 floors)
6	<b>Number of floors Served</b>	8 Nos. floors All floors/ all landings
7	<b>Inside size of lift well</b>	2600mm (width) x 1900 mm (Depth)
8	<b>Pit Depth</b>	1600 MM
9	<b>Over Head</b>	4800 MM
10	<b>Position of machinery</b>	Directly above the lift well in the lift machine room.
11	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.
12	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 900 mm
(c)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1 Hour.
13	<b>Lift car</b>	

(a)	Inside car size	1500 mm (width) x 1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of the manufacturer subject to NBC-2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Shall be Stainless Steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be a cross-flow blower with louver.
<b>14</b>	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p> <p>v. Battery-operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom</p> <p>vii. Luminous hall buttons at all landings and inside the car with Braille language signage.</p> <p>viii. Firemen's switch at the ground floor</p> <p>ix. Floor announcement in the car.</p>
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	8 Nos. doors
(c)	Size	2400 mm x 900 mm

(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with the floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr
16	<b>Electric supply</b>	<p>i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system</p> <p>ii) Lighting 230 V AC 50 Hz</p> <p>iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage</p>
17	<b>Is a neutral wire available for the control circuit</b>	Yes
18	<b>Emergency supply</b>	<p>i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system</p> <p>ii. An automatic rescue device in case of mains failure shall be provided.</p>
19	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
20	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a suitable in-built ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
	<b>Firemen lift</b>	<p>i. All the lifts shall be used as a fire lift.</p> <p>ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency</p> <p>iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.</p>
22	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/security room. Note: The Intercom in the lift car shall be a press & speak type

23	<b>Hand Rail</b>	<ul style="list-style-type: none"> <li>i) Slip-resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg</li> </ul>
		<ul style="list-style-type: none"> <li>ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.</li> </ul>
		<ul style="list-style-type: none"> <li>iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</li> </ul>
24	<b>Automatic rescue device</b>	<ul style="list-style-type: none"> <li>i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor, the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD the elevator is automatically switched over to normal operations as soon as normal power supply resumes.</li> </ul>
		<ul style="list-style-type: none"> <li>ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.</li> </ul>
		<ul style="list-style-type: none"> <li>iii. All the lift safeties shall remain active during the ARD mode of operation</li> </ul>
		<ul style="list-style-type: none"> <li>iv. The battery capacity should be adequate to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and the battery shall be maintenance-free with a 3-year free replacement guarantee.</li> </ul>
25	<b>CCTV System</b>	<ul style="list-style-type: none"> <li>i) Provisions for the installation of 1 no. IP IP-based dome camera should be kept in lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under</li> </ul>

		the CCTV package).
<b>26</b>	<b>Mirror</b>	The provision of a mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

**4.15. Bed Lift with machine room: (For Tower - 5 Building For Grade-A)**

Sr. No.	Description	Requirement
<b>1</b>	<b>Type of lift</b>	Passenger Lift
<b>2</b>	<b>Number of lift required</b>	1 Nos.
<b>3</b>	<b>Load: number of Persons</b>	20 Passengers cum Bed lift (1360 Kg)
<b>4</b>	<b>Rated Speed</b>	1.5 mps
<b>5</b>	<b>Travel in meters</b>	27.45 mtrs appx. (S+P+6 floors).
<b>6</b>	<b>Number of floors Served</b>	8 Nos. floors All floors/ all landings
<b>7</b>	<b>Inside size of lift well</b>	3000mm (width) x 2300 mm (Depth)
<b>8</b>	<b>Pit Depth</b>	1600 MM
<b>9</b>	<b>Over Head</b>	4800 MM
<b>10</b>	<b>Position of machinery</b>	Directly above the lift well in the lift machine room.
<b>11</b>	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 1000 mm
(c)	Type of doors	Horizontal sliding centre-opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof design, hairline finish with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1 Hour.
<b>13</b>	<b>Lift car</b>	

(a)	Inside car size	2000 mm (width) x 1500 mm (Depth). However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of the manufacturer, subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be cross-flow blower with louver.
14	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p> <p>v. Battery-operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade-proof Luminous buttons in the car and with an intercom</p> <p>vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.</p> <p>viii. Firemen's switch at the ground floor</p> <p>ix. Floor announcement in the car.</p>
15	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	8 Nos. doors
(c)	Size	2400 mm x 1000 mm
(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with the floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr

<b>16</b>	<b>Electric supply</b>	i) Power 400/415 volts, AC, 3-phase 50 Hz 4-wire system  ii) Lighting 230 V AC 50 Hz  iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system  ii. An automatic rescue device in case of mains failure shall be provided.
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a suitable in-built ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	i. All the lifts shall be used as a fire lift.  ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency  iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.
<b>22</b>	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/ security room. Note: The Intercom in the lift car shall be a press & speak type
<b>23</b>	<b>Hand Rail</b>	i) Slip-resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg  ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.  iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking

		when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall
24	<b>Automatic rescue device</b>	<p>i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor, the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD, the elevator is automatically switched over to normal operations as soon as the normal power supply resumes.</p>
		<p>ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.</p>
		<p>iii. All the lift safeties shall remain active during the ARD mode of operation</p>
		<p>iv. The battery capacity should be adequate so as to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and the battery shall be maintenance-free with a 3-year free replacement guarantee.</p>
25	<b>CCTV System</b>	<p>i) Provisions for the installation of 1 no. IP IP-based dome camera should be kept in lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under the CCTV package).</p>
26	<b>Mirror</b>	The provision of a mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.16. 13 Passenger Lift with machine room: (For Tower - 6 Building For Grade-A)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift
2	<b>Number of lift required</b>	1 No.

<b>3</b>	<b>Load: number of Persons</b>	13 Passengers (884 Kg)
<b>4</b>	<b>Rated Speed</b>	1.5 mps
<b>5</b>	<b>Travel in meters</b>	30.60 mtrs appx. (S+P+7) floors
<b>6</b>	<b>Number of floors served</b>	9 Nos. floors All floors/ all landings
<b>7</b>	<b>Inside size of lift well</b>	2600mm (width) x 1900 mm (Depth)
<b>8</b>	<b>Pit Depth</b>	1600 MM
<b>9</b>	<b>Over Head</b>	4800 MM
<b>10</b>	<b>Position of machinery</b>	Directly above the lift well in the lift machine room.
<b>11</b>	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 900 mm
(c)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design with multi-beam sensor covering the full height of the door.
(d)	Car opens in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1 Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	1500 mm (width) x 1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per standard design of the manufacturer subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Shall be Stainless Steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.

	iv) Lighting	Shall be 'LED' lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be cross-flow blower with a louver.
<b>14</b>	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p> <p>v. Battery-operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom</p> <p>vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.</p> <p>viii. Firemen's switch at the ground floor</p> <p>ix. Floor announcement in the car.</p>
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	9 Nos. doors
(c)	Size	2400 mm x 900 mm
(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with the floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	<p>i) Power 400/415 volts, AC, 3-phase 50 Hz 4 wire system</p> <p>ii) Lighting 230 V AC 50 Hz</p> <p>iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage</p>
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	<p>i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system</p> <p>ii. An automatic rescue device in case of mains failure shall be provided.</p>
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.

<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a suitable in-built ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	<p>i. All the lifts shall be used as a fire lift.</p> <p>ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency</p> <p>iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.</p>
<b>22</b>	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/ security room. Note: The Intercom in the lift car shall be a press &
<b>23</b>	<b>Hand Rail</b>	<p>i) Slip-resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg</p> <p>ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.</p> <p>iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</p>
<b>24</b>	<b>Automatic rescue device</b>	i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor, the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD, the elevator is automatically switched over to normal operations as soon as the normal power supply resumes.

		ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.
		iii. All the lift safeties shall remain active during the ARD mode of operation
		iv. The battery capacity should be adequate to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance-free with 3 years free replacement guarantee.
25	<b>CCTV System</b>	i) Provisions for the installation of 1 no. IP IP-based dome camera should be kept in lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under the CCTV package).
26	<b>Mirror</b>	The provision of a mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.17. Bed Lift with machine room: ( For Tower - 6 Building For Grade-A)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift
2	<b>Number of lift required</b>	1 Nos.
3	<b>Load: number of Persons</b>	20 Passengers cum Bed lift (1360 Kg)
4	<b>Rated Speed</b>	1.5 mps
5	<b>Travel in meters</b>	30.60 mtrs appx. (S+P+7 floors).
6	<b>Number of floors Served</b>	9 Nos. floors All floors/ all landings
7	<b>Inside size of lift well</b>	3000mm (width) x 2300 mm (Depth)
8	<b>Pit Depth</b>	1600 MM
9	<b>Over Head</b>	4800 MM
10	<b>Position of machinery</b>	Directly above the lift well in the lift machine room.
11	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.
12	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 1000 mm

(c)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof design, hair line finish with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1 Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	2000 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of manufacturer subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
<b>(c)</b>	<b>Interior Finish</b>	
	i) Panels	Stainless Steel Sheet (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be cross-flow blower with louver.
14	Type of signal system	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p> <p>v. Battery-operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom</p> <p>vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.</p>

		viii. Firemen's switch at the ground floor ix. Floor announcement in the car.
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	9 Nos. doors
(c)	Size	2400 mm x 1000 mm
(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with the floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system  ii) Lighting 230 V AC 50 Hz  iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system  ii. An automatic rescue device in case of mains failure shall be provided.
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a suitable in-built ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	i. All the lifts shall be used as a fire lift.  ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency  iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.
<b>22</b>	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/ security room. Note: The Intercom in the lift car shall be a press & speak type

<b>23</b>	<b>Hand Rail</b>	<ul style="list-style-type: none"> <li>i) Slip-resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg</li> <li>ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.</li> <li>iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</li> </ul>
<b>24</b>	<b>Automatic rescue device</b>	<ul style="list-style-type: none"> <li>i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor, the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD, the elevator is automatically switched over to normal operations as soon as normal power supply resumes.</li> <li>ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.</li> <li>iii. All the lift safeties shall remain active during the ARD mode of operation</li> <li>iv. The battery capacity should be adequate so as to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and the battery shall be maintenance-free with 3 years free replacement guarantee.</li> </ul>
<b>25</b>	<b>CCTV System</b>	<ul style="list-style-type: none"> <li>i) Provisions for the installation of 1 no. IP IP-based dome camera should be kept in the lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under the CCTV</li> </ul>

		package).
<b>26</b>	<b>Mirror</b>	The provision of a mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

**4.18. 13 Passenger Lift with machine room: (For Tower -7 & 9 Building For Grade – B & C)**

Sr. No.	Description	Requirement
<b>1</b>	<b>Type of lift</b>	Passenger Lift
<b>2</b>	<b>Number of lift required</b>	2 Nos. (One in Each Tower)
<b>3</b>	<b>Load: number of Persons</b>	13 Passengers (884 Kg)
<b>4</b>	<b>Rated Speed</b>	1.5 mps
<b>5</b>	<b>Travel in meters</b>	33.60 mtrs appx. (S+P+9 floors)
<b>6</b>	<b>Number of floors Served</b>	11 Nos. floors All floors/ all landings
<b>7</b>	<b>Inside size of lift well</b>	2600mm (width) x 1900 mm (Depth)
<b>8</b>	<b>Pit Depth</b>	1600 MM
<b>9</b>	<b>Over Head</b>	4800 MM
<b>10</b>	<b>Position of machinery</b>	Directly above the lift well in the lift machine room.
<b>11</b>	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 900 mm
c)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1 Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	1500 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of manufacturer subject to NBC- 2016 and local authority.

(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Shall be Stainless Steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be cross-flow blower with louver.
14	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p> <p>v. Battery-operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom</p> <p>vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.</p> <p>viii. Firemen's switch at the ground floor</p> <p>ix. Floor announcement in the car.</p>
15	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	11 Nos. doors
(c)	Size	2400 mm x 900 mm
(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with a floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr

<b>16</b>	<b>Electric supply</b>	i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system  ii) Lighting 230 V AC 50 Hz  iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system  ii. An automatic rescue device in case of mains failure shall be provided.
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a suitable in-built ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	i. All the lifts shall be used as a fire lift.  ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency  iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts landing doors at the ground floor.
<b>22</b>	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/ security room. Note: The Intercom in the lift car shall be a press & speak type
<b>23</b>	<b>Hand Rail</b>	i) Slip-resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg  ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.  iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be

		returned to the wall
24	<b>Automatic rescue device</b>	<p>i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor, the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD, the elevator is automatically switched over to normal operations as soon as the normal power supply resumes.</p>
		<p>ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.</p>
		<p>iii. All the lift safeties shall remain active during the ARD mode of operation</p>
		<p>iv. The battery capacity should be adequate so as to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance-free with 3 years free replacement guarantee.</p>
25	<b>CCTV System</b>	<p>i) Provisions for the installation of 1 no. IP IP-based dome camera should be kept in the lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under the CCTV package).</p>
26	<b>Mirror</b>	The provision of a mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.19. Bed Lift with machine room: (For Tower – 7&9 Building For Grade- B&C)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift

<b>2</b>	<b>Number of lift required</b>	2 Nos. (One in Each Tower)
<b>3</b>	<b>Load: number of Persons</b>	20 Passengers cum Bed lift (1360 Kg)
<b>4</b>	<b>Rated Speed</b>	1.5 mps
<b>5</b>	<b>Travel in meters</b>	33.60 mtrs appx. (S+P+9 floors).
<b>6</b>	<b>Number of floors Served</b>	11 Nos. floors All floors/ all landings
<b>7</b>	<b>Inside size of lift well</b>	3000mm (width) x 2300 mm (Depth)
<b>8</b>	<b>Pit Depth</b>	1600 MM
<b>9</b>	<b>Over Head</b>	4800 MM
<b>10</b>	<b>Position of machinery</b>	Directly above lift well in lift machine room.
<b>11</b>	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 1000 mm
(c)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof design, hairline finish with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	2000 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of the manufacturer subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Stainless Steel Sheet (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be ‘LED’ lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be cross-flow blower with louver.

<b>14</b>	<b>Type of signal system</b>	i. Digital floor position indicator in the car and at all landings, TFT / LED type.  ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel & at landing operating panels / above landing doors)  iii. Gongs and visual indication on all landings for the arrival of the car  iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload  v. Battery-operated alarm bell and Emergency light  vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom  vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.  viii. Firemen's switch at the ground floor  ix. Floor announcement in the car.
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	11 Nos. doors
(c)	Size	2400 mm x 1000 mm
(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with a floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system  ii) Lighting 230 V AC 50 Hz  iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system

		ii. An automatic rescue device in case of mains failure shall be provided.
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a suitable in-built ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	<p>i. All the lifts shall be used as a fire lift.</p> <p>ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency</p> <p>iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.</p>
<b>22</b>	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/ security room. Note: The Intercom in the lift car shall be a press & speak type
<b>23</b>	<b>Hand Rail</b>	<p>i) Slip resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg</p> <p>ii) Place of height of 800 mm to 900 mm from the floor level. It is fixed on both sides and at the rear of the lift.</p> <p>iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</p>
<b>24</b>	<b>Automatic rescue device</b>	i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor, the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD, the elevator is automatically switched over to normal operations as soon as the normal power supply

		resumes.
		ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.
		iii. All the lift safeties shall remain active during the ARD mode of operation
		iv. The battery capacity should be adequate to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance-free with 3 years free replacement guarantee.
25	<b>CCTV System</b>	i) Provisions for the installation of 1 no. IP IP-based dome camera should be kept in the lift car and the lift machine room (Camera and cabling shall be provided by the CCTV provider under the CCTV package).
26	<b>Mirror</b>	The provision of a mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.20. 13 Passenger Lift with machine room:(For Tower - 8 Building For Grade- D & Above)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift
2	<b>Number of lift required</b>	1 Nos.
3	<b>Load: number of Persons</b>	13 Passengers (884 Kg)
4	<b>Rated Speed</b>	1.5 mps

<b>5</b>	<b>Travel in meters</b>	24.30 mtrs appx. (S+P+5 floors)
<b>6</b>	<b>Number of floors Served</b>	7 Nos. floors All floors/ all landings
<b>7</b>	<b>Inside size of lift well</b>	2600mm (width) x 1900 mm (Depth)
<b>8</b>	<b>Pit Depth</b>	1600 MM
<b>9</b>	<b>Over Head</b>	4800 MM
<b>10</b>	<b>Position of machinery</b>	Directly above the lift well in the lift machine room.
<b>11</b>	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor-based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 900 mm
(c)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design with multi-beam sensor covering the full height of the door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have a fire resistance rating of not less than 1 Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	1500 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per the standard design of manufacturer subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Shall be Stainless Steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness, the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be ‘LED’ lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be cross flow blower with louver.
<b>14</b>	<b>Type of signal system</b>	i. Digital floor position indicator in the car and at all landings, TFT / LED type.

		ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel & at landing operating panels / above landing doors)
		iii. Gongs and visual indication on all landings for the arrival of the car
		iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload
		v. Battery operated alarm bell and Emergency light
		vi. Car operating panel with fade proof Luminous buttons in the car and with the intercom
		vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.
		viii. Firemen's switch at the ground floor
		ix. Floor announcement in the car.
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	7 Nos. doors
(c)	Size	2400 mm x 900 mm
(d)	Type of doors	Horizontal sliding centre-opening automatic power-operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be built with the floor Position indicator.
(f)	Landing Door Fire rating	Shall have a fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	<p>i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system</p> <p>ii) Lighting 230 V AC 50 Hz</p> <p>iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage</p>
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	<p>i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance-free batteries for emergency light, alarm bell and intercom system</p> <p>ii. An automatic rescue device in case of mains failure shall be provided.</p>
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.

<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge, having a suitable inbuilt ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	<p>i. All the lifts shall be used as a fire lift.</p> <p>ii. Firemen's switch for the fire lift shall be provided at the ground floor to enable the fire service personnel to ground the lift in case of an emergency</p> <p>iii. The word 'fire lift' shall be conspicuously displayed in fluorescent paint on all the fire lifts' landing doors at the ground floor.</p>
<b>22</b>	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, the respective machine room & lift lobby/control/security room. Note: The Intercom in the lift car shall be a press & speak type
<b>23</b>	<b>Hand Rail</b>	<p>i) Slip resistant with round ends. Rail shall be a circular section of 38 - 50 mm diameter. It shall bear a weight of 250 kg</p> <p>ii) Place of height of 800 mm to 900 mm from the floor level. Be fixed on both sides and at the rear of the lift.</p> <p>iii) Hand Rail bar should be constructed such that there are no open ends to cause hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</p>
<b>24</b>	<b>Automatic rescue device</b>	i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with the door open. After the operation is completed by the ARD, the elevator is automatically switched over to normal operations as soon as the normal power supply resumes.

		ii. In case the normal supply resumes during ARD in operation, the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If the normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.
		iii. All the lift safeties shall remain active during the ARD mode of operation
		iv. The battery capacity should be adequate to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance-free with 3 years free replacement guarantee.
25	<b>CCTV System</b>	i) Provisions for the installation of 1 no. IP IP-based dome camera should be kept in the lift car and the lift machine room (Camera and cabling shall be provided by the CCTV provider under the CCTV package).
26	<b>Mirror</b>	The provision of the mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.21 Bed Goods Lift with machine room: (For Tower- 8 Building For Grade - D & Above)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift
2	<b>Number of lift required</b>	1 Nos.
3	<b>Load: number of Persons</b>	20 Passengers cum Bed lift (1360 Kg)
4	<b>Rated Speed</b>	1.5 mps
5	<b>Travel in meters</b>	24.30 mtrs appx. (S+P+5 floors)
6	<b>Number of floors Served</b>	7 Nos. floors All floors/ all landings
7	<b>Inside size of lift well</b>	3000mm (width) x 2300 mm (Depth)
8	<b>Pit Depth</b>	1600 MM
9	<b>Over Head</b>	4800 MM
10	<b>Position of machinery</b>	Directly above lift well in lift machine room.
11	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor based simplex selective collective with/ without attendant.
12	<b>Car entrance door</b>	
(a)	Number	1 No.

(b)	Size	(i) Door Height – 2400 mm (ii) Width – 1000 mm
(c)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof design hair line finish with multi beam sensor covering full height of door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have fire resistance rating of not less than 1Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	2000 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per standard design of manufacturer subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Stainless Steel Sheet (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness; the weight of the granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with a hairline finish or any approved design.
	iv) Lighting	Shall be ‘LED’ lights with a uniform illumination level of 150lux, on floor level approximately.
	v) Ventilation	It shall be a cross-flow blower with louver.
<b>14</b>	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings, TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in the car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landings for the arrival of the car</p> <p>iv. Overload warning audio and Visual Indicator inside the car. The lift should not start on overload</p> <p>v. Battery-operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade-proof Luminous buttons in the car and with the intercom</p> <p>vii. Luminous hall Buttons at all landings and inside the car with Braille language signage.</p>

		viii. Firemen's switch at the ground floor ix. Floor announcement in the car.
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	7 Nos. doors
(c)	Size	2400 mm x 1000 mm
(d)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hair line finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be in-built with floor Position indicator.
(f)	Landing Door Fire rating	Shall have fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system  ii) Lighting 230 V AC 50 Hz  iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance free batteries for emergency light, alarm bell and intercom system  ii. An automatic rescue device in case of mains failure shall be provided.
<b>19</b>	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
<b>20</b>	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge having suitable inbuilt ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
<b>21</b>	<b>Firemen lift</b>	i. All the lifts shall be used as fire lift.  ii. Firemen switch for the fire lift shall be provided at ground floor to enable the fire service personnel to ground the lift in case of an emergency  iii. The word 'fire lift' shall be Conspicuously displayed in fluorescent paint on all the fire lifts landing doors at the ground floor.

<b>22</b>	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, respective machine room & lift lobby/control/ security room. Note: Intercom in lift car shall be press & speak type
<b>23</b>	<b>Hand Rail</b>	<p>i) Slip resistant with round ends. Rail shall be circular section of 38 - 50 mm diameter. It shall be bear a weight of 250 kg</p> <p>ii) Place of height of 800 mm to 900 mm from the floor level. Be fixed on both sides and at the rear of the lift.</p> <p>iii) Hand Rail bar should be constructed such that there are no open ends to causes hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</p>
<b>24</b>	<b>Automatic rescue device</b>	<p>i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with door open. After the operation is completed by the ARD the elevator is automatically switched over to normal operations as soon as normal power supply resumes.</p> <p>ii. In case the normal supply resumes during ARD in operation the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.</p> <p>iii. All the lift safeties shall remain active during the ARD mode of operation</p> <p>iv. The battery capacity should be adequate so as to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance Free with 3 years free replacement guaranty.</p>

<b>25</b>	<b>CCTV System</b>	i) Provisions for installation of 1 no. IP based Dome camera should be kept in lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under CCTV package).
<b>26</b>	<b>Mirror</b>	The provision of the mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.22. 13 Passenger Lift with machine room:(For Club - 1)

Sr. No.	Description	Requirement
<b>1</b>	<b>Type of lift</b>	Passenger Lift
<b>2</b>	<b>Number of lift required</b>	1 Nos.
<b>3</b>	<b>Load: number of Persons</b>	13 Passengers (884 Kg)
<b>4</b>	<b>Rated Speed</b>	1.5 mps
<b>5</b>	<b>Travel in meters</b>	7 mtrs appx. (G+1 floor)
<b>6</b>	<b>Number of floors Served</b>	2 floors
<b>7</b>	<b>Inside size of lift well</b>	2600mm (width) x 1900 mm (Depth)
<b>8</b>	<b>Pit Depth</b>	1600 MM
<b>9</b>	<b>Over Head</b>	4800 MM
<b>10</b>	<b>Position of machinery</b>	Directly above lift well in lift machine room.
<b>11</b>	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 900 mm
(c)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design with multi beam sensor covering full height of door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have fire resistance rating of not less than 1Hour.
<b>13</b>	<b>Lift car</b>	

(a)	Inside car size	1500 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per standard design of manufacturer subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Shall be Stainless Steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness, weight of granite shall be considered while designing the lift.
	iii) Ceiling	Stainless Steel Sheet (SS 304) with hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with uniform illumination level of 150lux, on floor level approximately .
	v) Ventilation	Shall be cross flow blower with louver.
<b>14</b>	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landing for the arrival of the car</p> <p>iv. Over load warning audio and Visual Indicator inside the car. lift should not start on overload</p> <p>v. Battery operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade proof Luminous buttons in car and with intercom</p> <p>vii. Luminous hall Buttons at all landings and inside car with Braille language signage.</p> <p>viii. Firemen's switch at ground floor</p> <p>ix. Floor announcement in the car.</p>
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	2 Nos. doors
(c)	Size	2400 mm x 900 mm
(d)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.

(e)	Lift in use/lift out of order sign	Lift out of order indication shall be in-built with floor Position indicator.
(f)	Landing Door Fire rating	Shall have fire rating of not less than 1 Hr
16	<b>Electric supply</b>	<p>i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system</p> <p>ii) Lighting 230 V AC 50 Hz</p>
		iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage
17	<b>Is neutral wire available for control circuit</b>	Yes
18	<b>Emergency supply</b>	<p>i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance free batteries for emergency light, alarm bell and intercom system</p> <p>ii. An automatic rescue device in case of mains failure shall be provided.</p>
19	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
20	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge having Suitable inbuilt ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
21	<b>Firemen lift</b>	<p>i. All the lifts shall be used as fire lift.</p> <p>ii. Firemen switch for the fire lift shall be provided at ground floor to enable the fire service personnel to ground the lift in case of an emergency</p> <p>iii. The word 'fire lift' shall be Conspicuously displayed in fluorescent paint on all the fire lifts landing doors at the ground floor.</p>
22	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, respective machine room & lift lobby/control/security room. Note: Intercom in lift car shall be press & speak type
23	<b>Hand Rail</b>	<p>i) Slip resistant with round ends. Rail shall be circular section of 38 - 50 mm diameter. It shall be bear a weight of 250 kg</p> <p>ii) Place of height of 800 mm to 900 mm from the floor level. Be fixed on both sides and at the rear of the lift.</p>

		iii) Hand Rail bar should be constructed such that there are no open ends to causes hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall
24	<b>Automatic rescue device</b>	i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with door open. After the operation is completed by the ARD the elevator is automatically switched over to normal operations as soon as normal power supply resumes.
		ii. In case the normal supply resumes during ARD in operation the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.
		iii. All the lift safeties shall remain active during the ARD mode of operation
		iv. The battery capacity should be adequate so as to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance Free with 3 years free replacement guaranty.
25	<b>CCTV System</b>	i) Provisions for installation of 1 no. IP based Dome camera should be kept in lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under CCTV package).
26	<b>Mirror</b>	The provision of the mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.23. 13 Passenger Lift with machine room:(For Club - 2)

Sr. No.	Description	Requirement
1	<b>Type of lift</b>	Passenger Lift

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE(C) AE(E) EE(C)

<b>2</b>	<b>Number of lift required</b>	1 Nos.
<b>3</b>	<b>Load: number of Persons</b>	13 Passengers (884 Kg)
<b>4</b>	<b>Rated Speed</b>	1.5 mps
<b>5</b>	<b>Travel in meters</b>	13 mtrs appx. (2S+P+1 floor)
<b>6</b>	<b>Number of floors Served</b>	4 floors
<b>7</b>	<b>Inside size of lift well</b>	2600mm (width) x 1900 mm (Depth)
<b>8</b>	<b>Pit Depth</b>	1600 MM
<b>9</b>	<b>Over Head</b>	4800 MM
<b>10</b>	<b>Position of machinery</b>	Directly above lift well in lift machine room.
<b>11</b>	<b>i) Type of control</b>	Microprocessor-based AC variable voltage variable frequency
	<b>ii) Type of operation</b>	Microprocessor based simplex selective collective with/ without attendant.
<b>12</b>	<b>Car entrance door</b>	
(a)	Number	1 No.
(b)	Size	(i) Door Height – 2400 mm (ii) Width – 900 mm
(c)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design with multi beam sensor covering full height of door.
(d)	Car open in front only	Yes
(e)	Fire resisting rating	Shall have fire resistance rating of not less than 1Hour.
<b>13</b>	<b>Lift car</b>	
(a)	Inside car size	1500 mm (width) X1500 mm (Depth), However, variation in car inside dimensions shall be within the minimum and maximum floor area limits specified in IS 14665 (part 3 / sec 1) with amendments or as per standard design of manufacturer subject to NBC- 2016 and local authority.
(b)	Construction design	CPWD General Specification for Electrical Works Part-III (Lifts & Escalators)-2003
(c)	Interior Finish	
	i) Panels	Shall be Stainless Steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
	ii) Flooring	Shall be recessed anti-skid granite stone of suitable thickness, weight of granite shall be considered while designing the lift.

	iii) Ceiling	Stainless Steel Sheet (SS 304) with hairline finish or any approved design.
	iv) Lighting	Shall be 'LED' lights with uniform illumination level of 150lux, on floor level approximately .
	v) Ventilation	Shall be cross flow blower with louver.
<b>14</b>	<b>Type of signal system</b>	<p>i. Digital floor position indicator in the car and at all landings TFT / LED type.</p> <p>ii. Travel direction indicator in the car and at all landings (to be provided in car operating panel &amp; at landing operating panels / above landing doors)</p> <p>iii. Gongs and visual indication on all landing for the arrival of the car</p> <p>iv. Over load warning audio and Visual Indicator inside the car. lift should not start on overload</p> <p>v. Battery operated alarm bell and Emergency light</p> <p>vi. Car operating panel with fade proof Luminous buttons in car and with intercom</p> <p>vii. Luminous hall Buttons at all landings and inside car with Braille language signage.</p> <p>viii. Firemen's switch at ground floor</p> <p>ix. Floor announcement in the car.</p>
<b>15</b>	<b>Landing entrance</b>	
(a)	Location of landing entrance in different floors	All doors on the same side
(b)	Number	4 Nos. doors
(c)	Size	2400 mm x 900 mm
(d)	Type of doors	Horizontal sliding center opening automatic power operated doors. Stainless steel (SS 304) 1.5 mm thick with scratch-proof hairline finish design.
(e)	Lift in use/lift out of order sign	Lift out of order indication shall be in-built with floor Position indicator.
(f)	Landing Door Fire rating	Shall have fire rating of not less than 1 Hr
<b>16</b>	<b>Electric supply</b>	<p>i) Power 400/415 volts, AC, 3 phase 50 Hz 4 wire system</p> <p>ii) Lighting 230 V AC 50 Hz</p> <p>iii) The entire lift equipment should be suitable for operation at +10% to -20% of the rated supply voltage</p>
<b>17</b>	<b>Is neutral wire available for control circuit</b>	Yes
<b>18</b>	<b>Emergency supply</b>	<p>i. Inverter backup with trickle/boost charges arrangement for at least 30 minutes with maintenance free batteries for emergency light, alarm bell and intercom system</p>

		ii. An automatic rescue device in case of mains failure shall be provided.
19	<b>Door Close Safety</b>	Full height Infrared light curtain door safety.
20	<b>Controller panel</b>	The controller panel shall be of suitable steel gauge having Suitable inbuilt ventilation system. A clear floor space of at least 900 mm x 1200 with no obstruction placed to prevent a wheelchair user from reaching it.
21	<b>Firemen lift</b>	<p>i. All the lifts shall be used as fire lift.</p> <p>ii. Firemen switch for the fire lift shall be provided at ground floor to enable the fire service personnel to ground the lift in case of an emergency</p> <p>iii. The word 'fire lift' shall be Conspicuously displayed in fluorescent paint on all the fire lifts landing doors at the ground floor.</p>
22	<b>Intercom System</b>	Intercommunication shall be provided for communication between the lift car, respective machine room & lift lobby/control/security room. Note: Intercom in lift car shall be press & speak type
23	<b>Hand Rail</b>	<p>i) Slip resistant with round ends. Rail shall be circular section of 38 - 50 mm diameter. It shall be bear a weight of 250 kg</p> <p>ii) Place of height of 800 mm to 900 mm from the floor level. Be fixed on both sides and at the rear of the lift.</p> <p>iii) Hand Rail bar should be constructed such that there are no open ends to causes hooking when used by passengers. If the end of a handrail directly faces a doorway, it shall be returned to the wall</p>
24	<b>Automatic rescue device</b>	i. ARD should monitor the normal power supply in the main controller and shall activate Rescue operations within ten seconds of normal power supply failure. It should bring the elevator to the nearest floor at a slower speed than the normal run. While proceeding to the nearest floor the elevator will detect the zone and stop. After the elevator has stopped, it automatically opens the doors and parks with door open. After the operation is completed by the ARD the elevator is

		automatically switched over to normal operations as soon as normal power supply resumes.
		ii. In case the normal supply resumes during ARD in operation the elevator will continue to run in ARD mode until it reaches the nearest landing and the doors are fully opened. If normal power supply resumes when the elevator is at the landing it will automatically be switched to normal power operation.
		iii. All the lift safeties shall remain active during the ARD mode of operation
		iv. The battery capacity should be adequate so as to operate the ARD at least seven times a day. Provided the duration between usage is at least 30 minutes and battery shall be maintenance Free with 3 years free replacement guaranty.
25	<b>CCTV System</b>	i) Provisions for installation of 1 no. IP based Dome camera should be kept in lift car and lift machine room (Camera and cabling shall be provided by the CCTV provider under CCTV package).
26	<b>Mirror</b>	The provision of the mirror on the wall of the lift car opposite the lift door. The mirror should not extend below 900 mm from the lift floor to avoid confusing people with visual impairments.

#### 4.24 General Features :

- i) All lift machine shall be installed in the Machine Room above the lift shaft.
- ii) All lifts shall have Automatic Rescue Devices.
- iii) All elevators will have AC variable voltage variable frequency drives with microprocessor-based control panel.
- iv) Overload protective device which will make the car inoperative when overloaded.
- v) Emergency car lighting shall be through maintenance free battery complete with rectifier/ charger.
- vi) Emergency light of adequate illumination level shall be provided in all elevator cars. It shall be operated by self-contained nickel-cadmium batteries having with self-maintained tricklechanger. The battery shall be able to maintain the full illumination continuously for a period not less than two hours.
- vii) Efficient Lifts & Escalators:
  - a) Regenerative lifts
  - b) Gearless traction elevators
  - c) With Machine-room traction elevators
- viii) Sub meter for lifts

- ix) **Braille and audio assistance in lifts for visually impaired people. Elevator call buttonsdesigned to be within reach of wheelchair occupants.**

**4.25 Provision of barrier free design:**

- 4.25.1 Appropriate provision shall be made for all people to travel vertically within the buildings conveniently and independently to other stories and to make use of all the facilities. Hence all the Lifts shall be barrier-free.

**4.25.2 Special Requirements for barrier-free Lifts.**

- i) Every floor of a building shall be accessible by a lift which shall fully comply with all the obligatory design requirements as stipulated in this section and have direct access to the main lift lobby.
- ii) Lifts shall have handrails at the rear and both sides of the car. (Rear side Handrail not required in Passenger/Bed/Goods Lift.
- iii) The top of the gripping surface of the handrails shall be at a height of 850 mm — 950 mm, with a space of 30 mm - 50 mm between the handrails and the wall.

**4.25.3 Lift Doors:**

- i) Lift car doors and landing doors shall be of the horizontally sliding type, power-operated and automatically controlled.
- ii) An audible signal shall be provided to signify the closing of the doors to alert persons.
- iii) A detection device shall be provided to reopen the lift doors in the event of hitting any obstacle.
- iv) The detection device shall be positioned at a height of between 500 mm to 600 mm above the floor of the lift car.

**4.25.4 Lift Control Buttons:**

- i) Essential lift control buttons, including floor numbering buttons, emergency alarm push button and door opening push button in the lift car shall not be less than 900 mm and not more than 1200 mm above the floor of the car.
- ii) Lift call buttons at the lift halls shall not be less than 900 mm and not more than 1200 mm above the floor of the finished floor level of the lift hall.
- iii) Call button panels should be provided on both sides of door openings.
- iv) Provision of a secondary control panel for over-spilt floor numbering buttons is always acceptable.
- v) All lift control buttons shall have a minimum dimension of 20 mm.
- vi) Braille and audio assistance in the lift for visually impaired people. Elevator call buttons are designed to be within reach of wheelchair occupants. Braille

and tactile markings shall be placed either on or to the left of the control buttons.

- vii) Such Braille and tactile markings shall be in Arabic numerals and/or symbols. Tactile markings shall have a minimum dimension of 15 mm high and be raised 1 mm minimum.
- viii) The tactile marking of the push buttons for the main entrance floor shall be identified with a symbol in a star shape.
- ix) The emergency alarm push button shall be in a tactile bell shape.

#### **4.25.5 Emergency Call Button in Lifts:**

- 4.25.5.1 An emergency alarm push button together with a buzzer, an indication light for acknowledgement and an intercom shall be provided in each lift car and be connected to the building management office or the caretaker's office.
- 4.25.5.2 The building management office or the caretaker's office shall be equipped with a buzzer, indication light(s) (one for each lift) and an intercom connected to the lift car(s). The indication light for acknowledgement shall be in the form of a blinking light adjacent to the intercom speaker and a notice. When the light blinks, it indicates your emergency call has already been received.
- 4.25.5.3 Please be patient and wait for the rescue." In English and Hindi shall be provided next to the blinking light.
- 4.25.5.4 This system shall be powered by an emergency electricity supply system in the event of power failure.

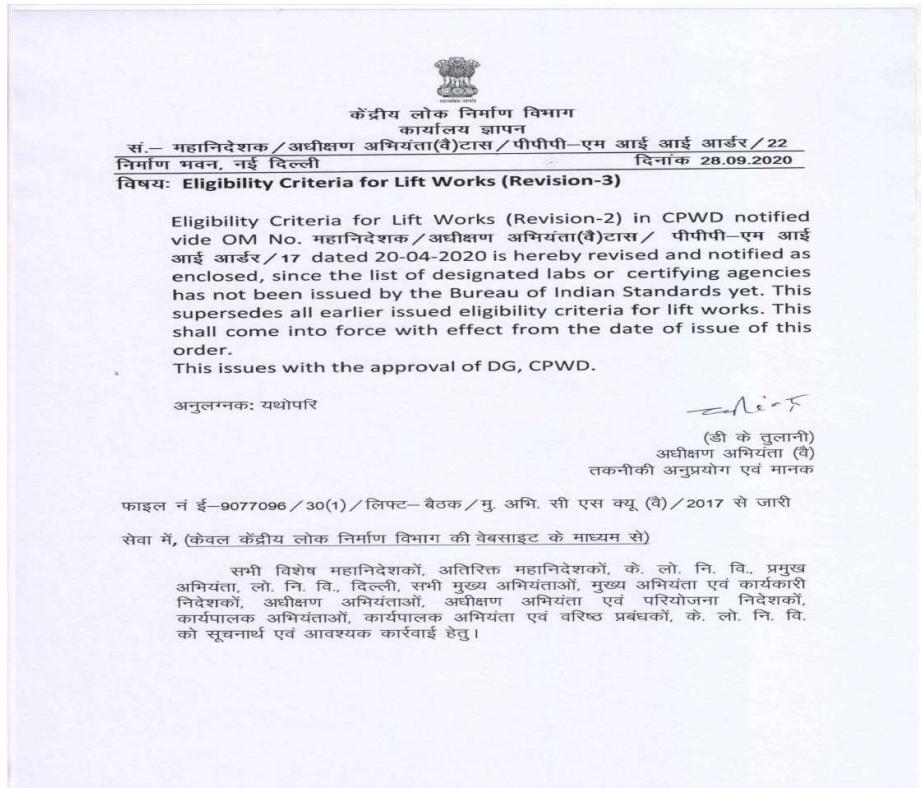
#### **4.25.6 Other Design Considerations.**

- 4.25.6.1 Lift door systems should be designed to allow adequate time for the passage of persons with disability and the elderly.
- 4.25.6.2 The use of visually and acoustically reflective wall surfaces can cause discomfort for persons with visual and hearing impairment.
- 4.25.6.3 For lifts of the size that do not allow a wheelchair user to turn around within the lift car, a mirror should be installed with the bottom edge to be set at 900 mm above the floor level in the lift car to facilitate a wheelchair user in reversing and to see which level the lift has reached.
- 4.25.6.4 Where planning allows, lift cars may be provided with opposing doors to allow a wheelchair user to leave without having to reverse.
- 4.25.6.5 The OEM shall provide a potential-free contact in each lift controller for monitoring of the floor position of the lift through IBMS. A necessary converter shall also be provided for monitoring of the lift through IBMS and other infrastructure.

**Note: The contractor should offer at least 3 Nos. makes of lift, the approval of one make will be given by the Engineer-in-charge**

560  
**Make of lift**

- 1) The lift manufacturer company shall comply the following criteria as per DG's circular:



## **Eligibility Criteria for Lift Works (Revision-3)**

1. The lift manufacturer shall comply with BIS standards, duly certified by the manufacturer itself.
2. The manufacturer shall be compliant with the Public Procurement (Preference to Make In India), Order 2017 (as amended from time to time) issued by the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry.
3. The experience of successful completion of similar works shall be as per the CPWD Works Manual/SoP.
4. The manufacturer shall furnish an undertaking regarding the availability of spares for the entire expected life of the lift, i.e. 15 to 20 years.
5. The complete lift installation including its components, safety devices, various types of controls etc., testing, inspection, operation & maintenance shall conform to relevant Codes, Standards, code of practices, guidelines, safety rules, inspection manual(s), rules issued by Bureau of Indian Standards, as amended up to the last date of receipt of tenders.
6. Quality standards shall conform to latest IS/ISO-9001:2015.
7. The downtime of installed lifts being maintained by the manufacturer shall not be more than 8 hours (average) in case of minor faults and 7 days (average) in case of major faults during the last financial year.

## PACKAGE C-5

### Sub-station and Sub-station Equipment's

5.1.1 The work shall be carried out as per CPWD General Specifications for Electrical Works (Part-IV- SUB STATION) 2013 CPWD General Specifications for Electrical Works Part-I(Internal 2023, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules & Acts shall be the latest norms as modified by Government of India on the date of execution.

5.1.2 The scope of work of Oil type outdoor type Substation shall include 33 KV 3 core 300 sq.mm. **Cross-linked XLPE insulated armored aluminum conductor** HT cable (Earth), HT Panels (one incoming and two outgoing), Transformers (Two Nos of 2000 KVA, 33/0.415 KV, Copper wound, oil type on-load with RTCC panel), Main L.T. Panels (Two nos. panel having one A.C.B. as incomer in each panel and one no ACB Bus-coupler to connect two panels) and other outgoings switchgears, Interconnection of Panel, Protections, metering, Capacitor panels (Two nos. one for each transformer), earthing, L.T. Power distribution feeder pillar, one No. panel for common metering system etc., energization, testing, commissioning etc. complete as required so that substation become fully functional according requirement of end user also as per Single Line Diagram (SLD) enclosed with Bid documents.

If APDCL provide 11 KV line in place of 33 KV as per their availability of feeder then all Substation equipments shall be of rating 11 KV and recovery made on account of change from 33 KV rating to 11 KV will be Rs. 900.00 Per kVA i.e. for 4000 kVA the recovery amount will be Rs. 36.00 Lakhs.

Cable from 33KV APDCL terminal point or 11 KV APDCL terminal point at RBI campus to substation provided by the contractor in the RBI campus is in the scope of the EPC contractor.

5.1.3 Load calculation: -

ELECTRICAL LOAD - RBI HOUSING, GUWAHATI (ASSAM)								
S. No.	Description	No. of Floors	No. of Units	Load Per Flat as per actual	Total Load (KW)	Diversity	Total Load (KW) for T/F	DG back up
A	<b>RESIDENTIAL</b>							
1	<b>CLASS-III-TOWER-1</b>							
a)	2 BHK	2S+P+9	40	7.60	303.88	0.45	136.75	0.00
b)	Caretaker Block-1		1	2.14	2.14	0.50	1.07	
2	<b>CLASS-III-TOWER-2</b>							
a)	2 BHK	2S+P+9	40	7.60	303.88	0.45	136.75	0.00

<b>3</b>	<b>CLASS-IV-TOWER-3</b>							
a)	1.5 BHK	2S+P+9	40	7.60	303.88	0.45	136.75	0.00
<b>4</b>	<b>CLASS-IV-TOWER-4</b>							
a)	1.5 BHK	2S+P+9	40	7.60	303.88	0.45	136.75	0.00
<b>5</b>	<b>GRADE-A-TOWER-5</b>							
a)	2 BHK	S+5+6	28	8.03	224.75	0.45	101.14	0.00
<b>6</b>	<b>GRADE-A-TOWER-6</b>							
a)	2 BHK	S+P+7	32	8.03	256.85	0.45	115.58	0.00
<b>7</b>	<b>GRADE-B&amp;C-TOWER-7</b>							
a)	2.5 BHK	S+P+9	30	10.23	306.83	0.45	138.07	0.00
<b>8</b>	<b>GRADE-D &amp; ABOVE-TOWER-8</b>							
a)	3 BHK	S+P+5	12	14.26	171.06	0.45	76.98	0.00
<b>9</b>	<b>GRADE-B&amp;C-TOWER-9</b>							
a)	2.5 BHK	S+P+9	30	10.23	306.83	0.45	138.07	0.00
b)	Caretaker Block-2		1	1.55	1.55	0.50	0.78	
<b>10</b>	<b>RD BUNGALOW</b>							
a)	3 BHK		1	16.58	16.58	0.45	7.46	0.00
b)	HVAC Load (VRF system)		1	22.00	22.00	0.80	17.60	
<b>11</b>	<b>Club-1</b>							
a)	Light & Power Load	G+1	1	35.38	35.38	0.50	17.69	17.69
b)	HVAC Load		1	111.00	111.00	0.70	77.70	
<b>12</b>	<b>Club-2</b>							
a)	Light & Power Load	2S+P+1	1	21.99	21.99	0.50	10.99	10.99
b)	HVAC Load		1	116.50	116.50	0.70	81.55	
<b>B</b>	<b>COMMON SERVICES</b>							

<b>1</b>	Common Area,Stairecase, Stilt, Podium Area.			75.83	0.60	45.50	45.50
<b>2</b>	Street Lights/ external development			30.00	0.60	18.00	18.00
<b>3</b>	<b>LIFT LOADS</b>						
<b>a)</b>	Lift-12 Nos (10 K.W Each)			120.00	0.70	84.00	84.00
<b>b)</b>	Lift-4 Nos (7.5 K.W Each)			30.00	0.70	21.00	21.00
<b>c)</b>	Lift-4 Nos (5.5 K.W Each)			22.00	0.70	15.40	15.40
<b>d)</b>	Lift Pressurization/ Ventilation Load			83.60	0.20	16.72	16.72
<b>4</b>	Swimming Pool			20.00	0.50	10.00	
<b>5</b>	Plumbing Load			40.00	0.50	20.00	20.00
<b>6</b>	Fire Fighting Load ( For running of Jockey pump Generate shall be provided)			165.00	Only Jockey Pumps	11.00	11.00
<b>7</b>	STP			30.00	0.50	15.00	15.00
<b>8</b>	Slow EV Charging station @ 63 nos. 2.5 KW Each			157.50	0.40	62.00	
<b>9</b>	Fast EV Charging station @ 19 nos. 22.5 KW Each			427.50	0.30	128.25	
10	Fresh air load for clubs						34.00
	<b>TOTAL Load in kW</b>					<b>1779kW</b>	<b>309 kW</b>

	<b>Adopting Overall Diversity @ 80%,Total</b>						<b>1423kW</b>
	<b>TRANSFORMER SELECTION</b>						
	<b>Adopting Transformer Loading 0.8 &amp; Power Factor 0.9</b>						
	<b>Transformer KVA Capacity comes out to be =</b>						<b>1976kVA</b>
	<b>Transformer Selection</b>						<b>2 Nos. x 2000 KVA (1W+1S)</b>
	<b>DG SET SELECTION</b>						
	Adopting Overall Diversity @ 80%,Total essential load						247.44
	<b>Adopting DG Set Power Factor 0.8 &amp; 85% loading</b>						363.88
	Considering @ 10% extra for future load						400
	<b>DG KVA Capacity comes out to be =</b>						<b>500</b>
	<b>DG Set Selection -</b>						<b>2 x 250 KVA</b>

## 5.2 VACUUM CIRCUIT BREAKER:

- 5.2.1 The Panel board shall be of indoor type, having the incoming sectionalization and outgoing switch gears as per IEC 60056, IEC 2300, IEC-100. The degree of enclosure protection shall be IP-4X & IP-5X.
- 5.2.2 All panels assembled to form a board shall be suitable for 800 Amps. and suitable for operation on 33 KV, 3 phase 50 Hz system.
- 5.2.3 The equipment shall be suitable for operation in tropical climate considering design ambient temperature of 40°C. Temperature rise shall be as per IEC 62271-200.
- 5.2.4 The HV Panel Board shall be metal clad, indoor, floor mounting, free standing type. It shall be totally enclosed dust, damp and vermin proof.
- 5.2.5 All the HV compartments shall be tested for Power frequency withstand voltage shall be 70KV rms. Impulse withstand voltage shall be 170KV peak.
- 5.2.6 The circuit breaker shall be tested for cable charging and capacitor duty for minimum “C2” category of latest IEC.

### 5.2.7 General Construction

Separately earthed compartments shall be provided for circuit breakers, bus bars, relay & instruments, CT&PT and cable boxes, fully and effectively segregating these from one another so that a fault in any one compartment does not cause damage to equipment(s) in other compartment(s).

The housing shall be of bolted construction to ensure a compact and rigid structure, presenting a neat and pleasing appearance. The sheet steel used should not be less than 2 mm thick.

The panels shall be bolted together to form a continuous flush front switch gear suitable for front operation of board and for extension at both ends.

The circuit breaker shall be designed so as to have class E2 (circuit breaker with extended electrical endurance) of electrical endurance, and class M2 (circuit breaker with extended mechanical endurance, mechanically type tested for 10 000 cycles) of mechanical endurance, as defined by IEC 62271-100.

#### **5.2.8 General Design Aspects**

The HV panel board shall be designed such that the switchgear, instruments, relays, bus bars, small wiring etc. are arranged and mounted with due consideration for the following: -

- (a) Facility for inspection, maintenance and repairs of testing terminals and terminal boards for ease of external connection.
- (b) Minimum noise and vibrations. Risk of accidental short circuits and open circuits. Secured and vibration proof connections for power and control circuits.
- (c) Risk of accidental contact and danger to personnel due to live connections.
- (d) Mountings at approachable height.

#### **5.2.9 CIRCUIT BREAKER**

##### **General Arrangements**

The circuit breaker panels shall be complete with the following:

- (a) Racking in / Racking out mechanism.
- (b) Isolating plugs and sockets.
- (c) Mechanical inter-locks and safety shutters.
- (d) Mechanical ON/OFF indicator.
- (e) Minimum of 4 NO and 4 NC Auxiliary contacts directly operated by the circuit breaker. Additional NO & NC contacts can be provided with auxiliary contractors.
- (f) Anti condensation space heaters suitable for operation on 230V, single phase 50 Hz A.C. for each panel.
- (g) Suitable tripping/ control arrangement.
- (h) Mechanical counter to assess the total number of operations of the breaker.

#### **5.2.10 Type**

The circuit breaker shall be of horizontal isolation, horizontal draw out pattern, having one VCB incoming and two outgoing VCB.

#### **5.2.11 Breaker Truck**

The breaker carriage shall be fabricated from steel, providing a sturdy vehicle for the circuit breaker and its operating and tripping mechanism. The carriage shall be mounted on wheels, moving on guides, designed to align correctly and allow easy movement of the circuit breaker and for removing the carriage for inspection and maintenance purposes. Vacuum

interrupters shall be hermetically sealed and shall be designed for minimum contact erosion, fast recovery of dielectric strength, maintenance free vacuum interrupter, suitable for auto-reclosing. The drive mechanism shall preferably be provided with facility for pad locking at any position namely, "Service", "Test" and "Fully Isolated". It should be possible for testing the circuit breaker for its operation without energizing the power circuit in the "Testing" position. The contacts shall be made only after the breaker is inserted into service position. Interlocking should prevent contacts from being disconnected if circuit breaker is tried to be moved from service position.

### **5.2.12 General Features**

- 5.2.12.1 Single break contacts are provided in sealed vacuum interrupter.
- 5.2.12.2 The circuit breakers shall be continuously rated current of 800 Amps. with 33 KV voltage rating and 31.5 KA.
- 5.2.12.3 Operating Mechanism. The operating mechanism shall be one of the following as specified: -Manually operated spring charged / motor wound spring charged with both mechanical and electrical release for closing. The operating mechanism shall be trip free.
- 5.2.12.4 External auxiliary supply shall be made available for charging motors & heaters operation.

### **5.2.13 BUS BAR SECTION**

The switch board shall be **single bus bar pattern** with air insulated encapsulated bus bars housed in a separate compartment, segregated from other compartments.

### **Material**

The bus bars shall be of high conductivity electrolytic Aluminum rated as minimum rated current of 800 Amps. The bus bars shall be sized for carrying the rated and short circuit current without over-heating. Maximum bus bar temperature shall not exceed 95<sup>0</sup> C.

### **5.2.14 CURRENT TRANSFORMER**

#### **General Requirements**

Accommodation shall be provided in the circuit breaker panel to mount one set of three numbers dual core dual ratio CTs for metering and protection purposes. Access to the CTs for cleaning, testing or changing shall be from the front, back or top of the panel.

#### **Rating**

Dual core & dual ratio suitable rating CTs of burden not less than 15 VA with 5 Amps secondary. CT ratio shall be compatible with the loading pattern on HV side.

The CTs shall conform to relevant Indian Standards. The design and construction shall be robust to withstand thermal and dynamic stresses during short circuits. Secondary terminals of CTs shall be brought out suitably to a terminal block which will be easily accessible for testing and terminal connections. The protection CTs shall be of accuracy class 5 P 10 of IS 2705- Part III-1992.

The metering CTs shall conform to the metering ratio and accuracy class 0.5 of IS 2705-1992 for incomer and class 1 for outgoing panels.

For further details, please refer technical data / specification of VCB listed below.

### **5.2.15 VOLTAGE TRANSFORMER**

#### **General Requirements**

A voltage transformer of burden not less than 100 VA and of proper ratio as specified shall be provided at the incoming panel.

The accuracy class for the VT shall be class 0.5 as per IS 3156 Parts I to III for incomer and class 1 for outgoing panels.

The transformer shall be of cast epoxy resin construction. It shall be fixed/withdrawable type. MCBs of suitable ratings shall be provided on both HV and LV sides.

### **5.2.16 PROTECTION AND TRIPPING ARRANGEMENT**

#### **Protection**

The Relays shall be microprocessor-based numerical relays with O/L, E/F and S/C protection Tripping relay shall be used for the tripping signal to the Shunt Trip Coil of Circuit Breaker and indication light operating through Control supply for closing and tripping shall be 110 Volts D.C. through **Power pack**. 230 Volts single-phase A.C. supply shall also be available for the operation of spring charging motor and cubicle space heater. Wattage of closing and tripping coils shall be within 250 watts. Aux supply shall be suitably distributed along with switchgear in loop in loop out fashion.

### **5.2.17 Relays**

Over current Relays shall have adjustable setting for current from 50% to 200% and earth fault from 10% to 40% or 20% to 80%. These should be of manual reset type. All relays shall have a LED indicator which will indicate operation for each function. It shall be possible to reset it only by manual operation. The number and types of relays shall be as specified.

### **5.2.18 SMALL WIRING**

The small wiring shall be carried out with minimum 1.5 sq. mm FRLS/ HFFR insulated copper conductor cables. CT wiring shall be done with minimum 2.5 sq mm wires with colour code: RYB, Gray for auxiliary DC circuits and Black for auxiliary AC circuits. The wiring shall be securely fixed and neatly arranged to enable easy tracing of wires. Identification tags shall be fitted to all wire terminals to render identification easy and to facilitate checking in accordance with IS 375. Necessary terminal blocks and cable entries shall be provided for RTD relay wiring, power supply etc.

All wiring shall be neatly routed, and group of wiring shall be securely fixed by clips so that wiring can be checked without necessity of removing the clamps. Wiring between fixed and moving portion of the panel shall be run in flexible tubes and the same shall be so mounted to avoid any damage to them due to mechanical movements. Ferrules with number shall be provided on both end of the wiring.

#### **5.2.19 Power Pack:**

Power Pack shall be suitable for 2 panels.

It shall be based DC Power pack, constant voltage, constant current type, self-powered power pack protected from overcharging, short circuit & fuse at Input, input voltage 230V / 110V AC ± 20% and output voltage 24V DC with 7AH Sealed maintenance free (SMF) Battery.

Type : CVCC (constant voltage constant- current)

Rated Input Voltage : 230 V AC.

Input Voltage Tolerance : 170v to 270 V

Rated Input Frequency : 50 Hz.

Input Frequency Tolerance : ± 5%.

Output Voltage(AC mode) : 26.0 Volts

Output Voltage(DC mode) : 24.0 Volts.

Battery : 12V7AH X2

Output Current : 0-10Amps. (for Tripping).

Tripping : 10(Depending on battery condition)

Recharge time : 8-10hrs. /Condition.

Protections : Over Charge and low battery Electronically controlled.

Indications : AC-ON,DC-ON, Ch. Fail

Ventilation : Air cooled

#### **5.2.20 METERING INSTRUMENT, PANEL ACCESSORIES (DIGITAL)**

##### **Metering**

Energy metering shall be done either on the incomers.

##### **Voltage Selection Scheme**

Where a bus coupler is incorporated and only one incomer feeder (out of two available) is intended to be operated at a time, a VT Transfer Relay shall be incorporated to provide necessary potential for metering. This will be necessary when energy metering is done on individual feeders or where VT supply is used for trip circuits. Alternatively PTs shall be provided on both the bus sections (incomers) with individual metering on each incomer.

##### **Instrument Panels**

The instrument panel shall form part of the housing. Relays, meters and instruments shall be mounted as per general arrangement drawings to be submitted by the tenderer. They shall be preferably of flush mounting type at a maximum height of 1800 mm.

## Instrumentation

- i) A voltmeter of class 1.5 accuracy as per IS 1248 shall be provided at each incomer panel, with selector switch. The instrument shall be calibrated for the ranges specified.
- ii) Energy meters of class 1.0 conforming to IS 722 (Part IX) and power factor meter of class of accuracy of 2 shall be provided.
- iii) Ammeter of suitable range of class 1.5 accuracy as per IS 1248 shall be provided at both incomer and outgoing panels along with necessary selector switches.
- iv) The panel assembly shall also take care of the following requirements:
  - (a) Lamp indication shall be provided to indicate ON/ OFF (by red green respectively) of switch gear.
  - (b) Panel illuminating lamp.
  - (c) Mechanical indication for spring charged status, an indicating lamp could be provided.
  - (d) Lamp indicating tripping at fault status.
  - (e) Healthy trip supply shall be indicated by clear lamp.
  - (f) Separate MCBs shall be provided for lamps, heaters, voltmeters and other instrumentation etc. on each panel.
  - (g) Where there is more than one incomer and bus sections, these shall be castle key interlocked as per interlocking scheme.

- 5.2.21 Cable boxes shall be situated in a compartment at the rear / side of the housing as specified.
- 5.2.22 Provision for top / bottom or such other side entry shall be made as per requirement with sufficient head room for cable termination. 3mm thick removable gland plate shall be provided for cable termination.
- 5.2.23 The earthing of the breaker body and moving portion shall be so arranged that the earthing of the non-current carrying structure to the frame earth bar is completed well before the main circuit breaker plugs enter the fixed house sockets.
- 5.2.24 The entire panel board shall have a common tinned G.I. earth bar of size not less than 50 mm x 6 mm with 2 earth terminals for effectively earthing metallic portion of the panels.
- 5.2.25 The installation work shall cover assembly of panels lining up, grouting the units etc. In the case of multi panels switch boards after connecting up the bus bar all joint shall be insulated with HV insulation tape or with approved insulation compound. A common earth bar shall be run preferably at the back of the switch board connecting all the sections for connecting the earth system. All protection, indications & metering connections and wirings shall be completed.

Where trip supply battery is installed, the unit shall be commissioned, completing initial charging of the batteries. All relay instruments and meters shall be mounted and connected with appropriate wiring. Calibration checks of units as necessary and required by the licensee like CTs, VTs Energy Meters etc. shall be completed before pre-commission checks are undertaken.

### **5.2.26 TESTING AND COMMISSIONING**

The procedure for testing and commissioning of relay shall be in general accordance with good practice. Commissioning checks and tests shall include in addition to checking of all small wiring connections, relays calibration and setting tests by secondary injection method and primary injection method. Primary injection test will be preferred for operation of relay through CTs. Before panel board is commissioned, provision of the safety namely fire extinguishers, rubber mats and danger board shall be ensured. In addition, all routine megger tests shall be performed. Checks and test shall include following:

- (a) Operation checks and lubrication of all moving parts.
- (b) Interlock function checks.
- (c) Continuity checks of wiring, fuses etc. as required.
- (d) Insulation tests.
- (e) Trip test and protection gear tests.
- (f) The complete panel shall be tested with 5000 V megger for insulation between poles and poles to earth. Insulation test of secondary of CTs and VT to earth shall be conducted using 500 V megger.
- (g) Any other tests as may be required by the Licensee / Inspector shall be conducted.
- (h) Any other test required by the consignee/ inspecting officer.

### **5.2.27. TECHNICAL DATA/ SPECIFICATION OF H.T. VCB PANEL**

<b>TECHNICAL DATA/ SPECIFICATION OF H.T. VCB PANEL</b>		
<b>1</b>	<b>Type of panel</b>	: Indoor, metal clad, floor mounting, free standing, totally enclosed, fully interlock, dust, damp and vermin proof, having one incoming sectionalisation & two outgoing switch gears as per IEC 60056, IEC 2300, IEC-100.
<b>2</b>	<b>Draw out mechanism</b>	: Horizontal isolation, horizontal draw out pattern, having one VCB incoming and two outgoing VCB.
<b>3</b>	<b>System type</b>	: 3 phase, 3 wire
<b>4</b>	<b>In coming System Volage</b>	: 33 KV
<b>5</b>	<b>Current rating</b>	: 800 Amps.
<b>6</b>	<b>Frequency</b>	: 50 Hz
<b>7</b>	<b>Fault level in KA</b>	: 31.5 KA /3 sec .
<b>8</b>	<b>Basic Insulation level</b>	: 36 KV/70 KV(RMS)/170 kVp

<b>9</b>	<b>Internal ARC fault withstands</b>	:	1 Sec
<b>10</b>	<b>Design ambient</b>	:	40 <sup>0</sup> C
<b>11</b>	<b>Vacuum Circuit Breaker with spring charging motor rated for 230 V AC, tripping coil and closing coil at 110 V D.C.</b>	:	One incomer and two out going.
<b>12</b>	<b>Bus bar material</b>	:	Aluminium
<b>13</b>	<b>Bus Bar (Cross Section Each Phases)</b>	:	Suitable ampers for the system, according to manufacture standard.
<b>14</b>	<b>Bus Bars Hardware Grade</b>	:	As per manufacturer standard and relevant IS.
<b>15</b>	<b>Current Transformers</b>	:	
	a) For incoming Panel	:	Suitable current rating as per manufacturer, class 0.5/5P10 of IS: 2075- Part-III amended up to date, suitable VA (not less than 15 VA) with 5 Amps secondary - 3 Nos.
	b) For outgoing Panel	:	Suitable current rating as per manufacturer, class 0.5/5P10 of IS: 2075- Part-III amended up to date, suitable VA (not less than 15 VA) with 5 Amps secondary - 3 Nos. for each out going panel.
<b>16</b>	<b>Potential Transformers</b>	:	Suitable rating shall be 3 phase 3 limb tpe , class 0.5/3P (as per IS: 3156 Parts I to III) not less than 100 VA (Draw out type) 3 Nos for each incoming panel.
<b>17</b>	<b>Relays</b>	:	
	a) For incoming Panel (Numerical with IEC61850 communication)	:	1 No.
	b) For outgoing Panel (Numerical with IEC61850 communication)	:	2 nos.
	c) Master Trip Relay	:	1 No. for incoming panel and 1 No for outgoing panel.
	d) Auxiliary Relay	:	2 nos. for outgoing panel.
<b>18</b>	<b>Meters</b>	:	
	a) Digital Ammeter	:	1 No. for incoming panel and 1 No for each out going panel.
	b) Digital Voltmeter	:	1 No. for incoming panel.
	c) Multifunction meter with 2x RJ-45 Ethernet port	:	1 No. for incoming panel and 1 No for each out going panel.
<b>20</b>	<b>Earth Bar Materials</b>	:	Aluminium.

<b>21</b>	<b>Size of earth Bar</b>	Suitable size according to system proposed and manufacturer standard (having extension outside, both side)
<b>22</b>	<b>Protection</b>	: IP-4X protection.
<b>23</b>	<b>Terminal arrangement</b>	:
<b>a)</b>	<b>Incoming Side</b>	: The incoming VCB panel should have suitable size air insulated cable termination box for termination of 33 KV 3 core 300 sq.mm. <b>Cross-linked XLPE insulated armored aluminum</b> HT cable (Earth) through indoor heat shakeable kit (Double Run for 1 No. stand by).
<b>b)</b>	<b>Outgoing Side</b>	: The outgoing VCB panels (in each panel) should have suitable size air insulated cable termination box for termination of 33 KV 3 core 300 sq.mm. <b>Cross-linked XLPE insulated armored aluminum</b> HT cable (Earth) through indoor heat shakeable kit (Double Run for 1 No. stand by).
<b>24</b>	<b>Communications</b>	: The panel board shall have BMS compatible, RS485 Ethernet port or 2 x LC in the front Ethernet port) and should suitable for Modbus, Net Bank and LOP protocols.

### 5.3 OIL TYPE ON-LOAD DISTRIBUTION TRANSFORMERS WITH RTCC PANEL

#### 5.3.1 General Construction

##### IEC 60076

The Transformers shall comply with the following Indian Standards as amended upto date.:

- IS 2026 - Part I to V - power transformers
- IS 10028 (Part II & III) - Installation and Maintenance of Transformers.
- IS 10028 (Part II & III) - Installation and Maintenance of Transformers.
- IS 2099 – Bushing
- IS 2705 - Current Transformers.
- IS 6600 - Guide for loading of oil immersed transformers

#### 5.3.2 Tap Changing Device:

Preferred tapping range is  $\pm 2.5\% \pm 5\% -7.5\%$  in 2.5 percent steps by means of on load tap changing links or tap switch. The device shall be provided on HV for HV Voltage to keep LV Voltage constant.

#### 5.3.3 Terminal Markings Connections:

Relevant provisions of IS 2026 (Part-IV): 1977 shall be applicable.

#### 5.3.4 Accessories

The transformer shall have suitable size air insulated cable termination box for termination of incoming of 33 KV 3 core 300 sq.mm. **Cross-linked XLPE insulated armored aluminum** HT cable (Earth) through indoor heat shakeable kit. The L.T. side shall also have suitable size air insulated flange type box to terminate copper bus trunking, inter-connection suitable for full load current of the transformer.

### 5.3.5 FITTINGS

The transformer shall be complete with the following fittings: -

- a. Oil conservator with oil level indicator, minimum level marking and drain plug.
- b. On load circuit type tap changer with position indicator and locking arrangement.
- c. Thermometer pocket with plug.
- d. 100 mm dial type /stem type thermometer with metal guard Dial type thermo- meter may have max. temperature indicator and resetting device
- e. Lifting lugs.
- f. Bi-directional /Unidirectional Rollers to be specified.
- g. Rating diagram and terminal marking plate.
- h. Explosion vent.
- i. Additional Neutral separately brought out on a bushing for earthing.
- j. Earth terminals (2 Nos.) for body earthing.
- k. Valves for filtration, drainage and filling etc. with necessary plugs.
- l. Radiator assembly.
- m. Silica gel breather.
- n. Air release plug.
- o. First filling of oil to IS 335:1993 including make-up fill during installation.
- p. Buchholz relay
- q. Inspection covers on tank cover for access to terminal connections.
- r. Bushing terminations or cable box terminations as specified.
- s. Necessary hardware, clamps, lugs etc. for termination on HV/MV etc.

### 5.3.6 Rating Plates

A rating plate of weather proof material bearing the data specified in clause of IEC 60076.

### 5.3.7 Joints and Gaskets

All gaskets used for making gas tight joints shall be of proven material.

### 5.3.8 Parallel Operation

For parallel operation of transformers, the transformers shall have the same percentage impedance, same voltage ratio, same vector group, phase sequence etc.

### 5.3.9 Tests

#### 5.3.9.1 Tests at Works

All routine and other tests prescribed in IEC 60076 shall be carried out at the manufacturer's works before the dispatch of the transformer in the presence of an inspecting officer. Copies of the test certificates shall be furnished to the department. In

addition to the prescribed routine tests, the temperature rise test shall be invariably done on one transformer of each design. A copy of the impulse test certificate done on the same type/design of the transformer shall be furnished in accordance with IEC 60076 for the purpose of record. If no impulse test was done in an earlier unit of the same design and type, one transformer will be subjected to impulse test in consultation with the Inspector at the firm's cost. Copies of the certificates of type test for short circuit shall be supplied to the Department.

### 5.3.9.2 Tests at Site

In addition to tests at manufacturer's premises, all relevant pre-commissioning checks and tests conforming to IS code of practice No. 10028 shall be done before energization. The following tests are to be particularly done before cable jointing or connecting up the bus bar trunking.

- (a) Insulation test between HV to earth and HV to MV with a 5000 volts Megger.
- (b) Insulation test between MV to earth with 500 volts Megger.
- (c) All test results are to be recorded and reports should be submitted to the department.

### 5.3.9.3 Installation and Commissioning

The transformer shall be installed in accordance with IS 10028-Code of practice for Installation and maintenance of transformer. Necessary support channels shall be grouted in the flooring.

The transformer shall be moved to its location and shall be correctly positioned. Transformer wheels shall be either locked or provided with wheel stoppers. Wiring of devices shall be carried out as per drawings.

<b><u>TECHNICAL DATA/ SPECIFICATIONS OF 2000KVA,33 KV /0.415 KV OUTDOOR TRANSFORMER</u></b>			
<b>1</b>	<b>Type</b>		Oil type, Outdoor, On-load Power Transformer with RTCC panel.
<b>2</b>	<b>KVA Rating:</b>		
	<b>a) HV Winding</b>		33 KVA
	<b>b) LV Winding</b>		0.415 KVA
<b>3</b>	<b>Winding materials</b>		99.9 % pure electrolytic grade Copper.
<b>4</b>	<b>Insulation Class</b>		Class F.
<b>5</b>	<b>Thermal stability of insulating materials in service</b>		As per IS: 1271 -2001/ IEC60076.
<b>6</b>	<b>Rated no load voltage</b>		
	<b>a) HV winding</b>		33 KV
	<b>b) LV winding</b>		0.415 KVA
<b>7</b>	<b>Rated Frequency</b>		50(+ to -5%)
<b>8</b>	<b>No of phases</b>		Three

<b>9</b>	<b>Connection</b>	
	<b>a) HV winding no</b>	DELTA
	<b>b) LV winding</b>	STAR
<b>10</b>	<b>Vector Group</b>	Dyn11
<b>11</b>	<b>Reference ambient Temperature</b>	50 <sup>0</sup> C
<b>12</b>	<b>Impedance</b>	6.25%
<b>13</b>	<b>a) Winding Temperature rise</b>	90 <sup>0</sup> C
	<b>b) Core, metallic parts and adjacent materials</b>	The temperature shall in no case reach a value that will damage the core itself, other parts or adjacent materials.
<b>14</b>	<b>Tapping Details</b>	
	<b>a) Type</b>	On-Load circuit
	<b>b) Range</b>	± 2.5% ± 5% -7.5%
	<b>c) No. of steps</b>	5 positions
	<b>d) Type of voltage variation</b>	CFVV (Constant Flux Voltage Variation)
<b>15</b>	<b>Cooling</b>	The transformer shall be oil and naturally cooled type (ONAN).
<b>16</b>	<b>Component Losses</b>	
	<b>a) No load loss at rated voltage &amp; at rated frequency</b>	As per IS/ ECBC.
	<b>b) Maximum load loss 50% at rated voltage &amp; at rated frequency(As per ECBC 2024)</b>	Not more than 4790 watt
	<b>b) Maximum load loss 100% at rated voltage &amp; at rated frequency (As per ECBC 2024)</b>	Not more than 14100 watt
<b>17</b>	<b>Terminal arrangement</b>	
a)	H.T. Side	Suitable arrangement for air insulated cable termination box for termination of 33 KV 3 core 300 sq.mm. <b>Cross-linked Polyethylene (XLPE) insulated armoured aluminum</b> HT cable (Earth) through indoor heat shakeable kit.
b)	L.T. Side	Suitable arrangement for termination of Bus trunking System (aluminium 4 strip).

18	Degree of protection		IP 23.
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#### 5.4 L.T. Panels, FF panel & APFC panel

The agency should assist the consultant to obtain service connection from the power supply company who will provide metering arrangement also. The contractor should plan his work in such a manner which synchronize the installation & commissioning of substation equipment with that of supply company. The contractor shall enable the consulting agency in liaison with the supply company & arrange to obtain necessary power connection approvals from statutory bodies. Details of calculated load in enclosed here in. All LT Panel will be type tested as per Standard IEC 61439- (Part-1 & 2).

The transformer and LT Panel shall be connected through bus trunking of outdoor application (IP 67 or higher)

All panel will be type tested as per standard IEC 61439- 1 & 2 and panel board shall have RS 485 port/ MODBUS/ BAEK NET/ LON compatible. All L.T. panel should be compatible to IBM system.

##### 5.4.1 Main LT Panel (as per SLD submitted by the consultant)

Cubical type LT panel suitable for 415V, 3 Phase, 4 Wire 50 Hz Ac supply system fabricated in compartmentalized (preferably) design from CRCA sheet steel of 2mm thick for frame work and covers, 3mm thick for gland, plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade, having suitable capacity extensible type 4 strip (4 pole) electrolyte grade Aluminum bus bars of high conductivity, DMC/SMC bus bar supports, with short circuit with stand capacity of 31 MVA for 1 Sec., bottom base channel of MS section not less than 100mmx 50mm x 6mm thick, fabrication shall be done in transportable sections, entire panel shall have a common G.I. earth bar of size 50 mm x 6 mm at the rear with 2 Nos. earth stud, solid connections from main bus bar to switch gears with required size of Al. bus bars and control wiring with sq. mm. PVC insulated copper conductor S/C cable, cable alleys, cable gland plates in two half, i/c providing following switch gears. Also, the panel will be provided with necessary instrumentation like CTs, PTs, Ammeters, Voltmeters, phase indicating lamps, other required instruments, wiring, fuses etc. LT panel shall be made as per SLD and agency should take prior approval of GAD drawing before fabrication of panel.

All HT and LT Panels are TTA Panels as per IEC 61439 1 &2 specification as in CPWD GENERAL SPECIFICATIONS FOR ELECTRICAL WORKS 2023 (Part-1) and Substation (Part -IV).

**5.4.1.1. Main LT Panel (Non- Essential Panel)** shall be installed at Substation building and should have facility to termination of aluminum 4 pole sandwich Busbar trunking. Non-Essential section of MV panel outgoing shall feed following non-essential load electrical loads:

- (a) APFC Panel for each panel.
- (b) Any other non-essential load/ common load metering panel.

5.4.1.1.1 Incomer: As per SLD attached with bid documents. The incomer shall be either a double break / contact repulsion MCCB or an Air Circuit Breaker.

5.4.1.1.2 The bus coupler shall be either a circuit breaker or a double break / contact repulsion MCCB as specified in SLD.

5.4.1.1.3 The outgoing feeders shall be circuit breakers/ MCCBs as specified in SLD.

5.4.1.1.4 Outgoings: As per SLD attached with bid documents.

#### **5.4.2 SANDWICH BUSBAR TRUNKING SYSTEM:**

The scope of work involves Supply, Installation, Testing and Commissioning of 3 phase, 4 wire (100% neutral) with integral earth bus Compact Sandwich bus trunking of suitable rating as per designed load for connection in between Transformer LT side to LT panel. All bus trunking products and fittings shall be in accordance with IEC 61439-6 or UL 857.

##### **5.4.2.1 General:**

This specification is intended for design, manufacture, transporting, installation and testing at site of compact sandwich type Aluminium conductor LT Bus Bar Trunking system (Bus duct) suitable for indoor installations. All bus trunking products and fittings shall be in accordance with IEC 61439 – 6.

##### **5.4.2.2 Standards:**

Updated and current Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract. In addition, the relevant clauses of the following standards as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC 61439-6 Standards shall be applicable.

##### **5.4.2.3 Bus Bar:**

Bus bars shall be electrolytic grade Aluminum Conductor with Halogen Free insulation. Rated operating voltage of the bus bar trunking is 1000V, 3 Phase, 4 wire with integral earth. The neutral conductor should have the same cross-sectional area as the phase conductor. The whole bus bar trunking system shall be capable of withstanding the short circuit of the electrical installation without damaging the electrical, mechanical, and thermal stress under fault condition at a service voltage of 1000V, 50Hz.

##### **5.4.2.4 Housing/ Enclosure:**

The bus bar trunking housing shall be constructed of electro galvanized steel and shall be provided with a suitable protective finish of epoxy paint. The enclosures of Bus Ducts shall be totally enclosed for protection against mechanical damage and tested for IK10 as per IEC 62262.

The bus bar trunking housing shall be totally enclosed, non-ventilated for protection against water and dust accumulation with suitable IP rating as mentioned below. It should have passed minimum 1500 hours salt spray test to ensure the anti-corrosion ability. The absolute temperature at any point of the bus bar trunking enclosure and at joints shall be strictly in conformation to IEC 61439-6.

Enclosures shall be provided with riveted joints applied at intervals specified by the manufacturer along the entire length to eliminate possibility of theft. Ingress protection for the enclosures shall be minimum IP-55 for Indoor application for Feeder & Distribution application with Plug-in-points as per IEC 60529. Ingress protection for the enclosures shall be minimum IP-65 (without considering any Canopy) for outdoor Bus ducts as per IEC 60529. However, suitable canopy to be provided to cover the outdoor busducts to avoid any mechanical damage by any accidental falling of foreign bodies.

The enclosure of Bus Trunking System shall be fabricated from min.1.6mm thick CRCA sheet steel/ GI/ Extruded Aluminium and shall be powder coated to suite the aesthetic ambience or as approved after regress metal treatment process. Enclosure shall be rendered dust proof and vermin proof by adequate gasketing etc. to provide ingress protection.

#### **5.4.2.5 Joints:**

The bus bar trunking joint shall be with Factory fitted type. The bolt shall be torque indicating and at earth potential. The bolt shall be two-headed design to indicate when proper torque has been applied and require only a standard long handle wrench to be properly activated. It should be possible to remove any joint connection assembly to allow electrical isolation or physical removal of a bus bar trunking length without disturbing adjacent bus bar trunking lengths. There shall be no bolts passing through the bus bars of the bus way as a part of safety.

#### **5.4.2.6 Insulation:**

Each busbar shall be insulated with minimum Class F (155 Deg Centigrade) Insulation. Further, the insulation material shall be certified as “halogen-free” by the manufacturer. All plastic components have a V1 Self-extinguishing degree as per UL 94.

**Flange End Boxes:** Flanged end box shall be provided to accommodate flange end for connecting the bus trunking with the flanges of panels, transformers etc., through flexible connections or as recommended by manufacturer. The flange end termination on panel should be guaranteed for Ingress protection as per requirement for indoor/outdoor application and should be backed by a type test report from the manufacturer. Phase matching of bus trunking with equipment shall be done prior to installation.

All insulating plastic components comply with the in can descent wire test and have self-extinguishing properties. Operating voltage and Insulation voltage level must be 1000 Volts and suitable for 50/60 Hz frequency.

#### **5.4.2.7 Supports:**

Both horizontal and vertical spacing between support structures shall be as per the recommendations of the manufacturer. Installation shall be done with all the required hot dipped galvanized iron supports as per the manufacturer's recommendations.

#### **5.4.2.8 Earthing:**

The entire bus trunking system shall be provided with integral earthing, and with two independent earthing aluminium conductors, throughout the length of the system. The

earth flats shall be effectively connected to the enclosure by riveting /bolting. End covers shall be provided as required.

#### **5.4.2.9 Certificates/ Documents to be enclosed:**

The type test certificates from international independent testing authority like LOVAG or UL, ASTA Diamond, KEMA KEUR, for the following are to be enclosed: -

- a) Resistance/ properties of insulating materials to abnormal heat.
- b) Resistance to flame propagation.
- c) Temperature rise limits.
- d) Short Circuit Strength.
- e) Effectiveness of the Protective Circuit.
- f) Dielectric Properties.
- g) Clearances and creepage distances.
- h) Mechanical operation.
- i) Structural strength Resistance to corrosion.
- j) Thermal Stability of Enclosures.
- k) Mechanical impact test – IK 10.
- l) Verification of marking.
- m) Ingress Protection.
- n) Seismic Zone Certificate Suitable for Zone 5.
- o) Test certificate/ reports of the Class “F“ insulating material from its manufacturer.
- p) Test certificate/ reports of salt spray test carried out on the enclosure.

#### **5.4.2.10 Testing at factory:**

Routine tests like dimensional checks, electric continuity checks, IR test, dielectric withstand test shall be carried out at works / factory as per IEC 61439-6 in the presence of customer engineers in order to qualify the product. All routine test reports are to be submitted to the engineers visiting the factory for inspection. The product shall be dispatched from the factory only after obtaining necessary clearances from the CPWD.

#### **5.4.2.11 Installation, Testing and Commissioning at site:**

The panel board shall be supplied in properly packed conditions. After ascertaining that there is no damage to the packing, all the items shall be inspected after unpacking. It is the responsibility of the vendor to inspect all the materials for damage, if any, after unloading at site. Installation shall be done with required supports, joints etc strictly as per the recommendations of the manufacture and IEC standards. Care should be taken by the vendor to ensure that no damage is caused either to the product or the technicians who are deployed for the installation work. All the required commissioning tests shall be carried out in the presence of customer engineers. Installation, Testing & Commissioning shall be done strictly by the manufacturer personnel / Authorised System Integrator only. The system shall be commissioned only after the manufacturer's engineer qualifies that the product has been installed and tested as per the manufacturer's recommendations and in conformation with IEC 61439-6-2012. All the required operating and maintenance manuals, as-built layout of the bus way along with complete details of all the components of the system, necessary protocols to be followed during maintenance etc shall be handed over to the Customer.

#### **5.4.2.12 General terms:**

The agency shall submit the fabrication drawings/ bus trunk layout drawings to the customer for approval. On approval agency shall proceed for fabrication. All test facilities required shall be provided for the tests prescribed in the schedule by the party without any additional cost at their factory. The tests shall be carried out in the presence of CLIP inspection team before despatch from their works.

- 5.4.2.13 The bus trunk system shall be guaranteed for a period of 12 months from the date of commissioning. The agency shall repair / replace the damaged components without any extra cost during the guarantee period.
- 5.4.2.14 The agency shall provide three complete sets of operation and maintenance manuals and test certificates for the operation and maintenance purpose of the customer.
- 5.4.2.15 The customer shall reserve the right to accept / reject any part of work, which is not acceptable as healthy engineering practice of carrying out such work as the case may be. In case of any failure to carry out the scope of work in time as per the instruction of customer, the work shall be carried out / got done by the customer at the cost and risk of the agency and the entire amount with supervision charges shall be recovered from the agency.

#### **5.5 Essential section of LT panel outgoing shall feed following electrical loads.**

- (a) Common area Lighting load.
- (b) External lighting load.
- (c) Lift load through separate L T panel at each building.
- (d) Fire Alarm Panel.
- (e) Water supply pump Panel.
- (d) Sewage treatment plant panel / Effluent treatment plant panel.
- (e) Security system DB.
- (f) Jockey pump
- (g) TFA of club houses

**5.5.1 Incomer:** As per SLD attached with bid documents.

**5.5.2 Outgoings:** As per SLD attached with bid documents.

Note: TOTAL TYPE TEST ASSEMBLY (COMPLETE TYPE TEST SWITCHGEAR AS WELL AS ENCLOSURE) of panel configurations offered shall be CPRI approved for all the tests as per IEC-61439-1&2 and internal arc tests. The material and the spacing of the Bus bar support should be same as per the type tested assembly. Copies of the test report shall be submitted as per direction of Engineer-in-charge.

**5.5.3 APFC Panel :** Separate APFC Panel shall be provided for each transformer.

5.5.3.1 APFC Panel shall be factory-built floor mounted auto manual power factor correction panel of suitable capacity having 3 phase, 4-Wire, ultra heavy duty, low loss, power capacitors in the required number of steps discharge resistors. The system shall have microprocessor-based power factor controller provided in the command module having target P.F. setting and digital P.F. display. The panel shall be of suitable size fabricated from cold rolled sheet steel of 2 mm thick for enclosure & 1.6 mm thick for doors with stiffeners where ever

required, chemically treated with seven tank process, epoxy powder coated with suitable rating aluminium busbar suitable for operation on 3 phase, 4-wire, 415 V 50 HZ AC supply i/c suitable no. switchgears mounted thereon and provided with cooling fans (with thermostat) and grills for proper ventilation complete with gaskets and interconnections including the connections with CTs in the Main LT Panel as per specifications complete as detailed below as required. (The board shall be with degree of protection of IP 42).

### 5.5.3.2 Incomer :

Suitable rating MCCB with rotary handle. Specification and selection of MCCBs shall be as per CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date.

- 5.5.3.3 Three Phase multifunction meter Digital Type Accuracy. Class -1.0 (96Sqmm.) with RS-485 communication port & 1 set of suitable CTs.
- 5.5.3.4 Suitable stage RTPFC relay card with manual / bypass switch
- 5.5.3.5 LED type indicating lamp with control MCBs.

### 5.5.3.3 Outgoing:

Suitable KVAR Capacitors with TP MCCB, as per CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date, auto manual push button, LED type ON/OFF indicating lamp, thyristor module, 07 % Copper Wound D-tuned filter.

- 5.5.3.3.1 Suitable space shall be provided to installed 1 set of capacitor TP MCCB, auto manual push button, ON/OFF indicating lamp, thyristor module.
- 5.5.3.3.2 System should be capable of real time cycle/Dynamic control.
- 5.5.3.3.3 Designed capacity to maintain overall P.F. of the system between 0.98 to 1.00.
- 5.5.3.3.4 No spikes and transient free system.
- 5.5.3.3.5 The system shall use **electronic thyristors switching**. The connection and disconnection should occur when the voltage across thyristor is “Zero”. This ensures smooth correction, which avoids transient’s effect typically created by electro mechanically switched compensation systems.

### 5.5.3.4 Capacitors:

- (a) The capacitor shall comply with the relevant IS specification
- (b) The capacitor shall be ISI/IEC marked.
- (c) Capacitor voltage must be rated @ 440 V for system voltage at 415 V.
- (d) Copper wound Detuned reactors, 440 V.

- (d) Total watt – losses excluding discharge resistors < 0.2W/KVAR
- (e) The entire capacitor unit shall be provided with high value fast discharge resistor, which shall discharge the capacitors within few seconds. The design shall be modular type for the simple mechanical assembly, no extra accessories/metal part to be required. Unit must be free standing.

#### **5.5.3.5 System– Controller (APFC Relay)**

- (a) The relay should have a microprocessor-based sensing having three phase measurement and thyristors output and maximum step type.
- (b) The relay should have a LED display panel and minimum current sensitivity of 40 mA. It should have RS 485 port with MODBUS, BACKNET, LON compatible.
- (c) Protection to be provided for :-
  - (i) Over/under voltage.
  - (ii) Capacitor over/ under current / THD.
  - (iii) Over/ under frequency.
  - (iv) Load unbalanced.
  - (v) Over temperature.

#### **5.5.3.6 Switching Module**

- a) Thyristors Switching Module (TSM) should be fast electrically controlled; self-observing thyristors switch for capacitive load and it should be capable to switch capacitors within few milli second (20 m sec) as often as required.
- b) Reaction time shall be 7-10 milli seconds and PIV of 2200 V to take care of system voltage, voltage due to crest factor and switching transients across the SCR. All intelligence needed should be offered within thyristors itself. Permanent self - controlling of Voltage parameter, phase sequence, capacitor out put, Superfast semiconductor fuses of suitable ratings shall be used for the protection of Thyristor switching module (TSM).
- c) Fast discharge resistance shall be provided with each set of capacitors Maximum ambient temp.: 45 deg-C.
- d) The TSM module should be protected against high temperature by the help of in-built thermal cut outs, which ensures disconnection at high temperature and restores when the temperature becomes normal.

The TSM modules shall be naturally cooled with heat sinks of special aluminium alloys.

#### **5.5.3.7 Compartments**

The switching module and high-speed fuses shall be placed on the front plate. The capacitors, reactors and discharge module shall be placed behind. The APFC modules shall be complete with all capacitors / reactors /HRC fuses and switching devices connected with cables of suitable sizes. The compartment should ensure proper heat dissipation.

5.5.3.7.1 The APFC Panel shall be type tested and certificate shall be produced.

5.5.3.8 Power distribution Feeder Pillar as SLD enclosed with Bid document.

5.5.3.9 Lift Panel as per OEM and standard practice.

5.5.3.10 Water supply, STP, Street Light Panel, Feeder Pillar, Each block Metering Panel (Prepaid meter supply, installation by APDCL) etc. should have RS 485 port with MODBUS, BACKNET, LON compatible.

<b>TECHNICAL DATA/ SPECIFICATION OF AIR CIRCUIT BREAKER (800 amp and Above)</b>			
<b>1</b>	<b>Type of ACB</b>	:	Electrical operated draw out type.
<b>2</b>	<b>Rated Current (A) 40°C (In)</b>	:	Suitable rating as per load
<b>3</b>	<b>Rated Operation Voltage (V) 50/60 Hz (Ue)</b>	:	415
<b>4</b>	<b>Rated insulation voltage (KV) ,50/60 Hz (Ui)</b>	:	10
<b>5</b>	<b>No of poles</b>	:	4
<b>6</b>	<b>Rated ultimate short circuit breaking capacity 50/60 Hz (KA rms) 415 V (Icu)</b>	:	60
<b>7</b>	<b>Rated service short circuit breaking capacity 50/60 Hz (KA rms) 415 V (Ics)</b>	:	100% of Icu
<b>8</b>	<b>Rated short time withstand capacity 50/60 Hz (KA rms) 1 sec 415 V (Icw)</b>	:	100% of Icu
<b>9</b>	<b>Rated making capacity 50/60 Hz (KA Peak) 415 V (Icm)</b>	:	220% of Icu
<b>10</b>	<b>Rated impulse withstand voltage of auxilary circuit (KV), Uimp</b>	:	8
<b>11</b>	<b>Rated impulse withstand voltage of main circuit (KV), Uimp</b>	:	4
<b>12</b>	<b>Utilization category</b>	:	B
<b>13</b>	<b>Number of electrical operating cycles at rated current (open = close) without changing arcing contact</b>	:	20,000
<b>14</b>	<b>Number of mechanical operating cycles at rated current (open = close)</b>	:	20,000
<b>15</b>	<b>MEASUREMENT &amp; PROTECTION</b>	:	

(a)	Microprocessor release	:	Self-powered, not tapped from neutral, Setting panel with locking arrangement
(b)	Tripping characteristic	:	With long time & short time characteristics
(c)	Overload setting	:	40% -100% In, steps of 10%.
<b>16</b>	<b>Overload setting time delay</b>	:	2.5 s to 40 s minimum three settings
<b>17</b>	<b>Short Circuit Setting</b>	:	100% - 800% of In, steps of 10%.
	Short Circuit Setting time delay	:	50ms - 400 ms in steps of 50ms
	Instantaneous setting	:	400% - 1500% of In & OFF
	Earth fault setting	:	10- 100 % of In, steps of 10%
	Earth fault setting time delay	:	50ms - 400 ms in steps of 50ms
<b>18</b>	<b>Measurements required in release</b>	:	a. Phase wise current b. Phase wise voltage c. Power factor d. Maximum current with date and time
	<b>Other requirements</b>	:	a. Release should have backlit display. b. Release should be plug-in type and easily replaceable in field. c. Separate fault indication shall be provided for each protection stage i.e overload, short circuit and earth fault. d. Release should store 10 fault records on FIFO basis with date and time stamp. e. Release should have RS485 port for remote communication on open Modbus, BACKNET, LON protocol.
<b>19</b>	<b>Bus Coupler arrangement</b>	:	ACB should be protection, but having interlock facility.

#### TECHNICAL DATA/ SPECIFICATION OF MCCB's

<b>1</b>	<b>Type of MCCM</b>	:	<b>MCCB with thermomagnetic release</b>	<b>MCCB with Microprocessor release</b>
<b>2</b>	<b>Rated Current (A) 40°C (In)</b>	:	16 Amps to 400 Amps.	401 Amps to 650 Amps.
<b>3</b>	<b>Rated Operation Voltage (V) 50/60 Hz (Ue)</b>	:	415	415
<b>4</b>	<b>Rated insulation voltage (KV),50/60 Hz (Ui)</b>	:	6/8 KV (according to SLD)	6/8 KV (according to SLD)
<b>5</b>	<b>No of poles</b>	:	3 pole / 4 Pole (according to SLD)	3 pole / 4 Pole (according to SLD)
<b>6</b>	<b>Rated ultimate short circuit breaking capacity 50/60 Hz (KA rms) 415 V</b>	:	25/36 KA	25/36 KA

	<b>(Icu)</b>			
7	<b>Rated service short circuit breaking capacity 50/60 Hz (KA rms) 415 V (Ics)</b>	:	100% of Icu	100% of Icu
8	<b>Rated short time withstand capacity 50/60 Hz (KA rms) 1 sec 415 V (Icw)</b>	:	100% of Icu	100% of Icu
9	<b>Life (Electrical and Mechanical )</b>	:	As per manufacturer standard	As per manufacturer standard
10	<b>Accessories (Internal &amp; External)</b>	:	As per manufacturer standard and required as per SLD	As per manufacturer standard and required as per SLD
11	<b>Adjustable Settings of MCCB</b>	:	As per manufacturer standard and required as per SLD	As per manufacturer standard and required as per SLD
12	<b>Conforming to</b>	:	IS/IEC 60947-2	IS/IEC 60947-2
13	<b>Comprehensive Energy &amp; Power measurements facilities</b>	:		In higher rating according to SLD requirement.
14	<b>Communication protocol</b>	:		MODBUS, BACKNET, LON, RTU in higher rating according to SLD requirement.
15	<b>Protection &amp; display</b>	:		
16	<b>Over load, short circuit, earth fault etc</b>	:	According to SLD requirement.	According to SLD requirement.

### 5.6 Cable work:-

- 5.6.1 33 KV grade **Cross- linked XLPE insulated armored aluminum cable**, 3 core earthed of suitable size according to load. The cable shall conform to IS.
- 5.6.2 1.1 KV grade **Cross- linked XLPE insulated armored aluminum cable** shall be 2/ 3.5 / 4 core of size as per site requirement and as per suitable load. The cable shall conform to IS.
- 5.6.3 All control wire shall be 650V grade copper conductor **Cross- Cross- Linked Halogen Free Flame Retardant (HFFR) Copper conductor (class-2) wires / cables (ISI marked) cables (ISI marked)**. The minimum size of the control wires shall be 1.5 sq. mm.
- 5.6.4 Jointing work shall be carried out only licensed experienced cable jointer and shall be in accordance to CPWD general specification for Electrical work Part- II(External) amended upto date.

The power cabling shall be adequately sized as to maintain the distribution losses as per ECBC. Record of design calculation for the losses shall be maintained.

The cable be designed as per the voltage drop regulation at peak load, and the losses be calculated on the assessed load during the day, week and year and should not be limited to the peak load.

### **5.7. Earthing system**

Earthing system shall be in accordance with CPWD General specifications for Elect. works (ParI Internal) 2023 as amended and corrected up to date, CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date for details in package -IEI in this Bid document.

#### **5.7.1 Safety requirements:**

##### **5.7.1.1 Insulation mats.**

Insulation mats 3.0mm thick conforming to IS : 15652-2006 shall be provided in front of main switch board as well as other control equipments as specified.

##### **5.7.1.2 Danger Plate** Danger plate shall be provided on HV and MV equipments. MV danger notice plate shall be 200 mm x 150 mm made of mild steel at least 2 mm thick vitreous enameled white on both sides and with the description in single red color on front side as required. Notice plates of other suitable materials such as stainless steel, brass or such other permanent nature materialshall also be accepted with the description engraved in single red colour.

#### **5.7.2 Fire Buckets :**

Fire buckets conforming to IS: 2546-1974 shall be installed with the suitable stand for storageof water and sand.

#### **5.7.3 33 KV Hand Gloves:**

Each pair of electrical rubber insulating gloves must comply with the **IEC 60903** and **EN 60903** standards and as a result of this, each pair undergoes voltage, ageing and mechanical testing.

#### **5.7.4 First Aid Kit as per St. Johson Ambulance Standard.**

#### **5.7.5 Tri Language (English, Hindi, Assamese) Shok Treatment Chart in laminated board.**

#### **5.7.6 TESTING:** All routine and mandatory testing shall be carried out at NABL accredited Laboratory.

### **5.8 FINAL INSPECTION AND TESTING**

When the installation is complete, the contractor shall arrange for inspection and testing of the installation. Test results obtained shall be recorded. The installation shall not be accepted until it complies with the requirement of these Specifications. The Sub Station installation shall be got inspected by the contractor from local licensee and/or CEA and their clearance taken before energizing the Sub Station. All the observations/ deficiencies pointed out by the inspecting authorities shall be complied with by the contractor on priority. The department shall render all help and pay mandatory charges to CEA and local licensee, if any, in this regard.

### **5.9 COMPLETION DRAWING**

Three sets of completion drawings comprising the following shall be submitted by the contractor while handing over the installation:

- a) Equipments layout drawing(s) giving complete details of the entire equipments.
- b) Electrical drawings for the entire electrical equipments showing cable sizes, equipment capacities, switch-gear's ratings, control components, control wiring etc.
- c) Schematic diagram of the entire Sub-station installation.

#### **5.10      Guarantee of Substation:**

The contractor shall guarantee the entire substation installation as per specifications. All equipments shall be guaranteed for **3 (Three) year** from the date of acceptance against unsatisfactory performance or break down due to defective design, manufacture and installation.. The warranty shall cover the following: -

- a) Quality, strength and performance of materials used.
- b) Safe mechanical and electrical stress on all parts under all specified conditions of operation.
- c) Satisfactory operation during the maintenance period.
- d) Performance figures and other particulars as specified by the tenderer under schedule of guaranteed technical particulars.

#### **5.11      AUTOMATIC FIRE SUPPRESSION FOR ELECTRICAL SUB-STATION PANELS ETC. (HT , ALL LT PANEL, METER PANEL, APPC PANEL):-**

The system shall be a pre-engineered, in cabinet FK-5-1-12 or equivalent compound system and shall provide and extinguishing concentration of no less than 1.3 times the minimum extinguishing concentration of fire source within the enclosure.

UL/FM approved extinguishing agent (F-5-1-12) clean agent filled in a PESO approved filling station and agent filled in stored pressure type cylinder with DLP valve assembly with automatic valve, push in connector for tube, safety burst disc at 28 bar and mounting bracket, end of the adopter and low-pressure switch for mounting system activation. Container as per IS 7285 stored pressure type fitted with pressure gauge, UV resistance, Operating pressure 15 Bar, Hydraulic pressure tested to 250 Bar pressure 305Bar, Red power coated. The gas extinguishing system be UL/LPCB approved.

UL certified linear pneumatic heat detection tube for automatic fire detection & suppression system made by special modified polyamide (PA), colour red RAL300, burst temperature 100 deg "C" to 140 deg "C", inner diameter 4mm, outer diameter 6mm. Pressurized with dry nitrogen at 15 Bar pressure with all necessary fittings & supports.

Master control unit with audio visual alarm control panel (IP54 third party rating), 2 NO/NC potential free relay contact for main fire alarm/ BMS/SCADA integration. Gas discharge LED indicator, battery LED indicator, system status LED indicator, AC power ON LED indicator.

The In-cabinet Fire suppression system shall be manufactured, assembled and supplied from company with the following certifications and procedures ISO9001:2015, 14001:2015, 45001:2018 registered companies. All certifications must be current and available upon request.

Bidder should have UL listed/PESO approved filling plant for quality assurance. Procedure in accordance with UL/LPCBV follow up audit requirements. Manufacturer's original test certificate clearly mentioning the serial number of cylinders being supplied and site detail is required. The cylinders being supplied should be DOT/CE approved and a certificate with regards to the same is required to be submitted. The system shall be supplied by authorized distributor and contractor shall submit authorization letter from Manufacturer.

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## **PACKAGE C- 6A**

### **D.G. SETS**

- 6.1 The work shall be carried out as per CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013), CPWD General Specifications for Electrical Works Part-IV- (SUB STATION) 2017, CPWD General Specifications for Electrical Works Part-I (Internal) 2023, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules & Acts shall be the latest norms as modified by Government of India on the date of execution.
- 6.2 The Scope of works includes Essential Load calculation, designs for distribution, 2 Nos. 250 KVA DG set with AMF panel, fabrications of synchronizing panel , testing, inspection as may be necessary before dispatch, dispatch, delivery at site, installation, testing, commissioning, inspections from competent authority and handing over to client in fully working condition
- 6.3 The Contractor shall be required to obtain NOC from appropriate authority. The work shall be deemed to be completed only after receiving NOC from CEA & and any other local body and rectification if any pointed out by the authority. Enabling all liaison work/ arranging inspection of local body or statutory body shall be within scope of the contractor.
- 6.4 Capacity of DG se shall be 2 Nos. 250 KVA DG set with AMF panel.
- 6.5 Following essential load shall be connected to DG set supply.
  - a) Pump set for water supply.
  - b) Sewage Treatment Plant (STP).
  - c) Security Equipment
  - d) All Lifts load through separate L T panel at each building/ Tower
  - e) EPABX
  - f) Light/ Fan load of creche, dispensary, community room, VOF block, etc.
  - g) Area lighting, street lights and staircase lighting for each block.
  - h) Common area lighting i/c stilt and podium.
  - i) Light and Power load of club Houses.
  - j) TFA in Club Houses.
  - k) Pressurization system.
  - l) Fire Pump panel.

- 6.6 The D.G. Sets shall be kept in the space specified on drawings building on suitable foundation and connected with 3½ core of suitable size of Cross-linked XLPE insulated LT armoured Aluminium cable to the synchronization panel. The incomers of the panels shall be properly electrically & mechanically interlocked with each other and with bus coupler to ensure that no short circuit should occur.
- 6.7 The outgoings of synchronizing Panel will be connected to the main LT panel with the help of sandwich type aluminium bus duct.
- 6.8 The DG set shall be silent type with acoustic enclosure and as per latest CPCB norms at the date of execution.
- 6.9 The height of the exhaust pipe shall be as per CPWD specification and CPCB norms modified by Government of India on the date of execution.
- 6.10 Suitable size MS structure with RCC foundation shall be provided for supporting the exhaust pipes. The MS structure shall be designed from the structural Engineer.
- 6.11 Brief technical details of 2(Two) Nos, 250 KVA silent DG set, CPCB norms modified by Government of India on the date of execution. Silent type Diesel Generating set having Prime Power Rating of 250 KVA 415 Volts at 1500 RPM, 0.8 lagging power factor at 415V suitable for 50 Hz, 3 phase system and consisting of the followings:
- i) Synchronous alternator- rated at 250 KVA , 415 volts at 1500 RPM, 3 phase 50 Hz, Self-excited, screen protected, self-regulated, brush less alternator, Horizontal foot mounted in single bearing construction with SPDP enclosure, IP-23 protection and H class of insulation.
  - ii) Diesel Engine — The engines shall be direct injection multi cylinder, vertical, 4 stroke cycles, water cooled, turbo charged diesel engine developing suitable BHP for giving a prime power output of 250KVA at 0.8 P.F. at the load terminals of the respective alternators (exclusive of the power requirements of auxiliaries driving power from the engine) (as per ISO 8528 part- I).
  - iii) The engines shall be capable for delivering specified prime power rating at variable loads for PF of 0.8 lag with 10% overload available in excess of specified output for one hour after every 12 hours. The average load factor of the engine over period of 24 hours shall be 0.85 for prime power output. The engines shall conform to BS 5514/ BS 649/ IS10000/ ISO: 3046 amended up to date.
  - iv) The engines shall be fitted with all the accessories as per CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013) as amended and corrected up to date.
  - v) Engine mounted Instrument Panel shall be as per manufacturer standard with digital display for indication of various parameters etc.
  - vi) In addition to daily fuel service tank provided by the OEM in the DG set canopy as per Manufacturer's standard, Fuel tank of minimum 990 ltrs capacity fabricated out of 3 mm thick MS sheet complete with all standard accessories and fuel piping between fuel tank and daily service tank with GI heavy duty (class 'C') pipes of suitable dia. Complete with valves, level indications & accessories etc. as required as per specifications.
  - vii) Dry exhaust system with residential type exhaust silencer with catalytic converter shall be provided.

- viii) 12V/24V DC starting system with suitable nos. of batteries (25 plates, 180 Amp. Hour capacity lead acid type) or as per OEM standard shall be provided.
- ix) Acoustic and weather proof enclosure as per CPCB norms as applicable at the date of execution with arrangement for fresh air intake for cooling of the engine & alternator, suitable extraction fan discharging hot air in to the atmosphere as per specification shall be provided.
- x) Synchronization panel with bypass system complete with relays, timers, set of CTs for metering & protection and multi function meter to indicate currents, phase, and linevoltages, frequency, KVA, power factor, KWH & provision for overload, short circuit, restricted earth fault, under voltage control, control cabling from AMF panel to diesel engine and elsewhere if required, all complete and inter locking including the following:
- xi) Suitable rating Four Pole MCCB with rotary handle confirming to CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date) and Package sub-station this bid for each DG set.

#### **6.12 Terminal Boxes:**

Terminal boxes shall be suitable for terminating multiple nos. of required size UG cables. The terminal box shall be suitable to withstand the mechanical and terminal stresses developed due to any short circuit at the terminals.

#### **6.13 Earthing system:**

Earthing system including type & selection of earth electrodes, earth conductor, earth bus and protective conductors etc shall be as per CPWD General Specification for Elect. Works (Part-I Internal) 2023 as amended and corrected up to date.

#### **6.14 Cabling**

Power cabling from MCCB near alternator to main panel shall be done with multiple numbers of required size Cross-linked XLPE insulated LT armoured Aluminium cable and shall be as approved by engineer-in-charge. Multi core armoured copper cable of 1.1 KV grade shall be used for inter connecting the engine controls with the switch gear and other equipment's.

#### **6.15 Foundation**

The Genset along with acoustic enclosure shall be installed on suitable CC foundation as per the OEM design. Genset should be mounted on AVM's pad inside the enclosure.

#### **6.16 Acoustic enclosure:**

The enclosure shall be out door type and to reduce the sound level as per CPCB norms as modified by Government of India on the date of execution and CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013) as amended and corrected up to date. The enclosure shall be provided by the OEM as per CPCB certification and corrected up to date on the date of execution.

##### **6.16.1 The canopy will enclose the following items inside:-**

- i) Diesel Engine.
- ii) Alternator.
- iii) Control Panel.

- iv) Starting Battery.
  - v) Daily service fuel tank.
  - vi) MCCB (Four Pole) of suitable capacity.
  - vii) Other accessories so that the DG set with all items and accessories could be placed in open space without any other requirement of Diesel Generator room suitable to withstand all weather conditions.
- 6.16.2 Adequate ventilation shall be provided to meet total air requirement. Suitable numbers and size of ventilation fans complete with necessary auto start arrangement shall be provided as per the manufacturers design. It shall also be provided with auto stop arrangement to stop the fan after 5 minutes of the stopping of D.G. sets.
- There should have a provision of DC Emergency light operated automatically with door opening. The inside of the enclosure shall be illuminated by the LED tube with the help of PVC insulated FRLS copper conductor wiring in recess/surface conduit suitable for single phase AC supply and shall be operated automatically with door opening as well as manually. To avoid re-circulation of hot air, durable sealing shall be done between radiator and canopy. The acoustic enclosure should be suitable for cable connection. Such arrangements on acoustic enclosure should be water proof and dust-proof confirming to IP-65 protection.

## 6.17 DG Control Panel

DG control panel shall be manufacturer standard and shall provide the following minimum operational requirements. Control panel must be BMS compatible and it should have Rs 485 port with ModBus / BacNet/ LON interface protocol:

### 6.17.1 Auto mode:

- i) A line voltage monitor shall monitor supply voltage in each phase. When the mains supply fails completely or falls below set value variable between 80% to 95% of the nominal value on any phase the monitor module shall actuate startup of diesel engine. To avoid initiation due to momentary dips or system disturbance a time delay adjustable between 0.5 to 5 second shall be incorporated in the startup module.
- ii) A three-attempt starting facility shall be provided with the sequence. 6 seconds ON, 5 seconds OFF, 6 seconds ON, 5 seconds OFF, and 6 seconds ON, if at the end of the third attempt, the engine does not start, engine shall be locked out to start, a master timer shall be provided for the function. Suitable adjustment timers be incorporated which will make it feasible to very independently ON-OFF setting periods from 1-10 sec. An audio-visual alarm shall be given.
- iii) Suitable adjustable timers shall be incorporated which will make it possible to vary independently ON-OFF setting periods from 1 second to 10 second. If on starting the alternator does not build up voltage after the first or any start as the case may be, further starting attempts will not be made and the starting facility will be reset.
- iv) Once alternator has built up voltage, signals shall be provided to each of the alternator circuitbreaker and mains circuit breakers as required. The Mains supply circuit breaker shall open before the alternator circuit breaker closes. System provided in the logic panel shall check and ensure that all the engine oil pump etc.

are running and healthy. In case of any fault in engine auxiliaries the system shall automatically stop the DG set and audio-visual alarm shall be given.

- v) When the mains supply is restored and is healthy as sensed by the line voltage monitor the load shall be transferred automatically to mains by providing signals to mains and alternator circuit breakers as required. The alternator supply circuit shall open before mains circuit breaker closes.
- vi) The diesel alternator set reverts to standby mode for next automatic operation.

#### **6.17.2 Manual mode:**

- i) Under manual mode it shall be possible for the operator to start the generator by ‘Pressing the (START) push button.
- ii) Three attempt starting facility shall also be operative for the startup function.
- iii) Alternator and mains circuit breakers “CLOSE” and “TRIP” operations as required shall be manual by pressing the appropriate push button on the panel “closure shall be feasible only after alternator has built up voltage. If the load is already on “MAINS” pressure on “CLOSE” button shall be ineffective.
- iv) Engine shut down other than due to fault shall be manually by pressing a “STOP” button, in manual mode.

#### **6.18 Test mode**

- i) When under “TEST” mode pressure on “TEST” button shall complete the startup sequence simulation and start the engine. The simulation will be that of mains failure.
- ii) Engine shall build up voltage but the set shall not close alternator circuit breaker when the load is on the mains. Monitoring performance of voltage/frequency etc. should be feasible without supply to load.
- iii) If during “TEST” run the power supply has failed the load shall automatically get transferred to alternator.
- iv) Bringing the mode selector to auto position shall shut down the sets as per the required sequences.

Suitable rating Four Pole MCCB ( as per SLD) for 250 KVA DG set confirming to CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date) shall be provided for each DG set in coming side (one no each in synchronization panel) fitted with interlocked door, automatic safety shutters, mechanical ON/OFF, Independent electrical and manual closing mechanism and One no Four pole MCCB for 250 KVA DG set( as per SLD) load current electrically operated horizontal draw out type with microprocessor release with short circuit, overload & earth fault protection fitted with interlocked door, automatic safety shutters, mechanical ON/OFF, Independent electrical and manual spring closing mechanism, service/test/isolated position indicators and frame earthing contact in outgoing of synchronization panel.

- a) Control system equipment and components such as PLC, relays, contactors, Timers, etc. both for automatic operation on mains failure and as well as for manual operation.
- b) Suitable capacity 4 strip heat shrinkable sleeved aluminium busbars (100% neutral)
- c) Necessary controls for testing the generating set's healthiness, with test mode and with load on mains.

- d) Necessary instruments and accessories such as multi-function meter/ Load Manager in all incoming feeder to read Voltage, Current, power factor, KW, KWH, Frequency etc.
- e) LED type indication lamps, MCBs, terminal blocks, push buttons control switches etc. as required in all incoming feeder.
- f) Battery charger with trickle and boost selection.
- g) Cable terminals shall be suitable for the number, size and type of cables as per design loads. Adequate spacing shall be allowed for spreading of cable tails to avoid stress on the insulation or terminals.
- h) All internal wiring, connection etc. as required.
- i) Terminals for neutral conductors for three phase and neutral circuits shall be the same size as for phase conductor, except where reduced section neutral cable cores are indicated.

#### **6.19 Automation failure operation**

- i) Operation of DG Set shall be monitored and controlled by PLC panel. In case of mains failure this logic panel shall control auto change over from mains to DG Set supply and interlocking the MCCBs/ACBs, auto load management functions along with annunciation for alternate control and protection. The logic panel shall be provided with a total manual override facility.
- ii) The logic panel shall be complete with all Auxiliary Relays, Timers, Contactors, Programmable logic controller of approved make, control wiring with not less than 1.5 sq.mm. 1.1 KV grade FRLS PVC insulated copper conductor wires etc. The PLC based logic panel shall ensure providing suitable software interlocks.

#### **6.20 Automatic start & stop of Engine.**

The system should come in operation after sensing of grid failure and automatically start & stop of the engine depending on the pre-defined load setting on the PLC. The automatic start & stop of engine, Back up protection and sequence of operation shall be as described in chapter 3 of CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013).

#### **6.21 Synchronizing cum PLC panel.**

Synchronization panel shall be cubical type LT panel suitable for 415V, 3 Phase, 4 Wire 50 Hz Ac supply system fabricated in compartmentalized (preferably) design from CRCA sheet steel of 2mm thick for frame work and covers, 3mm thick for gland, plates i/c cleaning & finishing complete with 7 tank process for powder coating in approved shade, having suitable capacity extensible type 4 strip (4 pole) aluminium alloy bus bars of high conductivity, DMC/SMC bus bar supports, with short circuit withstand capacity of 31 MVA for 1 Sec., bottom base channel of MS section not less than 100mm x 50mm x 6mm thick, fabrication shall be done in transportable sections, entire panel shall have a common copper earth bar of size 25mm x 5mm at the rear with 2 Nos. earth stud, solid connections from main bus bar to switch gears with required size of Al. bus bars and control wiring with sq. mm. PVC insulated copper conductor S/C cable, cable alleys, cable gland plates in two half, i/c providing following switchgears.

- a. Suitable rating Four Pole MCCB for 250 KVA load current with rotary handle confirming to CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date shall be provided for each DG set in coming side (one no each in synchronization panel) fitted with interlocked door, automatic safety shutters, mechanical ON/OFF, Independent electrical and manual closing mechanism and frame earthing contact in out going of synchronization panel.
- b. Control system equipment and components such as PLC, relays, contactors, Timers, etc. both for automatic operation on mains failure and as well as for manual operation.
- c. Suitable capacity 4 strip heat shrinkable sleeved aluminum busbars (100% neutral).
- d. Necessary controls for testing the generating set's healthiness, with test mode and with load on mains.
- e. Necessary instruments and accessories such as Multi-function meter/ Load Manager in all incoming feeder to read Voltage, Current, power factor, KW, KWH, Frequency etc.
- f. LED type indication lamps, MCBS, terminal blocks, push buttons control switches etc. as required in all incoming feeder.
- g. Battery charger with trickle and boost selection.
- h. Cable terminals shall be suitable for the number, size and type of cables as per design loads. Adequate spacing shall be allowed for spreading of cable tails to avoid stress on the insulation or terminals.
- i. All internal wiring, connection etc. as required.
- j. Terminals for neutral conductors for three phase and neutral circuits shall be the same size as for phase conductor, except where reduced section neutral cable cores are indicated.

#### **6.22**

#### **Automation failure operation**

- i) Operation of DG Set shall be monitored and controlled by PLC panel. In case of mains failure this logic panel shall control auto change over from mains to DG Set supply and interlocking the MCCBs/ACBs( as per SLD), auto load management functions along with annunciation for alternate control and protection. The logic panel shall be provided with a total manual override facility.
- ii) The logic panel shall be complete with all Auxiliary Relays, Timers, Contactors, Programmable logic controller of approved make, control wiring with not less than 1.5 sq.mm. 1.1 KV grade FRLS PVC insulated copper conductor wires etc. The PLC based logic panel shall ensure providing suitable software interlocks.
- iii) The PLC panel have all necessary OFC infrastructure i/c contact etc. to connect to PLC load to OFC network. The PLC load should have programmed and wired such network operation and DG set for the common control switch shall be possible.

#### **6.23**

#### **Automatic start & stop of Engine.**

The system should come in operation after sensing of grid failure and automatically start & stop of the engine depending on the pre-defined load setting on the PLC. The automatic start& stop of engine, Back up protection and sequence of operation shall be as described in chapter 3 of CPWD General Specifications for Electrical Works Part-VII (DG SETS-2013).

#### **6.24**

DG set shall be installed with stack formation. For structural details please follow the drawing and as per manufacturer's guidelines.

- 6.25 The emission limits of DG sets shall be as per Gazette Notification GSR 804 (E ) dated 03-11-2022 of Ministry of Environment Forest and Climate Change (The Environment (Protection) Third Amendment Rules 2022).
- 6.26 The factory inspection, trail run, running in period, safety measure and statuary clearances shall be as per CPWD specification for DG Set 2013 and amended upto date.

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## **PACKAGE C – 6B**

### **ONLINE UPS System**

- 6B.1 The scope of work covers providing online UPS system as per load requirements but not less than with 30 minute back up in each tower/ bldg., RD residence and club – I & II, SMF batteries, battery rack and all associated work to care uninterrupted power supply to ELV services and emergency lighting load. The online UPS shall be compatible with IBMS. The ON LINE UPS system suitable for single phase input, single phase output, AC supply. The UPS shall include a rectifier, inverter, battery bank suitable for 30 min back up (Battery VAH capacity shall not less than 1600 VAH per KVA of UPS rating per Hour back up time) on full load (Battery shall be VRAL, SMF in ABS container) and static bypass switch along with provision for manual bypass, suitable isolation transformer for additional protection against neutral fault and other features as described in the specifications.
- 6B.2 The contractor shall submit load estimation sheets to provide online uninterrupted power supply to the following area and other installations under the scope of work. Capacity of UPS shall be decided on the basis of load calculations. UPS backup will be provided for common area ELV load and 15% lighting of common area at each floor for avoiding a total blackout situation as emergency lighting in all common areas.
- 6B.3 Following critical load shall be connected to UPS Supply.
- CCTV and access control system
  - 6B.3.2 EPABX System
  - 15% lighting of common area (Staircase and Corridor light)
  - 25% light of club house
  - All exit signages
  - Guard room and Security control room lighting.
  - And others specified equipment as required by RBI
- 6B.4 Details of UPS capacities and location to be installed are tabulated here under(indicative):

Sl. No.	Name of Buildings/ Blocks	Location	of	Capacity of UPS
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		<b>floor</b>	
1	Residential Tower - 1	Ground Floor	2 KVA
2	Residential Tower - 2 (Control Room)	Ground Floor	3 KVA
3	Residential Tower - 3	Ground Floor	1 KVA
4	Residential Tower - 4	Ground Floor	1 KVA
5	Residential Tower - 5	Ground Floor	2 KVA
6	Residential Tower - 6	Ground Floor	2 KVA
8	Residential Tower - 7	Ground Floor	2 KVA
9	Residential Tower - 8	Ground Floor	1 KVA
10	Residential Tower-9 (Control Room)	Ground Floor	3 KVA
11	Regional Director	Ground Floor	3 KVA
12	Club – 1	Ground Floor	1 KVA
13	Club – 2	Ground Floor	1 KVA

- 6B.5 The online UPS system will be a standalone type with 30 min battery backup, 1 phase IN and 1 phase OUT 230, 50 Hz, THD < 2%, continuous operation, solid state type on-line fully microprocessor controlled double conversion PWM IGBT based digital signal processor-controlled rectifier and with batteries backup as mentioned above, battery charger, connecting links, open type battery stand all accessories required for installation complete as per technical specification.

#### UPS Specification

<b>KVA Rating/Range</b>	1/ 2/ 3 KVA
<b>Input Characteristics</b>	
Rectifier	IGBT Rectifier or Better
Input power Factor @ 100 % Load	> 0.99
Input Connections	1 Ph + N + Ground (2 Wire)
Input Voltage	160 – 300 VAC (On 100% load)
Input Voltage Range	-20/+20 % @ full load - 35% @ 50% load
Input Current Harmonics (Ithd) at various Load % (75% & 100%)	<5% at full load in normal UPS operating voltage
Input Frequency	45-70 Hz
Generator Compatibility	Compatibility to genset supply required.
<b>Bypass Tolerance</b>	
Centralised & Distributed Bypass	Static and Manual
Battery Charger	STD
Auto & Manual Battery Test Facility	Yes
Input Auto Phase Sequence Correction	Available
Inter type Module Structure	
<b>Output Characteristics</b>	
Inverter Design	H bridge High Frequency with IGBT devices or better
Output Power Factor Unity	<b>0.9</b>
Load Power Factor Handling Capability within kVA to KW Range	0.8 lag to .9 leading

Inverter Technology	PWM
Inverter Overload @ 150%	60Sec
125%	10min
110%	60min
Voltage Distortion	
Linear Load	<2%
Non-Linear Load	<5%
Battery Configuration	As per OEM
Adjustable DC Bus	Yes
Compatible Battery TYPE	SMF & Tubular
Isolation Transformer Winding & Config	
Transformer Provision ( built-in Input+ Bypass O/P)	Bulit-in Input
Cold Start Available	Yes
Power walking in	Yes
Foot Print in W X D X H mm	As per manufacturer standard
Service Access	Front and side
Paralleling Provision with power & backup sharing mode	up to 4 unts
Static Bypass	<b>Yes</b>
AC- AC Double Conversion @ 100% Load without transformer	up to 93%
Third Party type test Certificate	yes (type test)
Eco operating mode efficiency at 100% load ( third party type test certificate )	98%
Static & Manual Bypass Provision	YES
AC/DC Capacitor Life	5 YEARS
<b>Mechanical Data</b>	
Dimensions	As per manufacturer standard
IP Protection	20
<b>Environmental conditions</b>	
Acoustic Noise	<70dBA
Operating temperature	0-40° C Continuous
Relative humidity	20% to 90% (non-condensing)
Storage temperature	From – 10 deg C to + 40 deg C
Cable Entry (Top / Bottom)	Bottom
Sheet Thickness	not less than 1.2mm
Isolator/Switchgear Provision	Yes
<b>Communication</b>	
Paralleling Provision	Yes
Connectivity Options	SNMP/BMS
RS232	Yes
USB Com port	Yes
ROHS	Yes

Mandatory Requirement	
Safety	EN 62040-1 & IS 16242:2014
EMI/EMC	EN 62040-2
Performance	IEC 62040-3

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## **PACKAGE C-7**

### **CCTV SYSTEM**

#### **7.1 SCOPE OF WORK**

Scope of work involves design, drawing, supply, installation, testing and commissioning of suitable number of Day / Night IR IP Based cameras in all the buildings at entrance gates, lift lobby and staircase of Ground/ Stil/ Podium floor of each tower/ bldgs., inside of the lift car, around the boundary wall, entrance gates, club, campus etc. at suitable intervals and all the main gates, with suitable mounting arrangement (on Wall/ Powder coated MS poles in a Vandal Proof Housing) etc complete as required to make system fully functional. It will be the responsibility of the vendor/bidder to make the entire system fully functional as per the specifications. Vendor/bidder shall consider any equipment/devices required to make the system functional if not mentioned herewith.

The scope also included guaranty/warranty of entire installation and equipment's/accessories supply by them as per OEM.

**7.2** The work shall be carried out as CPWD General Specifications of Electrical Works Part-I 2023 corrected up to date, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard, good engineering practice.

**7.3** Details of area were proposed to install CCTV system: -

Sl. No.	Name of Building/ Block	Area to be covered by CCTV system
1	Residential Tower - 1	Entrance of Ground/ Stil/ Podium floor
2	Residential Tower - 2	Entrance of Ground/ Stil/ Podium floor
3	Residential Tower - 3	Entrance of Ground/ Stil/ Podium floor
4	Residential Tower - 4	Entrance of Ground/ Stil/ Podium floor
5	Residential Tower - 5	Entrance of Ground/ Stil/ Podium floor
6	Residential Tower - 6	Entrance of Ground/ Stil/ Podium floor
7	Residential Tower - 7	Entrance of Ground/ Stil/ Podium floor
8	Residential Tower - 8	Entrance of Ground/ Stil/ Podium floor

600		
9	Residential Tower - 9	Entrance of Ground/ Stil/ Podium floor
10	Regional Director	Outside of building
11	Club – 1	Entire area except sensitive area
12	Club – 2	Entire area except sensitive area
13	Podium Parking Staff	Entire area
14	Podium Parking Officer	Entire area
15	Outdoor area ( Boundary and campus)	Entire outdoor and along boundary wall.
17	All Tower	Inside each lift car and each lift Machine room

7.4 (a) IP Based CCTV System for Building Security with PTZ, Motorized Varifocal Cameras, cabling, to Monitor and supervise the entire area for security purpose, as well as record and inform officials on unwanted, untoward incidents. It is also essential to have recorded videos/images to be stored for minimum 180 days of all critical areas to facilitate investigations of reported incidents. The hardware required for the system including servers VMS & Recording, CCTV VMS software license, Workstations with latest configuration Desktop PC, Monitors, CAT-6 /CAT-6A, Web smart managed POE switches, Patch Cable to connect the camera to nearest POE enabled LAN point, Cables, connectors, conduits, power supplies etc. OFC Backbone up to core switch and suitable racks in CCTV control room.

a) A Closed-Circuit Television (CCTV) system is a surveillance system used to capture and transmit video streams to a Control Centre for real-time monitoring and for recording. The main purpose of a CCTV system is to enhance the security in the areas where it is installed. The recordings are useful to the security service and even security bodies in case of a security event or incident in the facilities.

## 7.5 IP BASED CCTV SPECIFICATIONS

### 7.5.1 Dome Camera (Indoor Type)

Technical Specification of Dome Camera (Indoor Type)		
	Parameter	Specifications
1	Image Sensor Type	CMOS progressive
2	Image Sensor Size	1/2.8 (0.357) inch or better
3	Camera Image Sensing capacity (Picture Mode)	4MP resolution or better
4	Resolution	D1 (704 x 480 Pixel), 720p (1280 x 720 Pixel), 1080p (1920 x 1080 Pixel), 1440 p (2560x1440 Pixel), 1520 P (2688 x 1520 Pixel) or better
5	Electronic Shutter	16/30 to 1/10,000 sec or better

6	Day/Night Capable	Yes, True day/night
7	IR illumination Range(mtr)	14 or better
8	Focal Length(mm)	2.5mm (+/- 0.5mm) Lens or better
9	Frame Rate (fps)	30fps or better
10	Video Compression	H.264, H.265, MJPEG
11	Video Streaming	4 streams or better
12	Privacy Masking	8 Zone or better
13	Image features	Defog, BLC, HLC
14	Audio Support	Yes, 2 way audio with Built -in mic
15	Alarm Support	Yes. Alarm in and alarm out
16	Audio Compression	G.726 (ADPCM), AAC-LC*7, G.711
17	Protocols	TCP/IPv4 & v6, UDP/IP, HTTP, HTTPS, SSL/TLS, SMTP, DNS, NTP, SNMPv1/v2/v3, DHCPv4 & v6, RTP, MLD, ICMP, ARP, IEEE 802.1X, DiffServ, SFTP, MQTT, LLDP, RTSP, RTP, RTP/RTCP, DDNS, UPnP, IGMP, SRTP
18	Minimum Illumination for Capturing Color Image	0.08 or better, 0 lux with IR
19	WDR (Wide Dynamic Range)	132dB or better
20	SNR (Signal to Noise Ratio)	50 or better
21	On Board SD/SDHC Card Support	Yes
22	SD Card Memory(GB)	512 or better
23	ONVIF support	Support for all profiles, (G, M,S, T)
24	Available ROM for AI Application	Should be available
25	Available RAM for AI Application	Should be available
26	Installation Type	Indoor Type
27	Material of the Housing construction	Alluminium/Metal
28	Protection	IP66, NEMA 4X compliant or better
29	Vandal Resistant Housing	Should be available
30	Ik rating	IK10
31	Power Input	PoE
32	Operating Temperature	-30 °C to 50 °C or better
33	Operating Humidity	Max 99% RH or better
34	Used SoC must be declaration	Must be available on datasheets or OEM website
35	Certification	UL, CE, FCC, BIS, NDAA, FIPS
36	SSL Certificate	GlobalSign / DigiCert device Certificate or similar should be pre-installed
37	Lens Type	Motorized Varifocal Zoom lens
38	Type of Camera Housing	Dome CAMERA
39	IP Camera with built-in AI Engine for Ready to installing 3rd party applications	Yes
40	Video analytics requirements	Intruder Detection, Loitering Detection, Direction Detection, Scene Change Detection, Object Detection, Cross Line Detection, Vehicle Detection, Number Plate detection

		at camera level*( Edge based analytics )
41	Mount Bracket	Company fitted Base Bracket must be available in the Box.

### 7.5.2 Fixed Type Bullet Camera Specification:

Technical Specification of Bullet Camera (Fixed)		
Sl. No.	Parameter	Specifications
1	Image Sensor Type	CMOS progressive
2	Image Sensor Size	1/2.8 (0.357) inch or better
3	Camera Image Sensing capacity (Picture Mode)	5MP resolution or better
4	Resolution	D1 (704 x 480 Pixel), 720p (1280 x 720 Pixel), 1080p (1920 x 1080 Pixel), 1440 p (2560x1440 Pixel), 1728 P (3072 x 1728 Pixel) or better
5	Electronic Shutter	1/30 to 1/10,000 sec or better
6	Day/Night Capable	Yes, True day/night
7	IR illumination Range(mtr)	35 or better
8	Focal Length(mm)	3mm (+/- 1mm) Lens or better
9	Frame Rate (fps)	30fps or better
10	Video Compression	H.264, H.265, MJPEG
11	Video Streaming	4 streams or better
12	Privacy Masking	8 Zone or better
13	Image features	Defog, BLC, HLC
14	Audio Support	Yes, 2 way audio
15	Alarm Support	Yes. Alarm in and alarm out
16	Audio Compression	G.726 (ADPCM), AAC-LC*7, G.711
17	Protocols	TCP/IPv4 & v6, UDP/IP, HTTP, HTTPS, SSL/TLS, SMTP, DNS, NTP, SNMPv1/v2/v3, DHCPv4 & v6, RTP, MLD, ICMP, ARP, IEEE 802.1X, DiffServ, SFTP, MQTT, LLDP, RTSP, RTP, RTP/RTCP, DDNS, UPnP, IGMP, SRTP

18	Minimum Illumination for Capturing Color Image	0.05 or better, 0 lux with IR
19	WDR (Wide Dynamic Range)	132dB or better
20	SNR (Signal to Noise Ratio)	50 or better
21	On Board SD/SDHC Card Support	Yes
22	SD Card Memory(GB)	512 or better
23	ONVIF support	Support for all profiles, (G, M,S, T)
24	Available ROM for AI Application	Should be available
25	Available RAM for AI Application	Should be available
26	Installation Type	Outdoor
27	Material of the Housing construction	Alluminium/Metal
28	Protection	IP66, NEMA 4X compliant or better
29	Vandal Resistant Housing	Should be available
30	Ik rating	IK10
31	Power Input	PoE
32	Operating Temperature	-30 °C to 60 °C or better
33	Operating Humidity	Max 99% RH or better
34	Used SoC must be declaration	Must be available on datasheets or OEM website
35	Certification	UL, CE, FCC, BIS, NDAA, FIPS
36	SSL Certificate	GlobalSign / DigiCert device Certificate or similar should be pre-installed
37	Lens Type	Motorized Varifocal Zoom lens
38	Type of Camera Housing	BULLET CAMERA
39	IP Camera with built-in AI Engine for Ready to installing 3rd party applications	Yes
40	Video analytics requirements	Intruder Detection, Loitering Detection, Direction Detection, Scene Change Detection, Object Detection, Cross Line Detection, Vehicle Detection, Number Plate detection at camera level*( Edge based analytics )
41	Mount Bracket	Company fitted Base Bracket must be available in the Box.

### 7.5.3 Motorized Varifocal Type Bullet Camera Specification

Technical Specification of Bullet Camera (Motorized Varifocal Lens)		
Sl. No.	Parameter	Specifications
1	Image Sensor Type	CMOS progressive
2	Image Sensor Size	1/2.8 (0.357) inch or better
3	Camera Image Sensing capacity (Picture Mode)	5MP resolution or better

4	Resolution	D1 (704 x 480 Pixel), 720p (1280 x 720 Pixel), 1080p (1920 x 1080 Pixel), 1440 p (2560x1440 Pixel), 1728 P (3072 x 1728 Pixel) or better
5	Electronic Shutter	1/30 to 1/10,000 sec or better
6	Day/Night Capable	Yes, True day/night
7	IR illumination Range(mtr)	50 or better
8	Focal Length(mm)	3 - 9 (+/- 1mm) Motorized Varifocal Lens or better
9	Frame Rate (fps)	30fps or better
10	Video Compression	H.264, H.265, MJPEG
11	Video Streaming	4 streams or better
12	Privacy Masking	8 Zone or better
13	Image features	Defog, BLC, HLC
14	Audio Support	Yes, 2 way audio
15	Alarm Support	Yes. Alarm in and alarm out
16	Audio Compression	G.726 (ADPCM), AAC-LC*7, G.711
17	Protocols	TCP/IPv4 & v6, UDP/IP, HTTP, HTTPS, SSL/TLS, SMTP, DNS, NTP, SNMPv1/v2/v3, DHCPv4 & v6, RTP, MLD, ICMP, ARP, IEEE 802.1X, DiffServ, SFTP, MQTT, LLDP, RTSP, RTP, RTP/RTCP, DDNS, UPnP, IGMP, SRTP
18	Minimum Illumination for Capturing Color Image	0.05 or better, 0 lux with IR
19	WDR (Wide Dynamic Range)	132dB or better
20	SNR (Signal to Noise Ratio)	50 or better
21	On Board SD/SDHC Card Support	Yes
22	SD Card Memory(GB)	512 or better
23	ONVIF support	Support for all profiles, (G, M,S, T)
24	Available ROM for AI Application	Should be available
25	Available RAM for AI Application	Should be available
26	Installation Type	Outdoor
27	Material of the Housing construction	Alluminium/Metal
28	Protection	IP66, NEMA 4X compliant or better
29	Vandal Resistant Housing	Should be available
30	Ik rating	IK10
31	Power Input	PoE
32	Operating Temperature	-30 °C to 60 °C or better
33	Operating Humidity	Max 99% RH or better
34	Used SoC must be declaration	Must be available on datasheets or OEM website
35	Certification	UL, CE, FCC, BIS, NDAA, FIPS
36	SSL Certificate	GlobalSign / DigiCert device Certificate or similar should be pre-installed
37	Lens Type	Motorized Varifocal Zoom lens

38	Type of Camera Housing	BULLET CAMERA
39	IP Camera with built-in AI Engine for Ready to installing 3rd party applications	Yes
40	Video analytics requirements	Intruder Detection, Loitering Detection, Direction Detection, Scene Change Detection, Object Detection, Cross Line Detection, Vehicle Detection, Number Plate detection at camera level*( Edge based analytics )
41	Mount Bracket	Company fitted Base Bracket must be available in the Box.

#### 7.5.4 Fixed Type Dome Camera

Technical Specification of Dome Camera (Fixed)		
Sl. No.	Parameter	Specifications
1	Image Sensor Type	CMOS progressive
2	Image Sensor Size	1/2.8 (0.357) inch or better
3	Camera Image Sensing capacity (Picture Mode)	5MP resolution or better
4	Resolution	D1 (704 x 480 Pixel), 720p (1280 x 720 Pixel), 1080p (1920 x 1080 Pixel), 1440 p (2560x1440 Pixel), 1728 P (3072 x 1728 Pixel) or better
5	Electronic Shutter	1/30 to 1/10,000 sec or better
6	Day/Night Capable	Yes, True day/night
7	IR illumination Range(mtr)	35 or better
8	Focal Length(mm)	3mm (+/- 1mm) Lens or better
9	Frame Rate (fps)	30fps or better
10	Video Compression	H.264, H.265, MJPEG
11	Video Streaming	4 streams or better
12	Privacy Masking	8 Zone or better
13	Image features	Defog, BLC, HLC
14	Audio Support	Yes, 2 way audio
15	Alarm Support	Yes. Alarm in and alarm out
16	Audio Compression	G.726 (ADPCM), AAC-LC*7, G.711
17	Protocols	TCP/IPv4 & v6, UDP/IP, HTTP, HTTPS, SSL/TLS, SMTP, DNS, NTP, SNMPv1/v2/v3, DHCPv4 & v6, RTP, MLD, ICMP, ARP, IEEE 802.1X, DiffServ, SFTP, MQTT, LLDP, RTSP, RTP, RTP/RTCP, DDNS, UPnP, IGMP, SRTP
18	Minimum Illumination for Capturing Color Image	0.05 or better, 0 lux with IR
19	WDR (Wide Dynamic Range)	132dB or better
20	SNR (Signal to Noise Ratio)	50 or better
21	On Board SD/SDHC Card Support	Yes
22	SD Card Memory(GB)	512 or better
23	ONVIF support	Support for all profiles, (G, M,S, T)
24	Available ROM for AI Application	Should be available

25	Available RAM for AI Application	Should be available
26	Installation Type	Outdoor
27	Material of the Housing construction	Alluminium/Metal
28	Protection	IP66, NEMA 4X compliant or better
29	Vandal Resistant Housing	Should be available
30	Ik rating	IK10
31	Power Input	PoE
32	Operating Temperature	-30 °C to 60 °C or better
33	Operating Humidity	Max 99% RH or better
34	Used SoC must be declaration	Must be available on datasheets or OEM website
35	Certification	UL, CE, FCC, BIS, NDAA, FIPS
36	SSL Certificate	GlobalSign / DigiCert device Certificate or similar should be pre-installed
37	Lens Type	Motorized Varifocal Zoom lens
38	Type of Camera Housing	Dome CAMERA
39	IP Camera with built-in AI Engine for Ready to installing 3rd party applications	Yes
40	Video analytics requirements	Intruder Detection, Loitering Detection, Direction Detection, Scene Change Detection, Object Detection, Cross Line Detection, Vehicle Detection, Number Plate detection at camera level*( Edge based analytics )
41	Mount Bracket	Company fitted Base Bracket must be available in the Box.

#### 7.5.5 Motorized Varifocal Type Dome Camera

Technical Specification of Dome Camera (Motorized Varifocal Lens)		
Sl. No.	Parameter	Specifications
1	Image Sensor Type	CMOS progressive
2	Image Sensor Size	1/2.8 (0.357) inch or better
3	Camera Image Sensing capacity (Picture Mode)	5MP resolution or better
4	Resolution	D1 (704 x 480 Pixel), 720p (1280 x 720 Pixel), 1080p (1920 x 1080 Pixel), 1440 p (2560x1440 Pixel), 1728 P (3072 x 1728 Pixel) or better
5	Electronic Shutter	1/30 to 1/10,000 sec or better
6	Day/Night Capable	Yes, True day/night
7	IR illumination Range(mtr)	50 or better
8	Focal Length(mm)	3 - 9 (+/- 1mm) Motorized Varifocal Lens or better
9	Frame Rate (fps)	30fps or better
10	Video Compression	H.264, H.265, MJPEG

11	Video Streaming	4 streams or better
12	Privacy Masking	8 Zone or better
13	Image features	Defog, BLC, HLC
14	Audio Support	Yes, 2 way audio
15	Alarm Support	Yes. Alarm in and alarm out
16	Audio Compression	G.726 (ADPCM), AAC-LC*7, G.711
17	Protocols	TCP/IPv4 & v6, UDP/IP, HTTP, HTTPS, SSL/TLS, SMTP, DNS, NTP, SNMPv1/v2/v3, DHCPv4 & v6, RTP, MLD, ICMP, ARP, IEEE 802.1X, DiffServ, SFTP, MQTT, LLDP, RTSP, RTP, RTP/RTCP, DDNS, UPnP, IGMP, SRTP
18	Minimum Illumination for Capturing Color Image	0.05 or better, 0 lux with IR
19	WDR (Wide Dynamic Range)	132dB or better
20	SNR (Signal to Noise Ratio)	50 or better
21	On Board SD/SDHC Card Support	Yes
22	SD Card Memory(GB)	512 or better
23	ONVIF support	Support for all profiles, (G, M,S, T)
24	Available ROM for AI Application	Should be available
25	Available RAM for AI Application	Should be available
26	Installation Type	Outdoor
27	Material of the Housing construction	Alluminium/Metal
28	Protection	IP66, NEMA 4X compliant or better
29	Vandal Resistant Housing	Should be available
30	Ik rating	IK10
31	Power Input	PoE
32	Operating Temperature	-30 °C to 60 °C or better
33	Operating Humidity	Max 99% RH or better
34	Used SoC must be declaration	Must be available on datasheets or OEM website
35	Certification	UL, CE, FCC, BIS, NDAA, FIPS
36	SSL Certificate	GlobalSign / DigiCert device Certificate or similar should be pre-installed
37	Lens Type	Motorized Varifocal Zoom lens
38	Type of Camera Housing	Dome CAMERA
39	IP Camera with built-in AI Engine for Ready to installing 3rd party applications	Yes
40	Video analytics requirements	Intruder Detection, Loitering Detection, Direction Detection, Scene Change Detection, Object Detection, Cross Line Detection, Vehicle Detection, Number Plate detection at camera level*( Edge based analytics )
41	Mount Bracket	Company fitted Base Bracket must be available in the Box.

### 7.5.6 PTZ Camera

<b>Technical Specification of PTZ Camera</b>		
<b>Sl. No.</b>	<b>Parameter</b>	<b>Specifications</b>
1	Image Sensor Type	CMOS progressive
2	Image Sensor Size	1/2.8 (0.357) inch or better
3	Camera Image Sensing capacity (Picture Mode)	5MP resolution or better
4	Resolution	D1 (704 x 480 Pixel), 720p (1280 x 720 Pixel), 1080p (1920 x 1080 Pixel), 1440 p (2560x1440 Pixel), 1728 P (3072 x 1728 Pixel) or better
5	Electronic Shutter	1/30 to 1/10,000 sec or better
6	Day/Night Capable	Yes, True day/night
7	IR illumination Range(mtr)	250 or better
8	Focal Length(mm)	5 - 135 (+/- 2mm) Motorized Varifocal Lens with 30X optical Zoom or better
9	Frame Rate (fps)	30fps or better
10	Panning Range	360° Endless Panning
11	Tilting Range	Operational -20° – +90° or better
12	Pan Speed	700°/Sec or better
13	Tilt Speed	500°/Sec or better
14	Video Compression	H.264, H.265, MJPEG
15	Video Streaming	4 streams or better
16	Privacy Masking	30 Zone or better
17	Image features	Defog, BLC, HLC
18	Audio Support	Yes, 2 way audio
19	Alarm Support	Yes. Alarm in and alarm out
20	Audio Compression	G.726 (ADPCM), AAC-LC*7, G.711
21	Protocols	TCP/IPv4 & v6, UDP/IP, HTTP, HTTPS, SSL/TLS, SMTP, DNS, NTP, SNMPv1/v2/v3, DHCPv4 & v6, RTP, MLD, ICMP, ARP, IEEE 802.1X, DiffServ, SFTP, MQTT, LLDP, RTSP, RTP, RTP/RTCP, DDNS, UPnP, IGMP, SRTP
22	Minimum Illumination for Capturing Color Image	0.01 or better, 0 lux with IR
23	WDR (Wide Dynamic Range)	132dB or better
24	SNR (Signal to Noise Ratio)	50 or better
25	On Board SD/SDHC Card Support	Yes
26	SD Card Memory(GB)	256 or better
27	ONVIF support	Support for all profiles, (G, S, T,M)
28	Available ROM for AI Application	Should be available
29	Available RAM for AI Application	Should be available

30	Installation Type	Outdoor
31	Material of the Housing construction	Alluminium/Metal
32	Protection	IP66, NEMA 4X compliant or better
33	Vandal Resistant Housing	Should be available
34	Ik rating	IK10
35	Power Input	PoE
36	Operating Temperature	-30 °C to 60 °C or better
37	Operating Humidity	Max 90% RH or better
38	Used SoC must be declaration	Must be available on datasheets or OEM website
39	Certification	UL, CE, FCC, BIS, NDAA, FIPS
40	SSL Certificate	GlobalSign / DigiCert device Certificate or similar should be pre-installed
41	BIS Registration for safety general requirements as per IS 13252 (Part 1):latest	Yes
42	Lens Type	Motorized Varifocal Zoom lens
43	Type of Camera Housing	Outdoor PTZ CAMERA
44	IP Camera	Yes
45	Video analytics requirements	Intruder Detection, Loitering Detection, Direction Detection, Scene Change Detection, Object Detection, Cross Line Detection, Vehicle Detection at camera level*( Edge based analytics )
46	Mount Bracket	Company fitted Base Bracket must be available in the Box.

### 7.5.7 NVR

NVR:		
SL. No.	Parameter	Specifications
1	GENERAL CHARACTERISTICS	The NVR shall be an all-in-one recording solution with intel CPU for IP video surveillance system of default 64 Network Cameras and expandable up to 128 Network Cameras without any additional hardware or better.
		The NVR shall store H.264 video data and H.265 video data or better
		The NVR shall have the capability of 600 Mbps or better total throughput. (Recording throughput: 350 Mbps, Output throughput: 250 Mbps) or better
		The NVR can offer 1000 TB or better of gross storage capacity with optional Hard Disk Extension units or better.
		The NVR shall offer hardware RAID 1, RAID 5 and RAID 6 data protection internally and with optional Hard Disk Extension units or better.
		The NVR shall offer motion detection search function which can search the moving of the selected specific area or better.
		The NVR shall monitor on multiscreen mode including corridor mode screen layout or better.

		The NVR shall offer displaying videos on the main and sub monitors connected to HDMI interface or better.
		The NVR shall offer the operation and configuration functions to the cameras and NVR from the main monitor connected to HDMI interface and mouse or better.
		The NVR shall store an encrypted stream and shall display encrypted streams/videos by decrypting or better.
		The NVR shall realize optional SSL / TLS communication with CA certificate or better.
		The NVR shall offer remote and mobile monitoring on a PC, smartphone, and tablet or better.
		The NVR shall conform to the ONVIF standard.
2	Protocols	Onvif conformant camera and encoder camera or better.
3	Local display	HDMI / 4K (Main monitor), Full HD (Sub monitor) or better.
4	Multiscreen Display	Main monitor: 1, 2, 3, 4, 5, 6, 7, 9, 12, 16, 24, 32,64 Sub monitor: 1, 4,16, 32 or better.
5	Camera control	Panning, Tilting, Zoom, Focus, Brightness, Preset position call and program, Auto mode, Click cantering, Wheel zoom, Zoom reset, Auto Back Focus, Aux, Wiper or better.
6	Image format	H.265, H.264, MJPEG or better
7	Frame rate	Up to 60 fps per stream (Depending on the Camera) or better
8	Recording rate	350 Mbps or better
9	Audio	G.711 for Onvif, G.726 (ADPCM) 32 kbps, AAC-LC or better.
10	Recording Mode	Schedule, Event (Pre/Sub stream), Emergency or better.
11	Event Action	Alarm recording, e-mail notification, Alarm message, Camera positioning, Terminal output, Buzzer, Indicator or better.
12	Search mode	Date and time (Calendar), Timeline, Video Motion Detection log list, Thumbnail or better.
13	Playback control	Play, Reverse Play, Pause, Stop, Fast Forward, Fast Reverse, Previous Record, Next Record, Previous Image, Next Image, Go to Date, Go to Last (Jumps to 30 seconds before the record end)Time-saving playback or better.
14	De-warping	1 de-warped playback of fisheye view video or better
15	Authentication	User authentication (ID and Password), Host authentication or better
16	HDD slot	The NVR can offer 1000 TB or better of gross storage capacity with optional Hard Disk Extension units or better
17	Camera SD card recording synchronization	Images recorded in the SD card in the network cameras can be transferred to the recorder automatically. (H.265/H.264)
18	RAID (Hardware RAID)	RAID 1,5, 6 or better
19	HDD type	3.5-inch SATA HDD or better
	INTERFACE	
20	Indicator	LCD or Seven Segment Display, Status indicator: ALARM, ERROR, OPERATE, REC, HDD (status), HDD (access) or better

21	Network	2x 10BASE-T/100BASE-TX/1000BASE-TX(RJ-45)
22	Video	2x HDMI or better
23	Alarm IO	Alarm inputs and outputs or
24	Mouse	mouse connection port USB2.0 or better
25	Copy port	2x USB 3.0 port or better
26	Power Source	220-240 V AC, 50 Hz
ENVIRONMENTAL		
27	Ambient Operating Temperature	+0 °C ~ +45 °C or better
28	Ambient Operating Humidity	5 % ~ 90 % (without condensation) or better
29	Standard	BIS, UL,FCC,CE

#### 7.5.8 55" Full HD LED Display Monitor (To be installed in the control room).

Sr. No.	Parameter	Minimum Specification
1	Display:	LED Panel Type
2	Screen Size:	55" (Diagonal)
3	Panel:	DIRECT LED
4	Resolution (HxV):	3840 x 2160 pixels or better
5	Brightness:	400 cd/m2 or better
6	Viewing Angle:	178 degrees or better
7	CONNECTION TERMINAL:	
8	VIDEO IN:	BNC x 1
9	HDMI IN:	HDMI x 3
10	Speaker Out:	External Speaker Jack (Side), 20W (10W x 10W)
	CONTROL TERMINAL:	
11	LAN:	RJ45 x 1
	System Requirements:	
12	Operating System version/Platform	Android 11 or better
13	RAM/ROM	2GB/16GB
14	Airplay/Miracast	Inbuilt
15	Bluetooth	Yes
16	Hotel Mode with Customised Logo	Yes
17	Display should be capable to run content in offline mode	Yes
	ELECTRICAL:	
18	Power Requirements:	110-127 V AC, 50Hz/60Hz, 120 V AC 50/60HZ

19	Power Consumption:	Less than 150 W
	MECHANICAL:	
20	Display only (WXHxD):	47.9" X 27.1" X 4.8" (1236 x 718.2 x 89.9 mm)
21	Temperature:	32°F to 104°F(0 to 40 degrees C)
22	Humidity(Non condensation):	20% to 80% (Non condensation)

#### 7.5.9 65" Full HD LED Display Monitor (To be installed in the control room).

Sr. No.	Parameter	Minimum, Specification
1	Display:	LED Panel Type
2	Screen Size:	65" (Diagonal)
3	Panel:	DIRECT LED
4	Resolution (HxV):	3840 x 2160 pixels or better
5	Brightness:	400 cd/m2 or better
6	Viewing Angle:	178 degrees or better
7	CONNECTION TERMINAL:	
8	VIDEO IN:	BNC x 1
9	HDMI IN:	HDMI x 3
10	Speaker Out:	External Speaker Jack (Side), 20W (10W x 10W)
	CONTROL TERMINAL:	
11	LAN:	RJ45 x 1
	System Requirements:	
12	Operating System version/Platform	Android 11 or better
13	RAM/ROM	2GB/16GB
14	Airplay/Miracast	Inbuilt
15	Bluetooth	Yes
16	Hotel Mode with Customised Logo	Yes
17	Display should be capable to run content in offline mode	Yes
	ELECTRICAL:	

18	Power Requirements:	110-127 V AC, 50Hz/60Hz, 120 V AC 50/60HZ
19	Power Consumption:	Less than 150 W
	MECHANICAL:	
20	Display only (WXHxD):	47.9" X 27.1" X 4.8" (1236 x 718.2 x 89.9 mm)
21	Temperature:	32°F to 104°F(0 to 40 degrees C)
22	Humidity(Non condensation):	20% to 80% (Non condensation)

**NOTE: The firm will be required to provide items/material as per the specifications indicated herein. The department reserves the right to accept items/materials with richer specifications as available in the market/ with manufacturer due to technological up gradations/ model up-dation, without any extra cost implication with the approval of Engineer in charge.**

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## **PACKAGE C- 8**

### **CENTRALIZED INTERCOM SYSTEM**

**8.0 Centralized intercom System:**

**8.1 The work shall be carried out as per CPWD General Specifications for Electrical Works Part-I (Internal) 2023, Part-II (External) 2023 as amended, relevant IE rules & Acts.**

**8.2 SCOPE OF WORK**

Scope of work involves design, drawing, supply, installation, testing and commissioning of One (01) number intercom connection in each flat, lift lobby at podium, security cabins at each tower and main security at main gate, CCTV control room, caretaker room, Dispensary Room, Pump room, Sub-station etc. complete as required to make system fully functional. It will be the responsibility of the vendor/bidder to make the entire system fully functional as per the specifications. Vendor/bidder shall consider any equipment/devices required to make the system functional if not mentioned herewith. The system should be capable to communicate to each flat to flat, and flat to securities and control rooms. The scope of work also included guaranty/warranty of entire installation and equipment's/ accessories supply by them as per OEM.

**8.3 System requirement:-**

8.3.1 The system shall be capable of working in a suitable ventilated non air conditioned environment as well as A C environment.

**8.3.2 The environment conditions limit:**

- a. Temperature–0 to 50Deg.C
- b. Humidity –0 to 95%

8.3.3 The System must be based on latest micro control based/digital technology using pulse code modulation/time division multiplex in (PCM/TDM).

8.3.4 The EPABX shall be able to handle analogue/digital trunk interface as per National /International standard.

- 8.3.5 The cabinet design shall provide for adequate ventilation to dissipate heat due to energy loss.
- 8.3.6 The equipment shall be capable of working under the following line & junction limits as under:-
- a) Extension loop resistance of 600 ohms for system.
  - b) Junction loop upto 1800 ohms.
  - c) Insulation lower limit 20K ohms

- 8.3.7 Tone and Ringing System shall provide standard tone sand ringing current in the public telephone network
- 8.3.8 There shall be protection EPABX system from high voltage, current transient lightening occurring on junction line so the exchange etc.

- 8.3.9 Minimum 400 analog users with suitable Operator console

#### **8.4 Inter com System Features**

- 8.4.1 Visit confirmation
- 8.4.2 Vendor call
- 8.4.3 Customized massages(8to10)
- 8.4.4 Call facilities from flat to flat so fall tower, flat to security.
- 8.4.5 Emergency call with voice message
- 8.4.6 Caller ID to all terminals.
- 8.4.7 Security watchdog.
- 8.4.8 Auto call back.
- 8.4.9 Flexible numbering.
- 8.4.10 Paging to parking area.
- 8.4.11 Unlimited conference. It shall be possible for an extension user (up to a minimum number of 10 to talk to each other at the same time on a conference circuit.
- 8.4.12 Call tracing.
- 8.4.13 Call blocking
- 8.4.14 Call Forwarding:
- 8.4.15 Privacy of call: Full privacy of conversation shall be available on all calls whether established directly or by the attendant.
- 8.4.16 Do not disturb.
- 8.4.17 Panic button (optional to occupant).
- 8.4.18 Extension to extension dialing: It shall be possible to establish internal calls automatically by dialing any number with out assistance of the attendant.

- 8.4.19 Battery back-up. The battery shall be lead acid as per IS-1652 for 10(Ten) hours back-up for 100% load with suitable rack.

### **8.5 Telephone instruments:-**

The instrument shall be having following minimum features:

- 8.5.1 Tone/pulse switchable
- 8.5.2 LED indication.
- 8.5.3 In ringing volume control
- 8.5.4 Redial.
- 8.5.5 Flash.
- 8.5.6 Mute.
- 8.5.7 Pause.
- 8.5.8 Caller ID

### **8.6 Display:**

Tri colour digital display system of same make shall be provided along with Intercom.

### **8.7 Telephone Cable & Cabling:-**

#### **A. Armoured jelly filled cable**

- 8.7.1 Armoured jelly filled cable of approved make to be laid in suitable size pipe buried underground for connections between tower to towers and main gate security.
- 8.7.2 Armoured jelly filled cable of approved make to be laid in wire mesh type tray of approved make if it is in surface of the wall of building.
- 8.7.3 The number of pairs of the Armoured jelly filled cable should be 20% more than the actual requirement.
- 8.7.4 Proper identification tag with crimping at both ends of each pair of cable including for spares and should be ready for use.
- 8.7.5 Proper coordination with the agency laying the pipes for telephone cable to be done by the intercom work executing agency.

#### **B. Telephone Cable**

- i) Suitable pair 0.5mm dia. FRLS PVC insulated annealed copper conductor, unarmoured telephone cable of approved make shall be drawn in existing heavy class PVC conduit in side the building.
- ii) Proper identification tag with crimping at both ends of each pair of cable including for spares and should be ready for use

- iii) Proper coordination with the agency laying the conduit pipes for telephone cable to be done by the intercom work executing agency.

**C. Junction boxes**

- i) Telephone junction boxes of approved make with locking arrangement and shall be of IP65 rating.
- ii) The boxes should have required number of krone terminal with 10% spares.

**D. Earthing**

All metal enclosures, conduits, junction/pull boxes/ Cabinets shall be grounded in compliance of CPWD General Specifications for Electrical Works Part-I (Internal2023)

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**Package C- 9**

**SOLAR PHOTOVOLTAIC POWER GENERATION & SOLAR WATER HEATER**

**9.1 GRID INTERACTIVE SOLAR PHOTOVOLTAIC POWER GENERATION**

9.1.1 **Scope of work:-** The scope of work includes manufacturing as per drawings enclosed with bid documents, testing, supply, installation and commissioning of Grid connect solar generating system the grid connects solar photovoltaic (SPV) system of suitable capacity as mentioned in specification, by optimum utilization of the available Roof Top areas, including liaison with APDCL, net metering ‘will be done as per Assam Power Distribution Company Limited (Net Metering for Rooftop Solar Systems) rules amended up to date and other related rules and code, as applicable , conversation system and successful commission and handed over to client in good working conditions. The scope of works also included guaranty/warranty of entire installation and equipment's/ accessories supply by them as per OEM etc. as required.

9.1.2 Adequate capacity of SPV modules, PCUs, Junction boxes etc. to ensure generation of power as per design estimates. This will be done by applying liberal de-rating factors for the array and recognizing the efficiency parameters of PCUs, conductor losses, system losses, site conditions etc. Details of proposed generative capacity each building/ block are tabulated below: -

Sl. No.	Name of Building/ Block	Grid	Interactive	Solar
		Solar Photovoltaic Collectors proposed (Nos.)	Power Generation (KW) (Each module 500 WP)	Photovoltaic Power Generation
1	Residential Tower - 1	42	21.00	
2	Residential Tower - 2	42	21.00	
3	Residential Tower - 3	42	21.00	
4	Residential Tower - 4	42	21.00	

5	Residential Tower - 5	70	35.00
6	Residential Tower - 6	70	35.00
7	Residential Tower - 7	76	38.00
8	Residential Tower - 8	54	27.00
9	Residential Tower - 9	76	38.00
10	Regional Director (Not provided due to low Hight & shadow of other tower )		-----
11	Club – 1	-----	-----
12	Club – 2	-----	-----
Total			257.00

- 9.1.3 Use of equipment and systems with proven design and performance that have high availability track records under similar service conditions.
- 9.1.4 Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.
- 9.1.5 Strict compliance with approved and proven quality assurance (QA) systems and procedures during different stages of the project, starting from sizing, selection of make, shipment, storage(at site), during erection, testing and commissioning.
- 9.1.6 System design shall have protection mechanism, so that any disturbance from the grid will not cause any damage to the equipment of the Solar Power Plant.
- 9.1.7 The basic and detailed engineering of the plant shall aim at achieving high standards of operational performance. SPV power plant should be designed to operate satisfactorily in synchronization with the grid within permissible limits of high voltage and frequency fluctuation conditions. It is also extremely important to safeguard the system during major disturbances, internal and external surge conditions while ensuring safe operation of the plant.
- 9.1.8 Shadow free plant layout with optimum tilt and orientation to ensure minimum losses and to maximize generation by using less area.
- 9.1.9 Higher system voltage and lower current options to be followed to minimize ohmic losses.
- 9.1.10 Selection of PCUs with proven reliability and minimum downtime. Ready availability of requisite spares.
- 9.1.11 The designed array capacity at STC shall be suitably determined to meet the proposed\ guaranteed generation output at the point of interconnection by the contractor in his bid. Bidder shall design the plant and equipment in order to have sustained life of 25 years with minimum maintenance efforts.
- 9.1.12 The specifications provided with this bid document are for guidelines only and generic; any design provided in this document is only meant as an example. The Contractor must submit a detailed design philosophy document for the project to meet the functional requirements based upon their own design in-line with the above. The bidders are advised to visit the site and satisfy themselves before bidding.

### **9.1.13 Standards and Codes for Photovoltaic Modules**

The following standards & codes shall be complied with latest amendments:

- i) Standard Description IEC 61215-1: 2016 Ed.1 Terrestrial photovoltaic (PV) modules -Design qualification and type approval - Part 2: Test requirements.
  - ii) IEC 61215-1-1:2016 Ed.1: Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules.
  - iii) IEC 61215-1-2 Ed.1: Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules.
  - iv) IEC 61730-1:2016 Ed.2: Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction.
  - v) IEC 61730-2:2016 Ed.2: Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing.
  - vi) IEC 61701:2011 Ed.2: Salt mist corrosion testing of photovoltaic (PV) modules (Applicable for coastal and marine environment).
  - vii) IEC 62716:2013 Ed.1 : Photovoltaic (PV) modules - Ammonia corrosion testing.
  - viii) IEC TS 62804-1:2015 Ed.1: Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon (under conditions of 85oC/85% RH for minimum 192 hours).
  - ix) As per the Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017.
- 9.1.14 **PV Modules used in the grid connected solar power projects shall be registered with BIS and bear the Standard Mark as notified by the Bureau of Indian Standards.** Further, PV Modules should have been included in the ALMM list as per MNRE Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019.

### **9.1.15 Technical Requirements: -**

#### **9.1.15.1 Parameter Specification**

9.1.15.1.1 Solar photo Cell type: Mono-crystalline.

9.1.15.1.2 Module Efficiency:  $\geq 17.5\%$  for Mono-crystalline, rated power at STC, No negative tolerance is allowed. Module capacity should not be less than 500Wp. Solar module and solar cell should be of same manufacturer.

9.1.15.1.3 Temperature co-efficient of power: Not less than  $-0.40\%/\text{oC}$ , say should not be  $-0.50\%$ .

9.1.15.1.4 Solar Cells, Solar Modules and all other component should be ALMM (Approved List of Models and Manufacturers), a list maintained by the Ministry of New and Renewable Energy (MNRE) in India.

### **9.1.16 Component Specifications**

- i) The glass used to make PV modules shall be toughened low iron glass with transmittance above 90%. The minimum thickness of mono or multi crystalline modules shall not be less than 3.8 mm for 72 cell module and 3.2 mm for 60 cell modules. In case of glass-glass Modules, glass thickness on each side shall be minimum of 2 mm. It shall be laminated using a laminator with symmetrical structure, i.e. heating plates on both sides.
- ii) The back sheet used in the PV modules shall be of three-layered structure durable for humid — hot conditions with properties of moisture barrier, elongation retention and UV resistance. The back sheet shall have the following properties.

Parameter Value: Material thickness  $\geq$  300- micron , Water vapour transmission rate  $< 2 \text{ g/m}^2/\text{day}$  ,Partial discharge test voltage  $\geq 1000 \text{ V} / 1500 \text{ V}$ , Elongation at break  $> 100\%$  Adhesion strength with encapsulant  $> 70 \text{ N/cm}$ , Interlayer adhesion strength  $> 5 \text{ N/cm}$  The engineer in-charge reserves the right to ask to conduct different tests as per code and practices.

- iii) The encapsulant used for the PV modules should be UV resistant and PID resistant in nature. No yellowing of the encapsulant with prolonged exposure shall occur.

Parameter Value Gel content  $> 75\%$  Volume resistivity  $> 1\times 10^{15} \Omega.\text{cm}$  Peeling strength with glass  $> 60 \text{ N/cm}$  1.3.4 The sealant used for edge sealing of PV modules shall have excellent moisture ingress protection with good electrical insulation (Break down voltage  $> 15 \text{ kV/mm}$ ) and with good adhesion strength. Edge tapes for sealing are not allowed.

- iv) The module frame shall be made of anodized Aluminium, which shall be electrically & chemically compatible with the structural material used for mounting the modules. It is required to have provision for earthing to connect it to the earthing grid. The anodization thickness shall not be less than 15 microns.
- v) The material used for junction box shall be UV resistant to avoid degradation during module life. The degree of protection of the junction box shall be at least IP67. Minimum three number of bypass diodes and two number of IEC 62852/EN 50521 certified MC4 compatible connectors with appropriate length of IEC 62930/EN 50618 certified 4 sq.mm copper cable shall be provided. The cable length shall be in accordance with the PV Module wiring strategy and adequate to ensure that the cable bending radius standard is not exceeded.
- vi) Each PV Module shall be provided a bar code which is embedded inside the module lamination and must be able to withstand harsh environmental conditions. The bar code data base shall contain the following information. Bar code scanner and database of all the modules containing the following information shall also be provided.
  - a) Name of the manufacturer of PV Module.
  - b) Name of the Manufacturer of Solar cells.
  - c) Type of cell: Mono / Poly.
  - d) Month and year of the manufacture (separately for solar cells and module).
  - e) Country of origin (only make in India).
  - f) I-V curve for the module.

- g) Peak Wattage, Im, Vm and FF for the module.
- h) Unique Serial No. and Model No. of the module.
- i) Date and year of obtaining IEC PV module qualification certificate.
- j) Name of the test lab issuing IEC certificate.
- k) Other relevant information on traceability of solar cells and modules as per ISO 9000 series.

### **9.1.17 Warranty**

- 9.1.17.1 PV modules must be warranted with linear degradation rate of power output except for first year (maximum 3% including LID) and shall guarantee 80% of the initial rated power output at the end of 25 years.
- 9.1.17.2 The modules shall be warranted for minimum of 10 years against all material/ manufacturing defects and workmanship.

### **9.1.18 Approval**

- 9.1.18.1 The Contractor shall provide Guaranteed Technical Particular (GTP) data sheet and Bill of Materials (BOM) of the module that is submitted for approval along with the data sheets of each component. The component datasheet shall contain all the information to substantiate the compliance for component specifications mentioned above.
- 9.1.18.2 The Contractor shall also provide test certificates corresponding to the standards mentioned above along with complete test reports for the proposed module.
- 9.1.18.3 The Contractor shall submit a detailed Manufacturing Quality Plan (MQP) for the PV Module with list of checks/tests performed during incoming material inspection, production, pre-dispatch and package.
- 9.1.18.4 The Contractor shall obtain the approval of the proposed module make & model, prior to manufacturing/ inspection call.

### **9.1.19 Manufacturing and Inspection**

- 9.1.19.1 The Contractor shall inform the module manufacturing schedule to the Engineer-in-charge at least 15 (Fifteen) working days, before the start of proposed schedule.
- 9.1.19.2 The Engineer-in-charge reserves the right for inspection of material at manufacturer works, before the start of manufacturing. Proof of procurement of components as per the approved B.O.M, mentioning manufacturer name, manufacturing date. Relevant test certificate shall be submitted during material inspection for verification.
- 9.1.19.3 The Manufacturing shall start only after the clearance by the Engineer-in-charge.
- 9.1.19.4 The cells used for module making shall be free from all defects like edge chipping, breakages, printing defects, discoloration of top surface etc. Only Class A solar cell shall be used.
- 9.1.19.5 The modules shall be uniformly laminated without any lamination defects.
- 9.1.19.6 Current binning of modules shall be employed, so that current mismatch of modules in a pallet does not exceed 0.1 A. Different colour codes shall be provided on the modules as well as pallet for identification of different bins. Maximum three nos. of bins will be allowed for each module rating.
- 9.1.19.7 Pre-dispatch inspection of modules shall be performed as per direction of Engineer-in-charge.

### **9.1.20 Transportation, Handling, Storage and Installation**

- 9.1.20.1 Transportation, handling, storage and installation of modules shall be in accordance with the manufacturer manual so as not to breach warranty conditions. The Standard Operating Procedure (SOP) for the same shall be shared by the Contractor prior to dispatch.
- 9.1.20.2 The manufacturing, dispatch and stacking of material should be time planned with site preparedness, so that after being delivered, the installation and commissioning of plant should take place immediately.
- 9.1.20.3 The stacking of modules, in any case, shall be stacked as per the manufacturer's recommendation only and shall be covered with tarpaulin sheet.

### **9.1.21 String Monitoring Unit**

#### **9.1.21.1 Standards and Codes**

Standard/Code Description IEC 60529 Enclosure Ingress Protection IEC 62262  
 Enclosure Impact Protection IEC 60269 Fuse IEC 61643-11 Surge Protection  
 Device IEC 62852 or EN 50521 Solar cable connector IEC 60695-2-11 Fire  
 hazard testing.

#### **9.1.21.2 Construction**

- a) SMU enclosure shall be made of UV resistant, fire retardant, thermoplastic material. Enclosure degree of protection shall be at least IP65 and mechanical impact resistance shall be at least IK08.
- b) Not more than two strings can be connected in parallel to a single input of SMU. One spare input terminal along with connector shall be provided for each SMU.
- c) Every SMU input shall be provided with fuses on both positive and negative side. The rating of the fuses shall be selected such that it protects the modules from reverse current overload. The fuses shall be 'gPV' type conforming to IEC 60269-6.
- d) DC switch disconnector of suitable rating shall be provided at SMU output to disconnect both positive and negative side simultaneously.
- e) Type-II surge protective device (SPD) conforming to IEC 61643-11 shall be connected between positive/negative bus and earth.
- f) MC4 connector conforming to IEC 62852 or EN 50521 shall be provided at each SMU input. Cable gland (double compression metallic) of suitable size for DC cables shall be provided at the SMU output.

- g) UV resistant printed cable ferrules for solar cables & communication cables and punched/embossed aluminium tags for DC cables shall be provided at cable termination points for identification.

#### **9.1.22 Warranty**

The SMU unit shall be warranted for minimum of 5 (five) years against all material/ manufacturing defects and workmanship.

#### **9.1.23 Tests**

- a) Routine tests and acceptance tests for the assembled unit shall be as performed as per standard practice and code after submittal of detailed plan to be approved by the Engineer-in-charge.

#### **9.1.24 Cables**

- a) Cable used for module interconnection shall also be referred as solar cable.
- b) Solar cable outer sheath shall be flame retardant, UV resistant and black in colour. Solar cable with positive polarity should have marking of red line on black outer sheath.
- c) DC cables shall be single core, armoured, Flame Retardant Low smoke (FRLS), PVC outer sheath conforming to IS 7098-I. DC cable with positive polarity should have marking of red line on black outer sheath.
- d) In addition to manufacturer's identification on cables as per relevant standard, following marking shall also be provided over outer sheath. (i) Cable size and voltage grade (ii) Word 'FRLS' at every metre (iii) Sequential marking of length of the cable in metres at every metre.
- e) Cables shall be sized based on the following considerations: (i) Rated current of module (ii) The average voltage drop in the cables (Modules to Inverter) shall be limited to 1.5 % of the rated voltage. The Contractor shall provide voltage drop calculations in excel sheet. (iii) Short circuit withstand capability (iv) De-rating factors according to laying pattern.

9.1.25 Warranty The cables (Solar and DC) shall be warranted for minimum of 5 (Five) year against all material/ manufacturing defects and workmanship.

9.1.26 Tests Routine test and acceptance tests requirements shall be as per IEC 62930/EN 50618 for solar cables and IS 7098-1 for DC cables.

#### **9.1.27 Installation**

##### **9.1.27.1 PV Array Configuration:**

- a) The solar array shall be configured in multiple No. of sub- arrays, providing optimum DC power. The bidder shall submit their own design indicating configuration of PCU and respective sub arrays. Hot dip galvanized MS mounting structures may be used for mounting the modules/ panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum insolation. However, to accommodate more capacity the angle of inclination may be reduced until the plant meets the specified performance ratio requirements.

- b) The PV modules should be mounted on a space frame made of material suitable to the climate of Guwahati, Assam. These can be aluminum structures/ GI/ MS powder coated of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour.
- c) The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.
- d) Regarding civil structure the bidder needs to take care of the load bearing capacity of the roof and to arrange suitable structures based on the quality of roof. The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m<sup>2</sup>. Suitable civil work for installation of the structure is to be done by the EPC contractor. Civil structure should be Neat & Clean, with proper alignment and round in shape with emphasis on proper grouting and there should not be leakage, seepage in roof after installation of plant. Alternatively roof top mounting structure can be used.

#### **9.1.27.2 Module Mounting Structure:**

- a) The mounting structure would be designed to sustain wind loading of up to 200 Kmph and shall be protected by using Eco friendly anticorrosion on structure. The contractor shall get design the structure from the expert in the field and got vetted from the reputed institute and submit to the Engineer in charge for approval before placing the order. The entire structure including array will be earthed to an independent pit with redundant paths. The Hardware shall be made of Stainless-Steel material or as per manufacturer standard.
- b) The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed. It may be ensured that the design has been certified by a recognized Lab/ Institution in this regard.
- c) Suitable fastening arrangement such as grouting and clamping should be provided to secure the installation against the specific wind speed.
- d) The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.
- e) Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Necessary protection towards rusting need to be provided either by anodization.
- f) The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.
- g) Regarding civil structures the bidder need to take care of the load bearing capacity of the roof and need to arrange suitable structures based on the quality of roof. Civil structure and construction are in the scope of bidder.
- h) The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m<sup>2</sup>.

- i) Cable installation shall be as per IS 1255.
- j) Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted.
- k) Solar cables shall be provided with UV resistant printed ferrules and DC cables shall be provided with punched/ embossed aluminium tags. The marking shall be done with good quality letter and numbers of proper size so that the cables can be identified easily.
- l) Cable terminations shall be made with properly crimped lugs and passed through cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa. Solar cables, wherever exposed to direct sunlight shall be laid through Double Wall Corrugated (DWC) HDPE conduits. The size of the conduit or pipe shall be selected on the basis of 40% fill criterion
- m) Solar cables shall be aesthetically tied to Module Mounting Structure using UV resistant cable- ties suitable for outdoor application.
- n) A.C and D.C cables shall be kept separate.

#### **9.1.27.3 Power Conditioning Unit**

**Standards and Codes Power Conditioning Unit (PCU) shall comply with the specified edition of the following standards and codes.**

- a) The efficiency of MPPT shall not be less than 97% & shall be designed to meet the Solar PV Array capacity control to extract maximum energy from solar array and provides 415V AC, 3-ph 50Hz to synchronize with local grid. Other specification shall be as per current BIS Standards/ MNRE Standards.
- b) It shall also have user friendly LCD display from programming and view online parameters such as DC power input, DC input voltage, DC current, AC power output, AC voltage and AC current and power factor and suitable for monitoring through the BMS system.
- c) The PCU shall be single phase static solid state type power conditioning units/ string invertors suitability connected & synchronized to give three phase supply output. Both AC & DC line shall have suitable fuses/ MCBs and contractors to allow safe start up and shut down of the system. Fuses/ MCBs used in the DC circuit should be DC rated. The PCU shall have provision for input and output isolation.
- d) The technical specification are as follows: AC side

Nominal AC power	per Manufacturer design
Output AC Voltage	330V/ 415 with a variation +10% at nominal voltage
Frequency	50 c/s (Hz) +5%
Total Harmonic Distortion	<3%
Total frequency protection	Yes
Under Voltage Protection	Yes

PV Power Correction...Nil Deletion...Nil Insertion...Nil	As per Manufacturer design Overwriting...Nil AE (C)	AE(E)	EE(C)
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Maximum DC Voltage	As per Manufacturer design
MPPT voltage range	As per Manufacturer design
Maximum DC current	As per string rating
DC over voltage protection	Yes
DC Voltage ripple	<3%
Minimum Efficiency (CE)	>95%
Ambient temperature range	0-50°C
Humidity (non condensing)	30-95%
Degree of protection	IP21 for internal units and IP 65 for outdoor units
Dimensions approx. (HXWxD)	As per Manufacturer design
Weight h e	As per Manufacturer design

### r Features

Recommended LCD Display on Front Panel	Accurate displays on the front panel:
	DC input voltage
	DC current
	AC Voltage (all 3 phases, in case of 3 phase)

### 9.1.28 BALANCE OF SYSTEM (BoS) ITEMS/ COMPONENTS:

- The BoS items/ components of the SPV power plants/ systems deployed under the work must conform to the latest edition of IEC/ equivalent BIS standards as specified below:

BoS Item/ component	Applicable IEC/ equivalent BIS standard	
	Standard Description	Standard Number
Power conditioner/ Inverters*	Efficiency Measurements Environmental Testing	EN61000-6-3 EN 50178
MPPT units*	Design Qualification Environmental Testing	EN 50178 UL 1741 CSA 107.1

Cables	General test and measuring methods PVC insulated cables for working voltage up to and including 1100 V-Do-UV resistant for outdoor installation	IEC 60189 IS 694/ IS 1554 IS /IEC 69947
Switches/ Circuit Breakers/ Connectors	General Requirements Connectors – Safety	IS/IEC 60947 part I, II &III, EN 50521
Junction Boxes/ Enclosures	General Requirements	IP 65 (for outdoor)/ IP 21 (for indoor) IEC 62208
SPV System Design	PV Stand-alone Systems Design verification	IEC6121 5 IEC6173

		0 IEC6170 1
Installation Practices	Electrical Installation of buildings requirements for SPV power supply systems	IEC 61730

Must additionally conform to the relevant national/ international electrical safety standards.

### SPECIFICATIONS FOR SPV PANEL

S. No.	Description	As per NIT
1	Max. output (Pmax) as per STC	545 Wp + 5%
2	Voc/ Isc	45.96 V/8.75A
3	MPP Voltage (VmP) V	37.65
4	MPP current (imp) A	8.5
5	Open circuit voltage (Voc) V	45.96
6	Normal operating cell temperature	44 + 2o C
7	Module dimensions (Lx W x H) Appx.	As per manufacturer
8	PV Module type	Mono Crystalline
9	No. of PV cells per Module	As per manufacturer
10	Min. efficiency of module	18%
11	Solar module frame material	Aluminum
12	Weather resistant junction	IP65
13	Glass	Toughened
14	Glass iron content	Low Iron
15	Glass transmissivity	High transmissivity
16	Frame	Anodized aluminium
17	Encapsulation	Ethyl Vinyl Acetate (EVA)
18	Tri laminate back surface	Tedlar/ Polyester
19	By-pass diode	To be provided
20	Standard	IEC 61215 / IS 14286 & IEC 61730 Part 1 & Part 2
21	Performance guarantee	10 years of 90% power output, 25 years of 80% power output, 10 years against manufacturing defects.

### 9.1.29 SPECIFICATIN OF SOLAR INVERTER (GRID TIED)

S. No	Description	As per NIT
1	Type	Grid tied
2	Max. DC Array Input Voltage	1000V
3	DC voltage tolerance	-20% + 15% of the DC array input voltage in Sr. No. 1 above
4	Type of solar charge controller	MPPT based solar charge controller
5	Switching Device	MOSFET/IGBT based
6	Continuous inverter output rating	50 KWp or above
7	Output wave form	Pure Sine wave output
8	Total harmonic distortion	<3% with resistive load
9	Nominal AC output voltage and frequency	415V, 3phase, 50Hz

10	Output frequency	50 Hz + 0.5 Hz
11	Grid frequency tolerance	+3%
12	Grid frequency synchronization range	+Hz
13	No-Load losses	<1%
14	Power factor	>0.9
15	PCU efficiency	>97% at nominal voltage & power
16	Noise level	<57 db
17	Certifications	IEC 61727, CE, IEC 62109-1, IEC 62109-2
18	Idle current	<4% of rated capacity
19	Regulation	Line regulation and load regulation-2%
20	Over load features	150% for one minute
21	Cooling	Forced air cooling with temperature controlled cooling
22	Operating Temperature	(-)20°C to 50°C
23	Relative Humidity	95% Maximum
24	LED/ LCD display	Indication's display shall indicate system functional parameters and protection functional indicators.
25	Data Monitor and display controls	RS 485, Ethernet or RS 232 connectivity
26		Input over Voltage Low/ High Frequency
	Protection	Short Circuit Under/ over output voltage Over Temperature Grid input under voltage/ over voltage with auto recovery DC disconnect device DC reverse polarity Anti Islanding protection as per the standard
27	Enclosure Protection Safety	IP 65 (for outdoor)
		Galvanic isolation at input & output through transformer
28	Warranty	10 years.

### 9.1.30 Technical Particulars of Energy Meters

S. No.	Description	As per NIT
1	Application IS	IS 13779 or IS 14679 depending upon accuracy of meters.
2	Accuracy Class Index	0.5 or better up to 650 V
3	Display	LCD
4	Power factor range	Zero lag-unity-zero lead

a)	5 I E	Display parameters	Display parameters: LCD test, kWH import, kWH export, MD in kW export, MD in kW import, Date & Time, AC current and voltages and power factor (Cumulative kWH will be indicated continuously by default & other parameters through push- button)
	6 C	Power Construction	Less than 1 Watt & 4VA in Voltage circuit and 2VA for Current circuit
	7 6	Frequency	50 Hz with +/- 5% variation
	8 1 6 8 3 E d	MD Registration	Meter shall store MD in every 30 min. period along with date & time. At the end of every 30 min, new MD shall be compared with previous MD and store whichever is higher and the same shall be displayed. b) it should be possible to reset MD automatically at the defined date (or period) or through MRI. c) Manual MD resetting using sealable push button is an optional.
	9 .	Memory	Non volatile memory independent of battery backup, memory should be retained up to 10 years in case of power failure.
	10 <sup>1</sup> :	Climatic conditions	As per IS : 13779 or IS : 14697 for climatic conditions. b) The meter should function satisfactorily in India with high end temperature as 50°C and humidity up to 95%
	11P h	Insulation	A meter shall withstand an insulation test of kV and impulse test at 8 kV
	12 <sub>o</sub> t	Connectivity	The meter shall have an Ethernet/ RS 485 communication port for communicating with the BMS.

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voltaic systems - Power conditioners - Procedure for measuring efficiency

- b) IEC 62109-1 Ed. 1 : Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
- c) IEC 62109-2 Ed. 1 : Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
- d) IEC 61000-6-2 Ed. 2 : Electromagnetic compatibility (EMC) - Part 6-2: Generic standards – Immunity standard for industrial environments.
- e) IEC 61000-6-4 Ed. 2.1 : Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
- f) IEC 62116 Ed. 2 : Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
- g) IEC 61727:2004 Ed. 2 : Photovoltaic (PV) systems - Characteristics of the utility interface IEC 60068-2- 1:2007 Environmental testing - Part 2-1: Tests - Test A: Cold

- h) IEC 60068-2-2:2007: Environmental testing - Part 2-2: Tests - Test B: Dry heat
- i) IEC 60068-2-14:2009 :Environmental testing - Part 2-14: Tests - Test N: Change of temperature
- j) IEC 60068-2-30:2005 : Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)

**9.1.31 CEA Technical Standards for Connectivity to the Grid Regulations 2007 with 2013 Amendment.** As per the Solar Photo voltaic Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017, Inverters used in the grid connected solar power projects shall be registered with BIS and bear the Standard Mark as notified by the Bureau of Indian Standards.

### **9.1.32 Technical Requirements**

Parameter Specification Rated AC power As per design Maximum input voltage 1000 V / 1500 V Rated AC output voltage As per design Tolerance on rated AC output voltage +/-10%, Rated frequency 50 Hz, Operating frequency range 47.5 Hz to 52 Hz, Power factor control range 0.9 lag to 0.9 lead, efficiency Minimum 98%, Maximum loss in Sleep Mode 0.05% of rated AC power, Total Harmonic Distortion Less than 3% at 100% load, Degree of protection IP 20 (Indoor)/IP 54 (Outdoor).

- 9.1.32.1 The rated/ name plate AC capacity of the PCU shall be AC power output of the PCU at 50°C.
- 9.1.32.2 Maximum power point tracker (MPPT) shall be integrated in the PCU to maximize energy drawn from the Solar PV array. The MPPT voltage window shall be sufficient enough to accommodate the output voltage of the PV array at extreme temperatures prevailing at site.
- 9.1.32.3 The PCU output shall always follow the grid in terms of voltage and frequency. The operating voltage and frequency range of the PCU shall be sufficient enough to accommodate the allowable grid voltage and frequency variations.

### **9.1.33 Construction**

- 9.1.33.1 Power Conditioning Unit (PCU) shall consist of an electronic three phase inverter along with associated control, protection, filtering, measurement and data logging devices.
- 9.1.33.2 Every DC input terminal of PCU shall be provided with fuse of appropriate rating. The combined DC feeder shall have suitably rated isolators for safe start up and shut down of the system.
- 9.1.33.3 Type-II surge protective device (SPD) conforming to IEC 61643-11 shall be connected between positive/ negative bus and earth.

- 9.1.33.4 In case external auxiliary power supply is required, UPS shall be used to meet auxiliary power requirement of PCU. It shall have a backup storage capacity of 2 hours.
- 9.1.33.5 Circuit Breaker of appropriate voltage and current rating shall be provided at the output to isolate the PCU from grid in case of faults.
- 9.1.33.6 All the conducting parts of the PCU that are not intended to carry current shall be bonded together and connected to dedicated earth pits through protective conductor of appropriate size. DC negative terminal shall be grounded.
- 9.1.33.7 PCU front panel shall be provided with LCD/ LED to display all the relevant parameters related to PCU operation and fault conditions. It shall include, but not limited to, the following parameters.
- (i) DC input power (ii) DC input voltage (iii) DC input current (iv) AC output power (v) AC output voltage (all the 3 phases and line) (vi) AC output current (all the 3 phases and line) (vii) Frequency (viii) Power Factor

#### **9.1.34 Operating Modes :**

Operating modes of PCU shall include, but not limited to, the following modes. These operating modes and conditions for transition are indicative only. The Contractor shall provide the detailed flow chart indicating the various operating modes and conditions for transition during detailed engineering.

- 9.1.34.1 Standby Mode The PCU shall continuously monitor the input DC voltage and remain on Standby Mode until it reaches the pre-set value.
- 9.1.34.2 MPPT Mode When the input DC voltage is above the pre-set value and AC grid connection conditions are fulfilled, the PCU shall enter into MPPT mode.
- 9.1.34.3 Sleep Mode When the AC output power/DC input voltage decreases below the pre-set value for pre-set time delay, the PCU shall switch into Sleep Mode.

#### **9.1.35 Protection Features:**

- 9.1.35.1 The PCU shall provide protection against the following type of faults, among others.
- (i) DC/AC over current (ii) DC/AC over voltage (iii) DC reverse polarity (iv) DC earth fault (v) AC under voltage (vi) AC under frequency/over frequency (vii) Islanding (viii) Over temperature (ix) Lightning surges

#### **9.1.36 Grid Support Functions:**

- 9.1.36.1 Active power regulation The PCU shall be able to limit the active power exported to the grid based on the set point provided through PCU front control panel. The PCU shall also be able to automatically limit the active power after an increase in grid frequency above a pre-set value. The ramp rate shall be adjustable during operation and start-up after fault. The applicability of the requirement shall be as per CEA regulation and compliance.

- 9.1.36.2 Reactive power control The PCU shall be able to inject /absorb reactive power to/ from the grid based on the set point provided through PCU front control panel. The same shall be performed automatically with adjustable ramp rate based on dynamic changes in grid voltage or reactive power reference.
- 9.1.36.3 Voltage Ride Through The PCU shall remain connected to the grid during temporary dip or rise in grid voltage as per the LVRT and HVRT requirements of CEA Technical Standards for Connectivity to the Grid Regulations. The PCU shall also be able to inject reactive power during the period of voltage dip.

#### **9.1.37 Warranty of PCU:**

The complete Power Conditioning Unit shall be warranted for minimum of 5 (five) years against all material/ manufacturing defects and workmanship.

#### **9.1.38 Tests of PCU:**

##### **9.1.38.1 Type Test:**

All the type test certificates as per the standards mentioned above shall be submitted for approval. The tests should have been conducted at a test laboratory compliant with ISO 17025 for testing and calibration and accredited by an ILAC/IECEE member signatory. Laboratory accreditation certificate or weblink along with scope of accreditation shall also be submitted. It is the responsibility of the Contractor to substantiate the compliance for CEA Regulations using test reports.

##### **9.1.38.2 Routine Test:**

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

#### **9.1.39 AC Cables:**

**Standards and Codes** All AC Cables shall conform to the following standards and codes.

- 9.1.39.1 Crosslinked polyethylene insulated PVC sheathed cables, Part 1: For working voltage up to and including 1100 V IS 7098.
- 9.1.39.2 All AC cables shall be flame retardant, low smoke (FRLS) type designed to withstand all mechanical, electrical and thermal stresses develop under steady state and transient operating conditions.
- 9.1.39.3 Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. However, cable joints may be allowed if the route length is more than maximum available drum length subject to Employer's approval.
- 9.1.39.4 In addition to manufacturer's identification on cables as per relevant standard, following marking shall also be provided over outer sheath. (i) Cable size and

voltage grade (ii) Word 'FRLS' at every meter (iii) Sequential marking of length of the cable in meters at every meter

9.1.40 Cables shall be sized based on the following considerations: (i) Rated current the equipment (ii) Maximum voltage drop in LT cable (from inverter to inverter transformer) shall be limited to 0.5% of the rated voltage. For HT cables , maximum voltage drop shall be limited to 0.5 % of the rated voltage. The Contactor shall provide voltage drop calculations in excel sheet. (iii) Short circuit withstand capability as per design for 1s. (iv) De-rating factors according to laying pattern.

9.1.40.1 All cables shall be warranted for minimum of 5 (Five) year against all material/ manufacturing defects and workmanship.

9.1.40.2 Testing- Routine test and acceptance tests requirements shall be as per relevant standards for all cable sizes.

9.1.40.3 Cable terminations shall be made with properly crimped lugs and passed through cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa.

9.1.40.4 All AC cables shall be provided with punched/embossed aluminium tags. The marking shall be done with good quality letter and numbers of proper size so that the cables can be identified easily.

#### **9.1.41 Earthing of PV array field**

Standards and Codes Earthing system shall comply with latest revisions and amendments of the relevant IEC standards and IS codes and Indian electricity rule and act, up to date.

#### **9.1.42 General Requirements**

- i) All PV Modules, Module Mounting Structures (MMS) and String Monitoring Unit (SMU) structures in the PV array field shall be bonded to the earthing system by two distinct connections.
- ii) Each PV Module frame shall be earthed using copper wire of sufficient cross section. The copper wire shall be connected to the earth hole provided in the module frame using suitable arrangement in line with the manufacturer recommendation. The earthing arrangement shall use stainless washers to prevent galvanic corrosion between aluminum frame and copper wire. In order to achieve effective earthing, serrated washers shall be employed to penetrate the anodization layer of the module frame.
- iii) Continuous copper earthing wire shall be run to connect a group of modules and both ends of the loop shall be bolted to the DC earth grid using bimetallic lugs and stainless-steel fasteners. The copper earthing wire shall be routed in such a way to avoid physical contact with the module aluminium frame.
- iv) The connection between MMS and DC earth grid shall be bolted or welded. Portion of the MMS which undergoes welding at site shall be coated with two coats of cold galvanizing and anti- corrosion paint afterwards.
- v) Earth electrodes of the DC earth grid shall be uniformly distributed throughout the PV array field so that optimum earth resistance is offered to leakage current flowing from any module frame or MMS.
- vi) SMU equipment earthing point shall be connected to the DC earth grid using flexible copper cable of sufficient cross section as recommended by the manufacturer. The connection with the DC earth grid shall be done using suitable bimetallic lugs and stainless-steel fasteners.

#### **9.1.43 PCU Earthing**

- 9.1.43.1 DC negative bus bar of the PCU shall be earthed to avoid Potential Induced Degradation (PID). DC negative bus bar and PCU equipment earth shall be bonded to the PCU earth bus and connected to earth electrodes through flexible copper cable of sufficient cross section as mentioned by the manufacturer. The interconnection of PCU earth electrodes with DC earth grid shall be as per PCU manufacturer recommendation.
- 9.1.43.2 Tests On completion of installation, continuity of earth conductors and efficiency of all bonds and joints shall be checked. Earth resistance at earth terminations shall be measured and recorded.
- 9.1.43.3 The earth plate shall be provided to facilitate its identification and for carrying out periodical inspection.

#### **9.1.44 Lightning Protection System:**

Lightning Protection System (LPS) for entire building against lighting strokes shall be provided as per drawing.

Conventional lightning protection system shall be provided. The systems includes conductor grid at roof level with multiple down conductor connecting to main grid at ground level with earth pits.

Good Quality of Coordinated SPD protection is provided in all Electrical & Electronic services. Especially it equipment, cameras, & Lift room equipment.

#### **9.1.45 METERING AND GRID CONNECTIVITY**

- 9.1.45.1 Metering and grid connectivity of the roof top solar PV system under this scheme would be the responsibility of the Bidder in accordance with the prevailing guidelines of the concerned power supply company (APDCL) and / or CEA (if available by the time of implementation).

#### **9.1.46 Grid Islanding:**

In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as “Islands.” Powered Islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.

A manual disconnect 4-pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility

personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

#### **9.1.47 Plant performance evaluation**

The successful bidder shall be required to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning and related Capacity Utilization Factor (CUF) as per the GHI levels of the location during the O&M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning and acceptance. Minimum CUF of 13% should be maintained for a period of 5 years . The bidder should send the periodic plant output details to user for ensuring the CUF. The PR will be measured at Inverter output level during peak radiation conditions.

The “Capacity Utilization Factor” (CUF) means the ratio of the actual output from a solar plant over the year (kWh) to the maximum possible output from it for a year (kWh) under ideal conditions CUF = Actual Plant Output in kWh over the year / (Installed Plant Capacity in kW x 365 x 24).

Monthly CUF: Monthly Plant out in kWh / (installed plant capacity in kW x number of days in a month x 24).

During grid failure or power outage due to any reason, the SPV system stops generating. Any instances of grid failure/power outage needs to be mentioned in the monthly report and those instances need to be authorized by local supply company and user. Then the period will be excluded in calculation of CUF.

#### **9.1.48 Completion of work:**

- Work will be treated commissioned and completed after evaluation of performance for 15 days after receipt/intimation of contractor in this regard. All parameters will be checked as per code, practices and tender documents.

**Contractor shall provide details schematic layout of Solar Photo Voltic Power Generation system as per available of the terrace space and taken approval from the Engineer-in charge before supplying of solar module panel and allied accessories.**

#### **9.1.49 SOLAR WATER HEATER**

- 9.1.49.1 Scope of work: - The scope of work includes drawing, fabrication, supply, erecting at terrace, testing, installation and commissioning of Solar water heating pressurized system flat plate collector, complete with SS 304 tank with 4.5 Bar pressure with 50 mm puff insulation, GI outer cladding and complete all accessories etc. as required for pre heated water and handed over to client. Superior corrosion resistant Epoxy coated Inner tank.
- 9.1.49.2 Flat plate collector with 100% copper fins coated in black for maximum absorption of solar radiation and effective heat transfer.

- 9.1.49.3 Powder coated MS stand- sturdy and rust resistant.
- 9.1.49.4 Power coated Outlet body: Long-life corrosion-proof Pre coated outer cladding.
- 9.1.49.5 Nitrile-rubber is an advanced technology insulation, prevents heat loss & ensures higher energy efficiency.
- 9.1.49.6 5mm Thick PUF insulation for minimum heat loss.
- 9.1.49.7 Pressure pump compatible with 5 bar pressure rating.
- 9.1.49.8 Halo (FPC) north-south x east-west HA 500- 13' x 18'
- 9.1.49.9 No. of FP collectors 25 Nos.
- 9.1.49.10 Safety Devices – Thermostat.
- 9.1.49.11 Pipe Connection – Minimum 1”.
- 9.1.49.12 Rated Working Pressure – 5bar (kg/cm<sup>2</sup>).
- 9.1.49.13 Insulation Thickness – 50 mm Injected PUF.
- 9.1.49.14 Stand Angle -28°.
- 9.1.49.15 Hot water generation capacity – detailed below ltrs per day for total Tower, Club house and RD residence.

<b>Sl.No.</b>	<b>Name of Building/ Block</b>	<b>Solar water heater with makeup water tank in ltrs per day</b>
1	Residential Tower – 1(Type-III)	500
2	Residential Tower – 2 (Type-III)	500
3	Residential Tower – 3(Type-IV)	500
4	Residential Tower - 4(Type-IV)	500
5	Residential Tower – 5 (Grade-A)	500
6	Residential Tower – 6 (Grade-A)	500
7	Residential Tower – 7 (Grade-B & C)	500
8	Residential Tower – 8 (Grade-B & C)	500

9	Residential Tower - 9 Residential Tower – 7 (Residential Tower – 7 (Grade-D & Above)	500
10	Regional Director Bungalow	100

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## PACKAGE C- 10

### DOMESTIC AND FLUSHING WATER PUMP SETS

- 10.1 The work shall be carried out as per CPWD General Specifications of Electrical Works Part-I 2023, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, updated BIS codes & Local Bye Laws.
- 10.1.1 Scope of work include design, drawing, supply, installation, testing and commissioning of Water supply pumping system of suitable designed capacity shall be for potable water, treated STP water, ordinary water etc. each separately with minimum 200% (1 Working + 2 Standby) standby capacity for **domestic and flushing** pumping arrangement, with required Electrical Panels, cabling, GI piping, controls, control wiring, safety and control equipment, earthing etc. as required.
- 10.1.2 Type, Pressure, Head and discharge of the pumps, sizes and type of valve shall be designed by the contractor for proper service. Suitable size Solenoid Valves for Releasing service after filling the overhead tank step by step in buildings shall be installed for automatic water control, which are to be electrically actuated.

10.1.3 Layout drawing (working) shall be prepared by contractor indicating dimension of each and every equipment, foundation, hanging arrangement etc. and shall be submitted to the Department for the approval.

10.1.4 Layout of pumps shall be prepared for easy maintenance.

10.1.5 All pumps shall be normally operated in Auto mode depending upon requirement/levels of water in various tanks, with manual override facility.

#### **10.2 PUMPS:** -

10.2.1 Water supply pump set shall be high pressure in-line close-coupled, variable spread, vertical multistage, fully automatic, BMS compatibility, user friendly hydropneumatics pump set with suitable capacity 2 nos booster pump having suitable flow rate and head, speed 2900 RPM, suitable for operation on 415 volts, 3 phase 50 Hz, AC supply with IP 55 protection for enclosure, Class-'F' insulation, conforming to IEC 34-1 with mechanical seal, suction discharge manifold CED coated, Valves, NRV, Pressure gauge, Pressure Transmitter and 1 No. VFD & 100 Liter pressure tank complete (2 Nos. running + 1 No. standby) with M.S. fabricated Common base plate, foundation bolts, suitable cement concrete foundation duly plastered with anti-vibration pads etc.

10.2.2 The pumps shall feed clear water from Under Ground tank to Terrace tank for the purpose of Fire, Domestic and Flushing in the building. One set of pumps with one working and two stand-by (1 working + 2 standby) shall fill the flushing tank. Second set of pumps with one working and two stand by (1 working + 2 standby) shall fill the domestic use tank overflowing through fire tank.

10.2.3 Pump details are given below:

S No	Description of the Pump	Qty	Discharge (in lpm)	Head (in Meters)
1	Domestic pump (for officers' quarters)	1Set (1W+2S)	Suitable	Suitable
2	Domestic pump (for Staff quarters)	1Set (1W+2S)	Suitable	Suitable
3	Flushing pump from ultra-filtering unit (for officers' quarters)	1Set (1W+2S)	Suitable	Suitable
4	Flushing pump from ultra-filtering unit (for staff quarters)	1Set (1W+2S)	Suitable	Suitable
5	Gardening pump from water softener unit (for officers' quarters side)	1 set (1W+2S)	Suitable	Suitable
6	Gardening pump from water softener unit (for staff quarters side)	1set (1W+2S)	Suitable	Suitable

7	TREATED WATER TRANSFER pump	1set (1W+2S)	Suitable	Suitable
8	RWHT pump	1set (1W+2S)	Suitable	Suitable
9	One (01) Nos. Terrace pump for flushing of Solar Panel Bord in each tower (Power to be fed from terrace panel) and water shall be taken from flushing water tank at terrace floor tank.	9 sets	Suitable	Suitable

10.2.4 STP Treated water transfer pump capacity and minimum discharge shall be designed considering to transfer the treated water received from 220 KLD STP plant (Treated watertank from- one ultra-filtered another water softener unit) to underground storage tank to be used for flushing/ gardening purpose through one working pump at a desired height, complete with making suitable CC foundation, anti- vibration mountings, base frame etc. The pump shall be one working with one stand by (1 working + 1 standby) to transfer STP treated water to underground storage tank to be used for flushing/ gardening purpose.

10.2.5 All types of pump motors shall be energy efficient class IE3 and shall comply relevant IS code.

### 10.3 Motor control panel :-

- i) The panel shall be cubicle type totally enclosed, fully compartmentalized with IP 42 degree of protection class and fabricated from CPRI approved manufacturer with 2 mm thick CRCA sheet powder coated with 7 tank process and shall be equipped with suitable rating of 4 pole MCCBs as incomer, Bus bars, digital type Multi-function meter with suitable CTs to measure parameters like current, voltage, frequency, wattage, power factor, KWH, KVA, etc. as per drawing approved by Engineer — in — charge.
- ii) Suitable rating Outgoing MCB/MCCBs (where rating is more than 40 Amp than MCCB to be used) confirming to CPWD General Specifications for Electrical Works Part-IV (Sub stations)- 2013 as amended and corrected up to date & starters, relays, contactors, timers, single phasing preventer, and any other control gears of required rating for smooth operation and safety of pump set, digital type ammeter, CTs, push buttons, LED type indicating lamps and control components shall be provided on each compartment of the pump control panel.
- iii) All MCCBs shall be provided with Rotary handle on the front door. Detachable Gland Plates made of 3 mm thick CRCA sheet, complete with required number and sizes of knock out shall be provided at top & bottom of the panel board for incoming and outgoing cable as required.
- iv) The panels shall be manufactured with separate busbar chamber isolated from unit feeder chambers and cable alleys. The height of the panel shall be as per the drawing but not more than 2300 mm and operating levers, handle etc. of highest unit shall not be more than 1.7 meters. Depth of the panel shall not be less than 300 mm and width of the panel will be given in the particulars of panel specifications or as per actual site conditions. Shop drawings shall have to be got approved from the Engineer-in-charge before fabrication is taken up.
- v) The bus bars shall be of four strip aluminium with a current density of 130 A/sq.cm. The busbars will be insulated with heat shrinkable sleeves and properly supported. All live parts shall be shrouded by means of acrylic / steel /FRP sheets to ensure no accidental contact with live parts during maintenance and provide simultaneous inspection. The bus bars will be adequately insulated and protected to prevent accidental contact during operation and maintenance.

- vi) Internal Wiring of the panel shall be with **Cross- Linked Polyethylene insulation HRFR** copper conductor 1100-volt grade with ISI marked stranded cables of approved make.
- vii) 2 Nos. 20x3 mm copper strip for LT panel up to 400 Amp. capacity or 2Nos. 20x5 mm copper strip for LT panel of higher capacity shall be fixed all around the panel connected to 2 Nos. earthbus copper strips connected to incoming earth conductors.

#### **10.4 G.I pipes**

G.I pipes of Class C (heavy class) ISI marked confirming to IS:1239 and of approved make, hot dip galvanized to Grade 1 of IS : 4736-1968, including accessories such as GI hot dipped tees / elbows / reducers / couplings / unions / bends / flanges etc. and fixing with suitable GI brackets and hangers as per CPWD specification as amended shall be provided.

#### **10.5 Valves**

##### **10.5.1 Ball Valve.**

Forged brass ball valves screwed type confirming to IS:554 shall be used for pipe size up to 50 mm dia. The body, bonnet and stem of the valve shall be of forged brass confirming to IS:6912 Gr. FLB. The Test Pressure of the valve shall be for Shell : 25 kg/cm<sup>2</sup>g and Seat : 16 kg/cm<sup>2</sup>g

##### **10.5.1 Butterfly valve.**

Butterfly valves shall be Flanged/ Thread Type of PN-16 with SG Iron body & SG Iron disc duly ISI marked conforming to IS 13095 including rubber gasket, flanges, nuts, bolts and washers & other accessories complete as required. Butterfly valve shall be used for pipes of sizes more than 50 mm dia. The pressure rating of the valves shall also be cross checked with the design requirement

##### **10.5.2 Solenoid valve**

Stainless steel body, orifice, Flange/ thread, Plunger, motorized, spring etc. with coil voltage AC 200 to 230 Volt 50 Hz, voltage tolerance +10% to -15%, protection class IP 65 or more, coil insulation class-F with desired size and pressure rating. The pressure rating of the valves shall also be cross checked with the design requirement.

##### **10.5.3 Non-return valve:-**

Non-return valves shall be PN-16 with CI body & SG Iron disc.

##### **10.5.4 Strainer: -**

'Y' Strainer shall be of PN-16, CI body, Flanged/thread Type with bolted cover & strainer fabricated out of brass/ stainless steel sheet with 3 mm dia. Holes.

##### **10.5.5 Isolating valve :-**

Isolation valves, also known as shut-off or stop valves, are designed Brass body to completely stop the flow of fluids or gases in a piping system. They are typically used for directing process media, for emergency shut-down, or for facilitating safe maintenance, with desired size and pressure rating and temperature ratings, end connections and actuation methods.

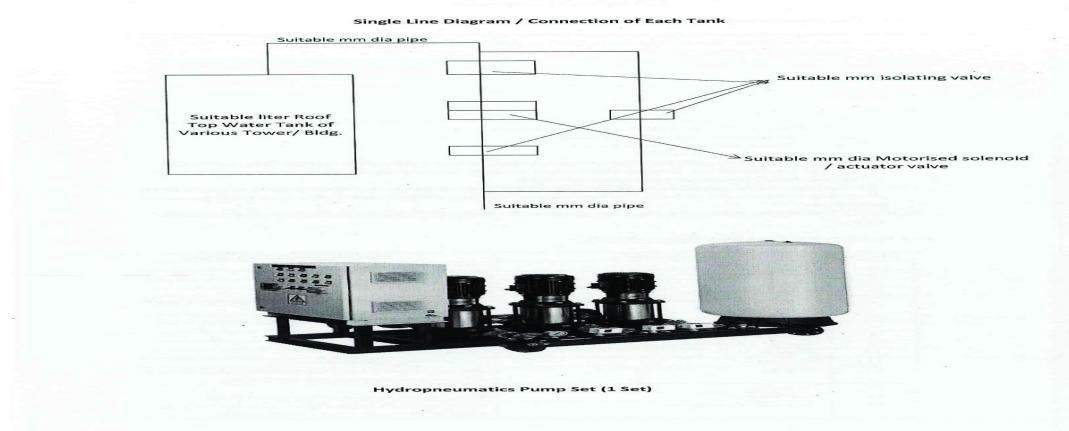
**10.6 Power Cable:**

- 10.6.1** The Power cable shall be Cross-linked XLPE insulated armoured Aluminium/ Copper conductor cables 1100 V grade. Power cable shall be of 2 core for single phase, 4 core for size upto and including 25 sqmm and 3 ½ core for size higher than 25sqmm for 3 phase.
- 10.6.2** The Power cable size shall be selected to meet the load of starting and running current of the equipments and shall be as approved by engineer-in-charge.
- 10.6.3** Cable shall be installed on approved perforated GI cable tray in pump room which is part of scope of the work.

**10.7 Earthing:**

- 10.7.1** Metallic body of all the equipments shall be connected by two separate earth conductors by two nos. 6mm dia. copper wire from the earth station of the installation confirming CPWD specifications for Electrical works (Part-I), Internal 2023 as amended and corrected up to date.

- 10.7.2** Armoring of cables shall be connected to equipments and panel at both the ends.

**PACKAGE C- 11****SEWAGE TREATMENT PLANT (STP)**

- 11.1 The scope of Sewage Treatment Plant (STP) shall consist of providing all labour, materials, equipment, appliances, and technology as specified and required to install all RCC work and other allied works (Civil, Electrical and Mechanical) to make the Sewage Treatment Plant ready for operation as per drawings, Flow diagram, and specification. All Civil works, including structure design and construction with foundation, manhole cover, ladder/staircase etc, supports of all types, interconnecting piping supports for vessels, lighting arrangements, all equipment, work and services, treated water pumps, drain sump pumps, puddle flanges, fresh air provision, exhaust fan etc. The scope of work also includes statutory approvals from the government bodies/ agencies. The scope of work shall also include DLP period of 12 Months from the date of handing over of the plant. It also includes training two personnel

for one month for day to day operations and preventive maintenance aspects of the installation. The scope of work shall also include all dosing materials etc as required for three years, and also submission of water test report (before and after) from a NABL accredited Lab.

However, the plant capacity shall not be less than **220 KLD per day**. The STP shall run with MBR (Membrane Bio Reactor) technology.

- 11.1.1 The scope of work is only inside the campus only.
- 11.1.2 STP systems should be compatible to IBM systems.
- 11.1.3 All pump-motor sets to be used in STP system should be energy-efficient BEE star-marked.
- 11.1.4 The agency has to obtain NOC test report from Pollution Control Board, Assam shall be taken before handing over the STP.

## **11.2 Process:**

The treatment process shall comprise the following stages:

- a) Physical treatment : Mechanised Coarse& Fine bar-screening
- b) Primary treatment : Equalization tank Oil & Grease Trap
- c) Equalization Tank : flow equalization with air mixing
- d) Biological treatment : Aeration with MBR through VFD
- e) Disinfection : UV unit with SS housing and auto operation
- f) Chlorination system : Stainless steel auto feed PLC based system
- g) V Guard Bio digester : Anaerobic digestion with dual chamber
- h) Sludge disposal : SS Solid Bowl centrifuge with auto chipper
- i) MBR Module : SS skid mounted with auto back wash
- j) Sodium metabisulfite (SMBS) Dosing : Auto feed through PLC, MOC-SS
- k) PH Correction : Stainless steel unit with vertical mounting
- l) OLMS (Online Monitoring System) : BOD, COD, TSS, PH.

- 11.2.1 The biodegradable detergent will be discharged into the Sewage Treatment Plant. The Agency shall provide the special equipment of stainless steel as salt neutralizer and FeCl<sub>3</sub> (Ferric chloride) for phosphate removal and precipitator of min capacity 5 percent of plant capacity, etc. and de-foaming agent.

### **11.2.2 Performance Criteria:**

- 11.2.3 The treatment plant shall be designed to treat the following basic characteristic expected in the raw sewage.

### **11.2.4 Description:**

Sl. No.	Parameter	Characteristics of influent
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1	Estimated daily flow	600 m <sup>3</sup> /day.
2	Discharge period	20/hrs/day
3	Average flow	10 m <sup>3</sup> /hr.
4	Peak factor	3

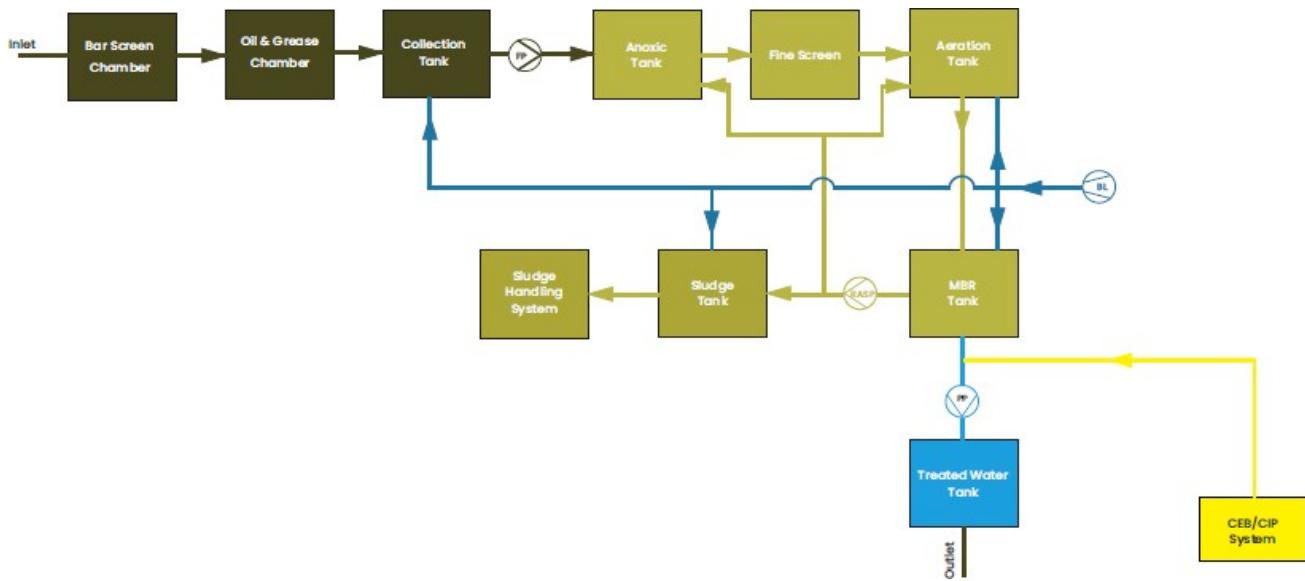
#### 11.2.5 INLET SEWAGE CHARACTERISTICS:

Sl. No.	Parameter	Characteristics of influent
1	PH	6.5-8.0
2	BOD (5 days at 20°C)	250-300 mg/l
3	COD	600-800 mg/l
4	Suspended Solids	200-400 mg/l
5	Oil & Grease	40-50 mg/l
6	Total Nitrogen	30-35 mg/l

#### 11.2.6 TREATED SEWAGE CHARACTERISTICS:

Sl. No.	Parameter	Characteristics of influent (after treatment)
1	PH	6.5-8.5
2	BOD (5 days at 20°C)	< 5 mg/l
3	COD	< 50 mg/l
4	Suspended Solids	< 10 mg/l
5	Oil & Grease	< 1 mg/l
6	Total Nitrogen	< 10 mg/l
7	Coliform	Nil.

#### 11.3 PROCESS FLOW DIAGRAM:



#### 11.4 TECHNICAL DATA SHEET: -

11.4.1	<b>BAR SCREEN - COARSE</b>	
	Make	Fabricated
	Qty	1 Nos.
	Pore Size	12 MM
	MOC	SS 304
	Operation	Manual
11.4.2	<b>BAR SCREEN - FINE</b>	
	Make	Fabricated
	Qty	1 Nos.
	Pore Size	6 MM
	MOC	SS 304
	Operation	Manual
11.4.3	<b>MBR FEED PUMPS (Raw Sewage Transfer Pump from EQT to Aeration)</b>	
	Qty	2 Nos. (1W+1S)
	MOC	Cast Iron
	Type	Monoblock (Self priming)
	Seal	Mechanical Seal (Cartridge type)
	Flow Rate	10.0 M <sup>3</sup> /Hr
	Head Range	10 - 12 Meter
	Motor Power	3.0 HP/ 2.2 kW
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt
	Motor of Class	F with IP 55 Enclosure
	<b>ANOXIC MIXER (AGITATOR)</b>	
11.4.4	Qty	1 Nos.

	Rod Length	1.2 Meter Long
	MOC	SS
	Stroke Speed	50 - 60 RPM
	Motor Power	1.0 HP/ 0.75 kW
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt
11.4.5	<b>COMMON BLOWER FOR EQT TANK, AERATION TANK AND MBR TANK</b>	
	Qty	3 Nos. (2W+1S)
	Air required for EQT	70 Nm <sup>3</sup> /Hr
	Air required for Aeration	125 Nm <sup>3</sup> /Hr
	Air required for MBR	30 Nm <sup>3</sup> /Hr
	Air Required for SHT	10 Nm <sup>3</sup> /Hr
	Total Air required for Entire	225 Nm <sup>3</sup> /Hr
	Each Air Blower Capacity	250 Nm <sup>3</sup> /Hr
	Head of Blower	0.4 Kg/cm <sup>2</sup>
	Blower Motor Power	10.0 HP/ 7.5 kW
	Blowers Type	Twin lobe root blower
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt
11.4.6	<b>MANUAL FINE SCREEN</b>	
	Make	Fabricated
	Qty	1 Nos.
	Pore Size	3 MM, Punched Hole Screen
	MOC	SS 304
	Operation	Manual
11.4.7	<b>MBR - MEMBRANE SPECIFICATION</b>	
	Qty	1 Nos. Module
	Daily Flow	220 M <sup>3</sup> /Day
	Operation Time	20 Hrs
	Design Flux	25 LMH
	Designed Membrane Area	500 M <sup>2</sup>
	Type of Membrane	HOLLOW FIBER
	Pore Size	0.1 μ
	Area of Cassette	0.8 M <sup>2</sup>
	No. of Cassettes per module	As per design
	Deck	01
	Proposed Membrane Area	25 M <sup>2</sup>
	<b>Module Specifications</b>	
	No. of Module	01 Nos.
	Membrane area per module	25 M <sup>2</sup>
	Total Membrane area	500 M <sup>2</sup>
	Air requires per cassette	0.6 Nm <sup>3</sup> /Hr
	Air requires per module	125 Nm <sup>3</sup> /Hr
	Length	1300 MM
	Width	1500 MM
	Height	2800 MM
	MOC of Membrane	PVDF (Polyvinylidene Fluoride or Polyvinylidene Difluoride)
	MOC of frame	SS 304
	MOC of air diffuser	PP (polypropylene)
11.4.8	<b>RECIRCULATION ACTIVATED SLUDGE TRANSFER PUMPS</b>	
	Qty	2 Nos. (1W+1S)
	MOC	Cast Iron

	Type	Self-Priming Coupled
	Seal	Mechanical Seal (Cartridge type)
	Flow Rate	10.0 M3/Hr
	Head Range	10 - 12 Meter
	Motor Power	2.0 HP/ 1.7 kW
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt
	Motor of Class	F with IP 55 Enclosure
11.4.9	<b>PERMEAT (MBR Treated) WATER SUCTION PUMPS</b>	
	Qty	2 Nos. (1W+1S)
	MOC	Cast Iron
	Type	Self-Priming Monoblock
	Seal	Mechanical Seal (Cartridge type)
	Flow Rate	10.0 M3/Hr
	Head Range	10 - 12 Meter
	Motor Power	2.0 HP/ 1.7 kW
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt
	Motor of Class	F with IP 55 Enclosure
11.4.10	<b>BACK PULSE PUMP/ CIP PUMPS – P4</b>	
	Qty	2 Nos. (1W+1S)
	MOC	SS Casing, SS Impeller & SS Shaft
	Type	Monoblock (non-submersible)
	Seal	Mechanical Seal (Cartridge type)
	Flow Rate	2.0 M <sup>3</sup> /Hr
	Head Range	10 - 12 Meter
	Motor Power	1.0 HP/ 0.75 kW
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt
	Motor of Class	F with IP 55 Enclosure
11.4.11	<b>DRAINAGE SUMP PUMPS</b>	
	Qty	2 Nos. (1W+1S)
	MOC	SS Casing, SS Impeller & SS Shaft
	Type	Submersible
	Flow Rate	15.0 M <sup>3</sup> /Hr
	Head Range	12 - 15 Meter
	Motor Power	2.0 HP/ 1.50 kW
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt
	Motor of Class	F with IP 55 Enclosure
<b>Note:</b> Clear water transfer pumps motor power may be changes as per performance data.		
11.4.12	<b>BACK PULSE TANK (Clean-in-place TANK)</b>	
	Qty	1 No.
	Tank MOC	LLDPE (Linear Low-Density Polyethylene) – 2000Ltr
11.4.13	<b>HYP0 DOSING SYSTEM FOR MAINTENANCE CLEANING</b>	
	Qty (Pumps & Tank)	1 Nos.
	Dosing Pump Capacity	0 - 12 LPH
	Pump Type	Diaphragm
	Motor Power	0.5 kW
	Dosing Tank Capacity	200 Liters
	Dosing Tank MOC	LLDPE (Linear Low-Density Polyethylene)
11.4.14	<b>CITRIC ACID DOSING SYSTEM FOR MAINTENANCE CLEANING</b>	
	Frequency	Once in year or as required

	Dosing Pump Make	Milton Roy or equivalent	
	Qty (Pumps & Tank)	1 Nos.	
	Dosing Pump Capacity	0 - 12 LPH	
	Pump Type	Diaphragm	
	Motor Power	0.5 kW	
	Dosing Tank Capacity	200 Liters	
	Dosing Tank MOC	LLDPE (Linear Low-Density Polyethylene)	
11.4.15	<b>POLY ELECTROLYTE DOSING SYSTEM FOR Sludge Thickness</b>		
	Dosing Pump Make	Milton Roy	
	Qty (Pumps & Tank)	1 Nos.	
	Dosing Pump Capacity	0 - 6 LPH	
	Pump Type	Diaphragm	
	Motor Power	0.25 kW	
	Dosing Tank Capacity	200 Liters	
	Dosing Tank MOC	LLDPE (Linear Low-Density Polyethylene)	
11.4.16	<b>FILTER PRESS FEED PUMP SCREW TYPE – P6</b>		
	Qty	2 Nos. (1W+1S)	
	Type	Screw Pump	
	Pumping Fluid	Sludge	
	Suction Head	Flooded	
	Flow Rate	1.0 M <sup>3</sup> /Hr	
	Head Range	40 - 50 Meter	
	MOC	CI	
	Suction & Delivery Position	Top/ End	
	Motor Power	1.0 HP/ 0.75 kW	
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt	
	Motor Efficiency, Phase/ Volt	IE 2, Three Phase/ 415 Volt	
11.4.17	<b>WASTE ACTIVATED SLUDGE HANDLING – FILTER PRESS</b>		
	Qty	1 Nos.	
	Type of filter press	Plate type	
	Plate Dia x Height	18" x 18" inch	
	Max. Permissible Load	500Ltr	
	Make of Unit	PP	
	Motor Power	1.0 HP/ 0.75 kW	
11.4.18	<b>INSTRUMENTATION LIST</b>		
	<b>Instrument</b>	<b>locations</b>	<b>Qty.</b>
11.4.18.1	Pressure gauges	At discharge of all pumps & blowers	Not less than 12 Nos.
11.4.18.2	Level switches	One in each: at equalization tank, at aeration tank, at RAS tank, at treated water storage tank, at back pulse tank, at MBR Tank, at Chlorine dosing tank, at Citric acid dosing tank, at polyelectrolyte dosing tank.	Not less than 9 Nos.
11.4.18.3	Flow meter	At MBR suction pump discharge line	Not less than 1 No.
11.4.18.4	Pressure Switch	At MBR Permeate line , at MBR Blower Discharge.	Not less than 2 Nos.
11.4.18.5	Vacuum Pressure Gauge	At permeate discharge line.	Not less than 1 No.

11.4.18.6	Air Rota meter	At Blowers outlet header	Not less than 1 No.
11.4.19	<b>ELECTRICAL EQUIPMENTS</b>		
	MCC – non draw out type		1 Nos.
	Power cabling, Instrument cabling, control cabling & cable trays		1 Lot
	MCC Control panel for PLC		1 Nos.
	PLC – non redundant Make – Delta / Eqv.		1 Nos.
	Pneumatically operated valves if required		1 Lot
11.4.20	The panel shall be compatible to IBM system.		
11.4.21	The panel should have multi-function energy meter.		

### 11.5 Civil Works

SL .No.	Description	Size /Capacity in MM	Qty.	Civil	Remarks
11.5.1	Bar Screen Chamber	1500 x 1500 x 1000	1	RCC	Above Ground
11.5.2	O&G tank	1500 x 2000 x 1500	1	RCC	Above Ground
11.5.3	Grit tank	1500 x 1700 x 1500	1	RCC	Above Ground
11.5.4	Equalisation tank	5800 x 5800 x 2500	1	RCC	Under Ground
11.5.5	Anoxic tank	1500 x 4000 x 4000	1	RCC	Above Ground
11.5.6	Aeration Tank	7400 x 2600 x 4200	1	RCC	Above Ground
11.5.7	MBR tank	3550 x 1100 x 3500	1	RCC	Above Ground
11.5.8	MBR Cleaning	3550 x 1100 x 3500	1	RCC	Under Ground
11.5.9	Sludge Holding Tank	2000 x 4000x 2500	1	RCC	Under Ground
11.5.10	MBR Treated Water Tank	6800 x 4000 x 2500	1	RCC	Under Ground

### 11.6 OTHER ITEMS –

11.6.1	Description	Qty
	<p>1.1 For Air distribution – MS C class (ISI marked)</p> <p>1.2 Size – as per requirement</p> <p>1.3 Make – as per approved make</p> <p>1.4 For all other entire Unit will be UPVC SCH 40 &amp; 80 (ISI Marked)</p> <p>1.5 Size – as per requirement</p>	1 Lot.

	Make – As per approved make	
11.6.2	1.6 Valves ( <b>ISI marked</b> ) 1.7 Size – as per requirement 1.8 Make – as per approved make 1.9 Size – as per requirement <b>1.10</b> Make – As per approved make Valves.	1 Lot.
11.6.3	Motor for pumps and blowers	1 Lot

### 11.7 Termination Points -

S. No.	Description	Interface Point
1	Raw Sewage	At Bar Screen of Equalization Tank
2	Treated Sewage Water	Up to Final Treated Water Tank
3	Backwash & drain of Filters and tanks.	Up to the drain trench below each equipment.
4	Sludge from STP	Up to Centrifuge
5	Electrical power	At Incomer Isolator MCC
6	All cables for Power & Control	Within plant's
7	Earthing	Earthing Lugs for equipment shall be provided at individual equipment.

### 11.8 Ultra Violet Treatment and Chlorination

Waster shall be passed through UV unit for disinfection entire unit shall be housed in stainless steel chamber. And a measure of auto chlorinator shall be provided metered in to the effluent by an electric dosing pump paced according to the sewage inflow. The effluent shall be retained in the baffle walled chlorine tank for a minimum of 30 minutes for effective disinfection prior to discharge.

#### 11.8.1 Chlorination System

A chlorinator SYSTEM (SS) with a capacity of not less than 30 min average flow detention shall be attached to the settling tank.

Chlorine feed system shall be furnished as a complete package assembly for installation in the plant room. Assembly shall include base plate, electronic positive displacement type chemical feed pump, fiberglass solution tank, suction and discharge tubing and fittings operated through PLC.

Each chlorine solution dosing pump shall perform to achieve a residue not more than 1 mg// in the treated effluent. Solution feed pump shall have a maximum capacity of 1 //hr chemical pump will operate on 50 Hz supply. Fiberglass solution tank shall be of no less than 100 litre capacity and include suction line fitted with strainer.

Control shall be by means of compound loop (i.e. flow proportional and residual measuring).

The feed pump shall be of variable speed positive displacement, solenoid-driven diaphragm metering type. The construction material shall be suitable for corrosive nature and as follows:

#### **11.8.2**

#### **UV System**

UV system for disinfection: Shall Utilize High purity quartz sleeves and high output UV lamps. UV Reactor MOC will be SS316L. System shall be designed to provide a UV dose of 600 J/m<sup>2</sup> at UVT of 65% and TSS less than 10 mg/L. System should deliver a 4 log reduction of coli forms and provide TC count to less than 200 CFU/100ml. The electrical control system should utilize high frequency electronic ballasts and provide efficiency of more than 90%. The reactor vessel shall utilize internal baffles to ensure turbulent and plug flow.

The UV intensity monitoring system shall be designed in accordance with the German DUGW W294 standard/US standard. The sensor shall be of dry type and removable without system shutdown.

#### **11.9**

#### **Online Monitoring System OLMS**

System should follow the principle of attenuation to receive data with accuracy of 0.24% at compensation of turbidity 530 nm with following:

Compatibility of system: Modbus Remote Terminal Unit (RTU)/analog Interface : RS485/RS 232 Source temp. : 4deg to 104deg Minimum measurement time: 4 sec or better T100 response time: 4 sec or better Sample collection : Automatic Sample platform: 300mm x 239mm (SS)/ As per OEM Sample suction : 80 mm (SS) Process chamber : dia. not less than 245mm, height 870mm Channels : 231( RS 485 compatible).

#### **11.10**

#### **Installation**

The machinery shall be accurately installed to correct dimensions, alignments, levels, etc., all as indicated on the final shop drawings. The machinery shall be mounted on flat steel packing pieces of thickness suitable to take up variations in level of the concrete foundations. Suitable packing pieces shall be located adjacent to each holding down bolt and shall be properly bedded by grinding the concrete surface to a smooth, level finish. The machinery shall be aligned and levelled and the nuts of the holding down bolts tightened with a spanner of normal length. The base plates shall be packed with grout after the machinery has been run and checked by the Engineer-in-Charge for stability and vibration.

#### **11.11**

#### **Maintenance Facilities**

Permanent work platform and catwalk shall be designed by the Agency and provided by the Agency for access to elevated equipment. The catwalk and platform for access shall allow a minimum width of 1000mm.

Catwalk to maintenance platform shall be provided with railings and guards designed for safe movement of personnel in a restricted space including provision for gaining access and to accommodate maintenance personnel.

Hand railing and guards shall be designed by the Agency and provided by the Agency for all concrete tanks to allow safe movement of personnel.

Waterproof power sockets required for servicing shall be provided by the Agency. The number and locations shall be proposed by the Agency and approved by the Engineer-in-Charge.

The design of all permanent work platform, hand rails, etc. shall be submitted to the Engineer-in-Charge for approval. The loading and fixing method of lifting facilitate shall also be submitted to the Engineer-in-Charge for approval and checking within 4 weeks on award of Contract or receipt of letter of intent.

- i. All Manhole Covers shall be minimum 5mm M.S chequered plate encased with 1 mm thick aluminium sheet.

#### **11.12**

#### **Testing and hand over**

The performance of the system shall be demonstrated by taking hourly samples of the raw sewage and final effluent over a twelve-hour period. The sample shall be taken at periods approximately the flow rates specified by the plant. The sample shall be combined and a 5-day BOD shall be run, the results of which must verify the capacity of the treatment plant prior to acceptance.

#### **11.13**

#### **Training**

Provide training facilities courses to ensure that the employer's staff may acquire full knowledge and appreciation of all aspects, day-to-day operation, breakdown and routine maintenance, and fault diagnosis of all plant, equipment and systems.

Training to the employer's staff shall be held as appropriate at the Agency's or manufacturer's premises and on site. A detailed syllabus for each of the training courses specified or proposed and the timing of the courses shall be submitted for approval. The Agency shall recommend the desirable qualifications and experience of the trainees to optimally benefit from the courses.

All consumable required for operation of plant for one year will be supplied at the time of handover.

#### **11.14**

**Electrical Installation:** As per CPWD General specifications for electrical work Part-I-(Internal)2023, Part-II(External)2023 and Part-IV (Substation).

#### **11.15**

#### **Inter connecting Pipe & Valves**

DESCRIPTION	For connection & interconnection, as per design.
Pipe	UPVC pipes and accessories (ISI marked)
Diameter of Pipe	200 mm dia. (ISI marked)
	150 mm dia. (ISI marked)
	100 mm dia. (ISI marked)
	75 mm dia. (ISI marked)

Valves (Diameter)	200 mm dia. (ISI marked)
	150mm dia. (ISI marked)
	100mm dia. (ISI marked)
	75mm dia. (ISI marked)

**11.16 Testing of treated water during DLP :**

During DLP, the treated water should be tested once in fortnight. The test should be carried in an NABL-accredited Lab, and the test report should be submitted to the RBI Engineer.

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## PACKAGE C- 12

### Boom Barrier

- 12.1 Boom Barrier:
- 12.1.1 The work shall be carried out as per CPWD General Specifications for Electrical Works Part- I (Internal 2023, Part-II (External) 2023 as amended, relevant I.E. Rules, BIS/IEC/CEA and as per directions of Engineer-in-charge.
- 12.1.2 The scope of work include design, drawing, supplying, erection & installation, testing and commissioning of Boom Barrier system complete with necessary foundation, labor and other necessary accessories to making the work fully functional.
- The scope also includes Electromechanical boom barrier with all accessories upto 6 meter length; consisting of a fixed housing and a movable arm; in two pieces without central support, electrically operated from security/guard- room through push buttons and remote-control; Barrier Housing Unit: Powder Coated; Boom: Powder Coated White RAL 9010m or approved color with Red reflective strips having IP 44 (Barrier Body) & IP 67; All Aluminium Housing with Base frame in SS-304 for high protection against corrosion; Operator console, necessary hardware, software, Power and control cabling etc. as required. The scope also includes handing over to client in working conditions.
- The scope of works also included guaranty/warranty of entire installation and equipments/ accessories supply by them as per OEM etc. as required
- 12.1.3 In all the entry points of campus Boom barriers are to installed. In the day/ night time, boom barriers at entry would be open and would close only when security/guard push the button or remote-control after verification from guard room.
- 12.1.4 System requirement: -
- (i) The environment conditions limit:
  - (ii) Temperature – 0 to 50 Deg. C
- 12.1.4.1 Humidity – 0 to 95%
- 12.1.5 It will be the responsibility of the vendor/bidder to make the entire system fully functional as per the specifications. Vendor/bidder shall consider any equipment / devices required to make the system functional if not mentioned herewith.
- 12.1.6 All equipment and materials used shall be standard components that are regularly manufactured and used in the system. All systems and components shall have been thoroughly tested and proven in actual use.
- 12.1.7 The Automatic Boom Barrier has been designed on the following minimum parameters which are summarized below: -

## TECHNICAL SPECIFICATIONS

**Automatic Boom Barrier:**

Application	Indoor/ Outdoor
Drive Motor	Electro-Mechanical DC Brushless
Type of use	Intensive
Frequency of Use	100%
Motor Power supply	24V DC
Absorbed power	Minimum 180 Watt
Protection Degree	IP54 or better
Adjustable Thrust	Yes
Decelerations	Yes
Torque	180 NM
RPM	1800 RPM or better
Operation Voltage	AC 230V (+/- 10%), 50 Hz
Environment condition	-25oC to + 70oC (RH 10% - 95%)
Type of Boom Balancing	Compression Spring
The Height of Boom Support	Minimum 890 MM
Encoder/Limit switch	Available
Housing Dimension	Not less than 340 x 290 x 960 MM
Housing colour	Red
Boom Arm material	Octagonal Aluminium with Rubber protection an red reflective strip
Certification	CE
MCBF (Mean Cycle Between Failure)	Minimum 10 Millions
Arm Length	Min. 6 mtr /Arm Kit LED (Optional)
No. of Digital inputs	8
No. of relays /Digital output	6/4
Modular Expansion of control system	Radio receiver and other detector modules
Maximum remote-control distance	Less than 30 M
Integrated and access control	Compatible with all kinds of access equipment seamless integration.

- 12.1.8 Anti bumping- The Barrier will automatically go back when meet obstacles during closing.
- 12.1.9 Manual wheel to release boom in case of power failure.
- 12.1.10 Aluminum die casting motor body.
- 12.1.11 Unique temperature calefaction design prevents freezing in cold weather.
- 12.1.12 Providing of integrate of Traffic Light / LED in Arm (Red/ Green).

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## **PACKAGES C- 13**

### **HVAC SYSTEM**

- 13.1 The work shall be carried out as per CPWD General Specifications for HVAC System 2024 as amended and corrected up to date, CPWD General Specifications of Electrical Works Part-I 2023 corrected up to date, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard. Contractor will enable the consultant for obtaining fire NOC and arrange inspection/ testing of the scheme as required for this purpose.
- 13.2 The scope of work includes heat load calculation, design, providing, installation, testing and commissioning of HVAC system with ducting, ventilation in community hall, dispensary, caretaker room, Club-I & II, fire control room, CCTV rooms, Server Room etc. Work includes not only the items exclusively defined hereunder but also any other item required to commission and complete the work as per site requirement in this sub head or as per good engineering practice or as required under the codes or by local/statutory authorities.
- 13.3 The capacities indicated are minimum capacities, and any rating/ capacities required over and above the indicated capacity shall be provided by the contractor at his own expense & nothing extra shall be paid on this account.
- 13.4 Area/ Rooms to be air conditioned using VRF/DX Split System, and the capacities and equipment selection are as mentioned in Annexures.
- 13.5 AIR CONDITIONING SYSTEM:-

**13.5.1 Basis of Design:-**

<b>Outdoor Design Conditions:</b>		As per ASHRAE 2021	
<b>Summer</b>			
Dry Bulb Temp.	47.0 deg. C (116.6 deg F)		
Wet Bulb Temp.	27.8 deg. C (82.04 deg F)		
<b>Monsoon</b>			
Dry Bulb Temp.	33.3 deg. C (91.94 deg F)		
Wet Bulb Temp.	29.5 deg.C (85.1 deg F)		
<b>Inside Design Conditions:</b>			
Air-conditioned Areas (Detailed given below)	Summer & Monsoon: - $23.0 \pm 1$ deg C ( $73.4 \pm 2$ deg F) (RH) 55% (Design Value – No Control)		
Lighting Load	As per ECBC-2017		
Equipment Load	As per the uses of the Area		
Occupancy	<b>As per the Architectural plan</b>		
Fresh Air	<b>As per NBC-2016/ISHRAE-2017</b>		
Ventilation	<b>As per NBC-2016/ ISHRAE-2017</b>		

13.6 Building Construction Data :- As per the Architectural and civil specifications.

**13.7 Brief of Air-conditioning Work :-**

- 13.7.1 **VRF system:** - Air Conditioning system with Air-cooled Variable Refrigerant flow (VRF System) with Inverter-based D.C Twin Rotary / Scroll modular compressor (**Heat Pump type- cooling in summer & monsoon while heating in winter**) with R-410 refrigerant. The make of the compressor shall be of the same as OEM. The VRF units shall be able to deliver 100% capacities at AHRI conditions till ambient temperature of 47.0 deg C.
- 13.7.2 Latest BEE guideline for AC system/ECBC/GRIHA/AHRI, whichever guideline is more stringent shall be followed based on the GRIHA star rating requirement of the building. Min. COP of ODU at AHRI Conditions shall be not less than 3.7 at Full Load.
- 13.7.3 The VRF System outdoor unit shall have an operating range from (-) 5 deg C to 52 deg C in cooling Mode, and the OEM shall submit a catalogue for VRF unit, mentioning the same. In case of one IDU fails or stops working for any reason during the running of the system, the VRF System must have a provision or capability to bypass so that the whole circuit is not get affected.
- 13.7.4 Various types of Indoor units referred to in equipment selection summary sheet. Cassette units, ductable units, high wall units and modular DX AHUs with communication kit, required sensors etc. shall be provided as per specific need of each area keeping in mind for Individual's temperature controls (Thermostat) for each area.
- 13.7.5 All standard VRF units shall have high lift drain pump to lift the condensate water properly.
- 13.7.6 Insulated Refrigerant piping network, ref-net joints, insulation, communication kits (wherever required) & expansion valves shall be provided complete in all respect. Thickness of piping will be as per CPWD HVAC specification. Closed-cell Nitrile rubber insulation of required thickness shall be provided.
- 13.7.7 Suitable size insulated drain pipe (heavy duty CPVC) shall be provided in proper slope.
- 13.7.8 Intelligent centralized push button controller compatible with BMS for a complete VRF system shall be provided (dedicated for each community building) for controlling (ON/OFF, scheduling, lock/ unlock, swing control, temperature setting, error detection) all indoor units and monitoring of corresponding outdoor units from one central location.
- 13.7.9 Complete electrical work, inclusive of panels, cables, cable tray etc. shall be provided.
- 13.7.10 Fresh air to conditioned spaces shall be provided as per NBC requirements.
- 13.7.11 All modular DX AHU - will have two-stage filtration i.e. one set of 50mm thick prefilter section equivalent to MERV-8 & second set of high-efficiency Electronic Air cleaner/ Electrically charged filter section. Filter efficiency is a minimum equivalent to MERV-14 rating.
- 13.7.12 For VRF standard ductable units, micro electrostatic filter (EAC) is to be provided.

- 13.7.13 All modular DX AHU & VRF units:- Duct-mounted advanced oxidation plasma cell system/UVGI system / Needlepoint, Tube Type & Carbon Brush Type Bi-polar Ionisation technology for indoor air quality shall be provided.
- 13.7.14 Duct shall be factory fabricated from galvanised steel sheets of various thicknesses ranging from 24 gauge to 18 gauge according to duct sizes and in accordance with CPWD Specifications. Site-fabricated ducts shall be provided except for critical pieces like connection pieces, collar pieces, reducers, offset pieces etc.
- 13.7.15 All types of Air terminals like Grilles/Diffusers/ VCD/ drum louvres/ slot diffuser/ jet nozzle etc. shall be provided as per the design requirements.
- 13.7.16 Fire dampers with actuators as per requirements shall be provided and shall be hooked up to fire alarm system.
- 13.7.17 The thermal insulation shall be provided over all air-conditioned duct-using mat finished AL foiled closed cell nitrile rubber as per specifications only.
- 13.7.18 In case of one IDU fails or stops working for any reason during the running of the system, the VRF System must have provision or capability to bypass so that the whole circuit should not get affected.
- 13.7.19 Acoustic (Fiber glass) insulation will be provided on AHU room walls/ ceiling or any other way to reduce AHU noise.
- 13.7.20 **DX Split unit:** -  
All control rooms (UPS room, fire control room, CCTV rooms, Server Room etc.) shall be provided with DX split units (Hi-wall type/ ductable/ cassette) with inverter technology BEE 5 star rated in N+1 combination (24\*7).  
Caretaker, dispensary, doctor room & engineer room etc. shall be provided with DX split units Heat pump type (Hi-wall type/ ductable / cassette) with inverter technology BEE 5 star rated.

**NOTE:**

- (i) Ensure that all the refrigerant & insulation used in the building for HVAC systems are CFC and HCFC free.
- (ii) All Indoor and outdoor units shall have a minimum warranty of 3 years (in DLP). Bidders are requested to quote accordingly.

**13.8 MECHANICAL VENTILATION SYSTEM:-**

Scope of covers includes planning, designing, supply, installation, testing and commissioning of complete mechanical ventilation system, smoke extraction system, pressurization system (Lift lobbies, lift wells & staircases) & normal ventilation system and specific exhaust as per requirements of National building code-2016 (latest amended

upto date), Fire officer recommendation, local by-laws under this contract. Work includes not only the items exclusively defined hereunder but also any other item required to commission and complete the work as per site requirements in this subhead or as per good Engineering practice, or as required under the codes or by local/statutory authorities.

Minimum Ventilation Rates shall be as per given Table below & bidders shall quote accordingly.

Area Description	Air Change Per Hour (ACPH)
Smoke Exhaust (in case of emergency)	12
Toilets	Min. 12
Pantry Exhaust	15
Store Exhaust / Fresh Air	6
UPS Battery Room	CFM based on UPS capacity & manufacturer recommendation
Pump Room (WTP/UGT/FIRE) / ESS (LT Panel room etc.) & service rooms	20
STP, ETP & Garbage room	30
Kitchen	40 ACPH or minimum requirement by BOH
<b>Pressurization</b>	<b>As per NBC-2016, Vol. 1, part IV-Table-6</b>
Lift Well Pressurization	Mechanically pressurized to maintain 50 Pa.
Lift Lobby Pressurization	Mechanically pressurized for maintaining 25 to 30 Pa or naturally ventilated
Staircase Pressurization	Mechanically pressurized for maintaining 50 Pa or naturally ventilated

The system consist of axial fans/ Inline Fan/ Propeller fans/ Cabinet fan/ scrubber etc., GSS duct work, fresh /exhaust air grills, louvers etc. shall be provided.

### 13.9 TECHNICAL SPECIFICATION FOR VRF/VRV AC SYSTEM

#### 13.9.1 SCOPE

The scope of this tender comprises supply, erection, testing and commissioning of **inverter technology based** Scroll Type VRV/VRF type system (Heat Pump type) of air conditioning conforming to these specifications/ explanatory note. The contractor shall calculate equipment capacity based upon design parameters specified for the system design & submit shop drawings accordingly to verify all the quantities and sizes of refrigerant pipe, fitting, cables, control cable, pipes, insulation, indoor units, and outdoor units etc. before installation to avoid any shortfall or surplus. The tenderer shall also include all necessary civil work and MS framework for the installation of outdoor and indoor units in a VRF-based air conditioning system. The work includes the refrigerant gas & its charging for proper & specified functioning of the air conditioning system. The scope of work of the contractor shall also includes:

- (i) Cutting of walls and floors/ceiling.

- (ii) Making holes.
- (iii) Sleeves.
- (iv) Foundations

Civil work & MS frame work for indoor and outdoor units related to VRF equipments, all cuttings should be properly finished as existing surrounding. The scope of work in the tender schedule also includes designing of complete air-conditioning system based on inverter technology base Scroll VRF air conditioner with air cooled outdoor units system capable of cooling and heating (reverse cycle) as per individual or season requirement suitable for operation on 415 V, 3 Phase, 50 Hz AC electric supply. The outdoor units shall have both cooling, consisting of one/ multiple outdoor unit with single circuit of refrigerant piping and multiple indoor units of various types. Each indoor unit should have capability to cool as per seasonal weather changes.

The lay-out of refrigerant piping is to be designed in such a way so that it should not disturb the aesthetic of the building/ room, inadvertent damage in the route of pipe should not occur in future & optimum length of pipe line for efficient air conditioning. After completion of the work four sets of "As erected/ commissioned drawing" of activities listed above shall be submitted. Suitable size GI cable tray shall be provided for laying of cables and refrigerant piping wherever required for indoor and outdoor units.

#### **13.9.2 Outdoor Unit**

- (i) The outdoor unit shall be factory assembled, weatherproof casing (Material of casing shall be vendor's standard design), constructed from heavy gauge GI sheets steel panels and coated with baked enamel finish. The outdoor unit shall be completely factory wired, tested with all necessary controls & filled with first charge of refrigerant before delivering at site.
- (ii) The inverter technology based on Scroll/twin rotary type VRF equipment should be capable so that refrigerant piping between indoor units and outdoor unit shall be extendable up to 225m of equivalent length with maximum height difference between outdoor & indoor unit of 90m & level difference between two indoor units shall be maximum up to 15m. All the outdoor units comprising of multiple modules should have all inverter type compressor in each module.
- (iii) The outdoor unit shall be factory tested and filled with first charge of refrigerant before delivering at site. Any extra refrigerant filling for proper cooling shall be done by the contractor only without any extra cost whatsoever.
- (iv) It should also be provided with duty cycling for D.C inverter Scroll/Twin rotary compressors capable of changing the 'rotating speed of compressor by inverter controller to follow variation in cooling & heating loads & switching starting sequence for better stability and prolonging equipment life.
- (v) The unit shall be provided with its own microprocessor control panel with provision for integration with the building management system for Air-conditioning system.

- (vi) The machine must have a sub cool feature to use coil surface more effectively through proper circuit bridge so that it prevents the flushing of refrigerant from long piping due to this effect, thereby achieving energy savings.
- (vii) The outdoor unit should have a low noise level and should not be more than 67 db (A) at normal operation at a horizontal distance of 1 mtr when measured at 1.5m vertical distance from ground level.
- (viii) The outdoor unit should be fitted with low noise aero spiral design fan with aero fitting grill for spiral discharge airflow to reduce pressure loss and should be fixed with DC/AC fan motor for better efficiency.
- (ix) In case of trouble occurs in an indoor unit(s), the continuous operation of system should be possible.
- (x) The outdoor unit shall be designed in such a way that cleaning of drain Pan should be easy & inspection/ replacement of compressor should be easy.
- (xi) The condensing unit shall be designed to operate safely when connected to multiple fan coil units.
- (xii) The outdoor units shall be provided in such a fashion that these do not affect the overall aesthetics and ambience of the building. If required these units shall be suitably camouflaged to give good aesthetic look

#### **13.9.2.1 Compressor:**

The compressor in inverter based D.C Twin Scroll/twin rotary System shall be highly efficient. The system should respond efficiently in accordance to the variation in cooling or heating load requirement. Each outdoor unit shall have more than one compressor.

All outdoor units shall have multiple steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed. Oil heaters shall be provided in the compressor casing or as per manufacturer standard equipments.

#### **13.9.2.2 Oil Recovery system**

Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths. The system must be provided with oil balancing circuit to avoid poor lubrication.

#### **13.9.2.3 Refrigerant Circuit**

- (i) The refrigerant circuit shall include liquid and gas shut-off valves and a solenoid valve at condenser end. The equipment must have inbuilt refrigerant stabilization control for proper refrigerant distribution.
- (ii) All necessary safety devices shall be provided to ensure the safe operation of the system.

#### **13.9.2.4 Heat Exchanger**

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminium/copper fins to form a cross-fin coil. The aluminum/copper fins shall be covered by anticorrosion resin film.

The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

### 13.9.2.5 Safety Devices

All necessary safety devices shall be provided to ensure safe operation of the system. Following safety devices shall be part of outdoor unit:- high pressure switch, fuse, fan drive overload protector, fusible plug, crankcase heater, over load relay, overload protection for inverter based technology & digital based technology.

### 13.10 Indoor Units

All indoor units as specified shall have, in general, noise levels less than 46 db. For critical applications noise levels below these limits may, however, be specified during design stage.

- (i) Each unit shall have electronic control valve to control refrigerant flow rate respond to load variation of the room.
- (ii) The address of the indoor unit shall be set automatically or through central controller in case of individual and group control.
- (iii) The fan shall be dual suction, aerodynamically designed, Turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct-driven type, mounted directly on motor shaft having support from housing.
- (iv) The cooling coil shall be made of seamless copper tubes and have continuous aluminium/Copper fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested at 21 kg/sq.m air pressure under water.
- (v) Indoor unit shall have cleanable type filter fixed to an integrally moulded / moulded plastic frame. The filter shall be slide in and neatly insertable type. It shall be possible to clean the filters either with compressed air or water.
- (vi) Each unit shall have Electronic control expansion valve for variable refrigerant Flow Effect.
- (vii) Each indoor high wall, unit shall be with corded/cordless remote controller as standard features. The controller shall be able to change fan speed as per requirement of Indoor units: Ceiling mounted cassette type unit / High wall type/ ductable type (as specified in tender drawings).

#### 13.10.1

##### **Indoor Unit:**

- (i) **Cassette type :** Supply, installation, testing and commissioning of 4-way flow VRV/VRF Cassette Type Indoor ceiling mounted unit equipped with synthetic washable media pre-filter, fan section with low noise fan/dynamically balanced blower, multispeed motor, coil section with DX Copper coil, electronic expansion valve, outer cabinet, drain pump, grill, necessary supports, vibration isolation, cord less remote control etc., suitable for operation on single phase 230 V ± 10%, 50Hz AC supply, complete, as required.
- (ii) **High wall type:** Supply, installation, testing and commissioning of VRV/VRF High wall 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, outer cabinet, cord less remote control, drain pan, necessary

accessories etc., suitable for operation on  $230\text{ V} \pm 10\%$ , 50 Hz, single phase AC supply, complete as required.

- (iii) **Ductable type** (High/Medium Static Ductable type): Supply, installation, testing and commissioning of 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  $230\text{ V} \pm 10\%$ , 50 Hz complete as required.

### 13.10.2 Ref-net Joints / Header Joints

The system shall use V-Joint/ Ref-net separation refrigeration pipe joints and headers in the appropriate orientation to enable the correct distribution of refrigerant. The Distribution Joints should be factory insulated with pre-formed sections of Expanded Polystyrene/Equivalent

#### a) Refrigerant Piping with insulation and with UV protection coating

1. Refrigerant piping for the air-conditioning system shall be up to 19.1 mm dia. of soft seamless copper tubes & for above 19.1 mm dia. the pipe material shall be of hard seamless copper tubes with the pipe material being hard-drawn copper pipe. Forged copper fittings shall be used for the refrigerant piping. The refrigerant piping arrangements shall be in accordance with good engineering practices as applicable to the air-conditioning industry, and shall include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits except Y joint/separation tubes.
2. Before joining any copper pipe or fittings, their internals shall be thoroughly cleaned by passing a clean cloth via wire or cable through their entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently, it shall be thoroughly blown out using nitrogen gas.
3. After completion of installation of the refrigerant piping, the refrigerant piping system shall be pressure tested using nitrogen gas at a suitable pressure as specified by OEM (Original Equipment Manufacturer). Pressure shall be maintained in the system for 48 hours. The system shall then be evacuated to vacuum of not less than 700 mm Hg and held for 24 hours.
4. The supplier of air-conditioning system shall choose sizes as designed and erect proper interconnections of the complete refrigerant circuit.
5. The suction line pipe size and the liquid line pipe sizes shall be selected according to the manufacturer's specified diameter. All refrigerant pipes shall be properly supported and anchored to the building/structure using steel hangers, fasteners, brackets and supports which shall be fixed to the building/structure by means of inserts or expansion shields or anchor fasteners of adequate size and number to support the load imposed thereon.
6. The refrigerant piping should be laid in such a way that it should not distort the interior of the room, wherever the refrigerant pipe shall be laid across the room, it should be laid in a concealed. All associated minor Civil Engineering works (like chasing on wall, ceiling & re- plastering & repainting etc.) related with the above

items are included in the scope of work. The above scope does not include false ceiling wherever required.

- 7. To protect Nitrile rubber insulation of outdoor installed copper piping from degradation due to ultra violet rays and atmospheric condition, it shall be covered with polyshield coating of at least two coats of resin and hardener (poly bond make or equivalent). Fibre glass tape shall be helically wound with adequate overlap & coated with two coats of resin with hardener to give smooth & plain finish.**
8. Entire liquid and suction refrigerant pipe lines including all fittings, valves and strainer bodies, etc. shall be insulated as per DSR (items for VRF/VRV air conditioning system) – 2019 part-I.
9. UV protection coating on existing copper pipes (with insulation) shall be done with the help of starbond and 7mm cloth etc. UV protection coating shall be done on all the pipes irrespective of size of pipes.

**b. PUSH BUTTON TYPE based central controller**

The contractor should provide Push button type based central controller for controlling (ON/OFF, scheduling, lock/unlock, swing control, temperature setting, error detection, filter detection) all indoor units (256) add monitoring of corresponding outdoor units from one central location. PC based central controller should be BMS (like Bacnet, Lan works, Modbus) compatible. It must show the status of all indoor units along with outdoor unit.

**c. Drain Piping duly insulated**

The drain pipe connection of each fan coil unit to the main header should be 25 mm dia./32 mm dia. as required. The header pipe should be of 50 mm dia. /40 mm dia./32 mm dia. as required. The drain-pipe should be heavy PPR pipe ISI marked and conforming to relevant IS complete with fitting as required whereas the connection of the fan coil unit to the PPR pipe should be with flexible braided pipe. The drain piping should be insulated with 6 mm thick tubular nitrile rubber insulation.

For proper drainage of condensate U trap shall be provided in the drain piping wherever required. Drainage arrangement shall be concealed as far as possible. If it is not possible due to some technical constraint, then all pipe supports shall be prefabricated and pre-painted slotted angle supports, properly installed with clamps. The condensate drain pipe arrangement for disposal of condensate water shall be made in such a way that there should not be any leakages of condensate water inside rooms as well in the route of drain water pipe line & water should be discharged in the ground/ rain water harvesting system at the location jointly decided with Engineer-in-Charge of work or his representative. All associated Civil Engineering works, if required, as per requirement at site in above connection like making chase in the wall & restoring its original shape by re -plastering & repainting, etc. are included in the scope of work. The arrangement of drain- pipe shall be made in such a way that it should not affect the aesthetic of the building as well as is maintenance friendly & easily accessible.

**d. Various Sizes PVC Insulated Copper Conductor Wiring Cables**

**Cross- Linked Halogen Free Flame Retardant Copper conductor (class-2) cables (ISI marked)** multi stranded sheathed copper conductor wiring cable for working voltage upto & including 1100 Volts, ISI marked conforming to IS 694/1990 (Latest Version). Wiring of installation shall be in conformity with IS 732/1989 (Latest Version), IS 4648/1968 (Latest Version).

#### e. DOUBLE SKIN AIR HANDLING UNITS

The air handling units shall be double skin construction, draw through / blow through type comprising of various sections, pre filters (MERV-8), EAC (Electrically charged filter) filter section, coil section and fan section, mixing box with volume control dampers, (wherever the return air and fresh air are ducted) as per approved shop drawings.

#### f. CASING

Double skinned panels shall be 40mm thick made of galvanized steel, pressure injected with PUF insulation (density 38 kg/cum) between both inner and outer skin shall be fixed to 1.5 mm thick aluminium alloy twin box section structural framework with stainless steel screws. Outer sheet of panels shall be made of galvanized pre-coated sheet of minimum 0.8mm and inner sheet of 0.8 mm plain G.I. Sheet.

The entire framework shall be mounted on an aluminium alloy or galvanized steel (depending on size) channel base as per manufacturer's recommendation. The panels shall be sealed to the framework by heavy duty 'O' ring gaskets held captive in the framed extrusion. All panels shall be detachable or hinged. Hinges shall be made of die cast aluminium with stainless steel pivots, handles shall be made of hard nylon and be operational from both inside and outside of the unit. Units supplied with various sections shall be suitable for onsite assembly with continuous foam gasket. All fixing and gaskets shall be concealed.

Units shall have a hinged, quick-opening access door in the fan section and also in the filter section where filters are not accessible from outside. Access doors shall be double-skinned.

Condensate drain pan shall be fabricated from 1.25 mm thick stainless steel sheet externally insulated with 10mm thick closed cell polyethylene foam insulation or nitrile rubber or PUF with necessary dual slope to facilitate fast removal of condensate. Necessary supports will be provided to slide the coil in the drain pan with all corners welded. It shall be isolated from bottom floor panel through 25mm heavy duty TF expanded polystyrene or polyurethane foam.

AHU panels shall be factory fitted with pressure ports for DPT installation. The number and size of these shall be confirmed in the AHU technical approval stage. In case opening is to be made in AHU panel, the same shall be with C-channel all around to prevent entry of PUF into air stream. The channels shall be cut at 45 degrees at the corners to avoid overlap. Material for the channel shall be same as that of internal skin of AHU.

Rubber grommets shall be provided at all entry points into AHU such as coil connection, cable entry etc. The same shall be double lip tight fitting to prevent air leakage.

All access doors shall be outward opening. For doors provided downstream of the fan, especially in high static AHUs, additional clamps shall be provided along the periphery of door to maintain constant pressure and ensure proper sealing.

Water resistance marine light with power cabling shall be included.

Micro switch along with wiring for the Door shall be provided such that fan motor shall stop upon opening the door.

#### **g. THERMAL BREAK PROFILE**

AHUs shall be provided with thermal break profile as required. Panels and thermal break profiles for all AHUs shall be designed and assembled in such a way that there shall not be any condensation on AHU with conditions of 35 degree C and 92% RH (AHU surrounding conditions) at designed operating conditions inside the AHU.

#### **h. DAMPER**

Dampers shall be opposed blade type. Blades shall be made of double skinned airfoil aluminium sections with integral gasket and assembled within a rigid extruded aluminium alloy frame. All linkages and supporting spindles shall be made of aluminium or nylon, turning in teflon bushes. Manual dampers shall be provided with a bakelite knob for locking the damper blades in position. Linkages shall be extended wherever specified for motorised operation. Damper frames shall be sectionalized to minimise blade warping. Air leakage through dampers when in the closed position shall not exceed 1.5% of the maximum design air volume flow rate at the maximum design air total pressure.

#### **i. MIXING BOX**

AHU's requiring mixing boxes as per duct design which shall be complete with fresh and return air dampers.

#### **j. MOTOR AND DRIVE FAN**

Fan motors shall be IE-3 efficiency class and shall be  $415 \pm 10\%$  volts, 50 cycles, three phases, totally enclosed fan-cooled class F, with IP-55 protection. Motors shall be especially designed for quiet operation and motor speed shall not exceed 1440 rpm. Drive to fan shall be provided through 'V' belt-drive arrangement. Belts shall be of the oil-resistant type. Minimum efficiency of shall not be below 75%.

Fans shall be DIDW centrifugal, backward curved (For FM AHU)/forward curved (For CS AHU) aerofoil blades. Fan casing shall be made of galvanized steel sheet. Fan wheels shall be made of galvanized steel. Fan shaft shall be grounded C-40 carbon steel and supported in self-aligning Plummer block operating at less than 75% of first critical speed, grease lubricated bearings. Fan wheels and pulleys shall be individually tested and precision balanced dynamically.

Motors shall be mounted inside the AHU casing on slide rails for easy belt tensioning, and be totally enclosed, fan cooled, to be class 'F' insulation. Motors shall drive heavy duty V-belt, constant pitch, drive selected at 110% of motor horsepower.

Both fan and motors assemblies shall be mounted on a deep section aluminium alloy base frame.

Isolation shall be provided from the unit casing by combination spring and rubber anti-vibration mounts and flame retardant, waterproof neoprene impregnated flexible connection on the fan discharge.

Height of CS AHU should not more than 750mm.

#### **k. COOLING COILS/ HEATING COIL**

DX coils selections (Thickness, size and rows) as per VRF manufacturer recommendations. Coils with sine wave aluminium fins firmly bonded to copper tubes assembled in stainless steel frame. Face and surface areas shall be such as to ensure rated capacity from each unit and such that the air velocity across the coil shall not exceed 155 meters per minute. The coil shall be pitched in the unit casing for proper drainage. The coil shall have copper header with chilled water supply & return connections protruding out of AHU casing by minimum 150 mm and fitted with dielectric coupling or adapter for connection with MS pipes. Fin spacing shall be 11 to 13 fins per inch (4 - 5 fins per cm).

In case AHU has multiple coil stacked one above another, intermediate drain tray of SS 304 (18 gauge) shall be provided so that upper level of coil drains into this drain tray. SS 304 piping shall be provided from this drain tray upto main bottom tray.

Computerized cooling coil selection output shall be submitted. Coil rating shall be as per AHRI-410. Each AHU shall be provided with complete AHU communication Kit including DX- Type electronic expansion valve, AHU kit or any other attachment or device to make it complete and functional with the VRV outdoor unit and central controller.

#### **I. FILTER SECTION (For all AHUs/ TFA/ HRW, below filter section to be provided):-**

##### **Pre Filter**

Each unit shall be provided with a 50 mm thick factory assembled filter section containing washable synthetic type air filters having anodized aluminum frame. The media shall be supported with High Density polyethylene (HDPE) mesh on one side and aluminium mesh on the other side. Filter banks shall be easily accessible and designed for easy withdrawal and replacement of filter cells. Filter bank framework shall be fully sealed and constructed from GSS. The efficiency of the filters shall be 90% down to particle size of 10 microns (MERV-8) in AHU's, as per IS 7613, and ASHRAE 52.1. Filters face velocity shall not exceed 500 Feet per Minute. Filters shall fit so as to prevent by-pass.

##### **13.11 Electronic Air Cleaner Filter (MERV-14/15)**

Highly efficient electronic air filtration system (Electrostatic precipitation) with low pressure drops. All units shall be fitted with a true electronic air cleaner system (complete

with charging section and collector section) to be installed before the cooling coils. Other forms of air filtration systems such as charged media filters, dielectric media filters, or ionizers (which do not have second stage collector plates) shall not be acceptable. The electronic air cleaner (EAC) shall be capable of removing particulates as small as 0.01 microns including microscopic haze particles, smoke, dust, mold spores and bacteria.

Central Air Cleaner, a hybrid air purification system, should improve the indoor air quality by reducing harmful pollutants like particulate matter PM- 10, PM 2.5, allergens, pollen, smoke, bacteria, pathogens based on Electrostatic precipitation technology. It should be a monobloc structured unit specifically designed for integration in Return Air path of the AHU, to centrally capture the pollutants. It should be equivalent to MERV14/15 efficiency. It should be within built provision to connect to BMS. The product has to be certified as a green product by any of the Green Building councils across the world. The central air cleaner units must have a valid ANSI/ASHRAE 52 test report to verify filtration efficiency. Ozone level of units provided must be within the acceptable limit of 0.05ppm. The units shall have local LEDs at each individual unit to indicate when the units are up for wash/malfunctioning.

**Filters - Codes and Standards** ASHRAE 52.1 Gravimetric and Dust spot procedures for testing Air cleaning devices. IS 7613 Methods of testing panel type Air filters for HVAC.

### **13.11.1 FILTER ASSEMBLY**

The housing shall be made from extruded aluminium sections. All joints shall be sealed airtight and shall be made free of all burrs and sharp edges.

The filter loading mechanism shall be sliding type or front loading type. The locking mechanism shall be a spring loaded, toggle type mechanism with a bolt and thrust assembly which shall thrust the filter evenly against the sealing flange of the housing when it is installed.

### **13.11.2 ISOLATORS**

Vibration isolators shall be provided with all air handling units. Vibration isolators shall be cushy foot mounting type. Minimum vibration isolation efficiency shall be 90% and certificate of vibration isolator shall be provided by Contractor.

### **13.11.3 PAINTING**

Shop coats of paint that have become marred during shipment or erection shall be cleaned off with mineral spirits, wire brushed and spot primed over the affected areas, then coated with paint to match the finish over the adjoining shop painted surface.

### **13.11.4 NOISE CONTROL**

Air Handling Units shall be selected for the lowest operating noise level of the equipment. Fan performance rating, power consumption, and sound power data with operating points

clearly indicated shall be submitted by the tenders along with technical submittals for approval and verified at the time of testing and commissioning of the installation. The sound level within the AHU room shall be less than 75 dB at a distance of 2 meter from AHU.

### **13.11.5 CONNECTIONS**

Piping installation requirements are specified in other section. The Drawings indicate the general arrangement of piping, valves, fittings, and specialties. The following are specific connection requirements:

Arrange piping installations adjacent to units to allow unit servicing and maintenance.

Connect piping to air-handling units with flanges enabling easy removal of the coil

Connect condensate drain pans using 50 mm (2-0 inch) minimum, insulated G.I. pipe and extend to nearest floor drain. Construct deep trap (depth as per detail) at connection to drain pan and install cleanouts at changes in direction.

Duct installations and connections are specified in other sections. Make final duct connections with flexible connections.

**Electrical Connections:** The following requirements apply:

Electrical power wiring is specified in section Electrical.

Temperature control wiring and interlock wiring is specified in Section "Electrical Control systems."

**Grounding:** Connect unit components to ground in accordance with the Indian Electrical Code.

### **13.11.6 TESTING**

Cooling capacity of various Air handling units shall be computed from the measurements of air flow and dry and wet bulb temperatures of air entering and leaving the coil. Flow measurements shall be by a calibrated rotating vane anemometer and temperature measurements by accurately calibrated mercury-in-glass thermometers. Computed ratings shall conform to the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current, whereas, noise level at various locations within the conditioned spaces shall be measured by a sound pressure level meter.

## **13.12 FANS**

### **13.12.1 SCOPE**

The scope of this section comprises the supply, erection, testing and commissioning of centrifugal, axial, in-line and propeller type fans conforming to these Specifications and in accordance with the requirement of system design.

### **13.12.2 TYPE**

Centrifugal, in-line, propeller fans and Axial fans shall be of the type as approved of design/ engineer in charge.

### 13.12.3 CAPACITY

The air-moving capacity of fans shall be as shown on approved shop Drawings approved by Engineer-In-charge in consultation with NBCC.

### 13.12.4 CENTRIFUGAL FAN

Centrifugal fan shall be DIDW /SISW Class I construction arrangement 3 (i.e. bearings on both the sides) for DIDW/SISW fans complete with squirrel-cage induction motor, V- belt drive, belt guard and vibration isolators, direction of discharge / rotation, and motor position shall be as per the Approved-for- Construction shop drawings.

- a. Housing shall be as per OEM standard design and shall be of airtight permalock construction. It shall be rigidly reinforced and supported by structural angles. Housing for fan size bigger than 1250 mm dia shall be made out of continuously welded heavy gauge steel and will be made in split casing.
- b. 18 gauge galvanized wire mesh inlet guards of 5 cm sieves shall be provided on both inlets. Housing shall be provided with standard cleanout door with handles and neoprene gasket. Rotation arrow shall be clearly marked on the housing.
- c. Fan Wheel shall be backward-curved non-over loading type. Fan wheel and housing shall be statically and dynamically balanced. For fans upto 450 mm dia, fan outlet velocity shall not exceed 550 meter/minute. For fans above 450 mm dia, the outlet velocity shall be within 610 meter/minute. High static pressure fan speed shall be as per manufacturer.
- d. Shaft shall be constructed of steel, turned, ground and polished.
- e. Bearings: shall be of the sleeve / ball-bearing type mounted directly on the fan housing. Bearings shall be designed especially for quiet operation and shall be of the self-aligning, oil / grease pack pillow block type.
- f. Motor: Fan motor shall be high energy efficient (IE-2) and suitable for  $415\pm10\%$  volts, 50 cycles, 3 phase AC power supply, squirrel-cage, totally enclosed, fan-cooled motor, provided with class F insulation, and of approved make. Motor shall be designed especially for quiet operation. The fan and motor combination selected for the particular required performance shall be of the most efficient (smallest horse power), so that sound level is lowest.
- g. Drive to fan shall be provided through belt with adjustable motor sheave and a standard belt guard. Belts shall be of the oil-resistant type.
- h. Vibration Isolation: MS base shall be provided for both fan and motor, built as an integral part, and shall be mounted on a concrete foundation through vibration isolators. The concrete foundation shall be at least 15 cm above the finished floor level, or as shown in approved-for-construction shop drawings.
- i. Centrifugal fans shall be shaft driven external belt drive and motor .
- j. Fan shall conform to AMCA standard 211 and 311. Fan must be tested in accordance with ANSI/AMCA standard 210-99 and AMCA standard 300-96 in an AMCA accredited laboratory. Fans shall be certified to bear the AMCA label for air and sound performance.

### 13.12.5 AXIAL FLOW FAN

#### GENERAL :-

- a. Fans shall be of the type, size, arrangement and capacity as shown on the drawings.
- b. Unless specified, fan performance rating data shall be tested accordance with AMCA Standard 210-85(Air Moving and Conditioning Association).
- c. A computer printout of fan performance rating corresponding to the AMCA licensed data, with corrected ratings for altitude and temperature, fan operating speed, bearing life, etc. shall be submitted for approval.
- d. All fans shall be dynamically trim-balanced to ISO1940 or AMCA 204/3 - G2.5 quality grade after assembly. A computer printout with the vibration spectrum analysis shall be attached to the fans.
- e. Fan motors shall comply in all respects with continuous rating in accordance with IS/ IEC34 or equivalent. Motor bearings shall be of ball or roller type, grease or lubricant sealed for life. Fan and drive shall be earthed to prevent accumulation of static charge.
- f. Fans shall be installed at staircase or lobby where fresh air intake is free from any obstruction and shall be energized only by fire alarm system. Fan shall be of Axial Flow Fan. Protective grille at the suction of the fan is required.
- g. Fans for elevated temperature (Smoke Extraction Fans) with components rated for high temperature (250C, 2Hrs) service, with belt drive assemblies exposed to the air stream are not acceptable.
- h. For Smoke Extraction Fans where motor is in the air stream with electrical/electronic temperature limit switch for motor protecting shall not be used.
- i. Fan should be of G.S.S, the Steel sheet should be JFE Galva zinc (Base metal cold rolled), JIS G3302, SGCC with Z22 (minimum coating weight on both sides @ 220 g/m<sup>2</sup>) zinc coating & Zero Spangle, skin passed, chromated and dry or powder coated MS casing.
- j. If fan is open to atmosphere, Fans shall be with pure polyester powder coating for minimum thickness of 60 microns.
- k. Fan shall be AMCA certified for Air performance and Fan Efficiency Grade (Min FEG 71, lesser is not acceptable).
- l. Thickness of Axial fan's casing shall be as per OEM standard design.
- m. Smoke and heat exhaust fans are required to be in compliance with the CE/UL labelled / 'BSEN12101-3:2015'. This requires the fan to be subjected to a rated temperature of 250C for a rated duration of 120 minutes

#### 13.13 For Pressurization and other services:

- a. Outlet velocity of the fans should not exceed 16m/s.
- b. RPM as per OEM best selection to meet efficiency and noise criteria.
- c. Sound level for fans should not exceed 80DB (A) @ 3 meter (Room Condition).  
Except following specifications, rest of the specification shall be as per specifications mentioned in CPWD Specifications for HVAC works – 2017 amended up to date.

#### 13.14 BRIEF:-

- a. Single Piece Long Casing (Motor should completely be accommodated inside the fan casing) Axial Fans shall be licensed to bear the AMCA Seal.

- b. To achieve the minimum and equal clearance between the blade tips and casing, tube casing shall maintain its roundness by means of using one piece of sheet metal with 90 edges flanging up.
- c. Fan motor base support shall be properly secured (locked and sealed) to the fan housing and be of adjustable type to have precise control of motor shaft central position as well as running clearance between blade tips and casing. Motor (KW/HP) shall be able to be changed or upgraded at site without changing fan housing or ducting construction.
- d. Fans supplied shall be complete with factory fabricated mounting bracket (ceiling or foot mounted) and suction/discharge matching flanges as accessories.
- e. All hubs shall be cast Aluminum or Aluminum alloy (Grade LM2) unless for Smoke Extractor Fans where high temperature (250C/2Hrs) air is expected then Aluminum alloy or steel fan impeller blades are required. Otherwise impeller blade material with Polypropylene (PP), Glass- reinforced Polypropylene (PPG) and Glass-reinforced Polyamid (PAG), to provide self- balancing, anti-static, anti-sparking characteristic is preferable.
- f. Running clearance between blade tips and casing shall not exceed 1% of the impeller diameter and 2% for smoke spill high temperature fan where mechanical expansion coefficient is different from normal ambient temperature. Fan manufacturer shall provide the fan assembled with the same clearance between blade tips and casing of the tested prototype. Note that the air performance and pressure loss are greatly affected by this clearance.
- g. Impellers shall be secured to the drive shaft by a key and keyway. Axial location shall be provided by a collar or shoulder on the drive shaft together with a retaining washer and screw fitted into a tapped hole at the end of the shaft and locked in position. Blades shall be secured in place to the angle setting by setscrews, locking nuts or setting pins.
- h. Fan motor shall be totally enclosed and external terminal box of at least IP55 shall be provided
- i. All fans after assembly shall be dynamically trim-balanced to ISO1940 or AMCA 204/3 - G2.5 quality grade. A computer printout with vibration spectrum analysis shall be attached to the fans.
- j. For vanes Axial, Fan Casing should be provided with Special Designed Integral Straightening Vanes to reduced turbulence provide high performance & low noise level.
- k. Motor shall be as per high energy efficient (IE-2), totally-enclosed, fan cooled standard round frame, constant speed, continuous duty, single winding, suitable for 415+ 10% volts, 50 cycles, 3 phase AC power supply, provided with class 'F' / 'H' insulation with IP54/IP55 protection. Motor shall be specially designed for quiet operation. For lowest sound level, fan shall be selected for maximum efficiency or minimum horsepower. Motor conduit box shall be mounted on exterior of fan casing and lead wires from the motor to the conduit box shall be protected from the air stream by enclosing in a flexible metal conduit /vanes.
- l. The Axial Fan Blades shall be of Cast Aluminum or Aluminum alloy of aero foil design for high efficiency and high static pressure. The blades shall be joined together on cast aluminum hub.

- m. The mounting ring shall be of CRCA/sheet steel with steel brackets to connect the frame, with the Fan/Motor assembly. Rubber mounts shall be provided between the mounting frame and the mounting brackets.
- n. In case of fire the exhaust fans & motor shall be suitable for operation at minimum 250 deg C for 2 hours & shall be CE/UL labelled /EN certified.
- o. Fan blade shall be as per OEM standard design.

#### **13.14.1 Accessories : The following accessories shall be provided with all fans**

- a. Fire rated Canvas flexible connection as required.
- b. Gravity Louver.
- c. Bird Screen.
- d. Vibration isolation: The assembly of fan and motor shall be suspended from the slab by vibration isolation suspension of rubber-in-sheet type.
- e. TP isolator of suitable capacity with its enclosure shall be provided.
- f. Nuts, bolts, shims etc. as required for the grouting of the equipment.
- g. Fan shall be factory assembled and shipped with all accessories factory mounted.

#### **13.14.2 PROPELLER FAN**

Propeller fan shall be direct-driven, multiple blade type, mounted on a steel mounting plate with orifice ring.

- a. Mounting Plate shall be of steel construction, square with streamlined venturi inlet (reversed for supply applications) coated with baked enamel paint or with min 220gsm zinc coating. Mounting plate shall be of standard size depending upon the fan size as per OEM. Orifice ring shall be correctly formed by spinning or stamping to provide easy passage of air without turbulence and to direct the air stream.
- b. Fan Blades shall be constructed of aluminium or steel. Fan hub shall be of heavy welded steel construction with blades bolted to the hub. Fan blades and hub assembly shall be statically and dynamically balanced at the manufacturer's works.
- c. Shaft shall be of steel, accurately ground and shall be of ample size for the load transmitted and shall not pass through first critical speed thru the full range of specified fan speeds.
- d. Motor shall be energy efficient standard (easily replaceable) permanent split capacitor or shaded pole for small sizes, totally enclosed with pre-lubricated sleeve or ball bearings, designed for quiet operation as per approved design for  $220 \pm 10\%$  volts, 50 cycles single phase power supply/ $415 \pm 10\%$  volts, 50 cycles three phase power supply.
- e. Accessories : The following accessories shall be provided with propeller fans:
  - i. Wire guard on inlet side and bird-screen at the outlet.
  - ii. Fixed or gravity louvers built into a steel frame at the outlet.

#### **13.14.3 INLINE FANS**

##### **a) Circular Inline Fans**

Circular inline Centrifugal duct fan shall be a straight through radial fan. It should be compact. Motor shall be energy efficient.

The fan shall cope with high pressure and long duct runs, whilst still operating at an acceptable sound level.

The circular inline fans should be moisture resistant and should be approved for installing in humid or damp environments. The fans should be rated IP-44 when installed in a duct system. The casing should be manufactured from pre galvanized steel. Automatic thermo – contact shall open up if the temperature within the motor windings becomes excessive. Fan should be equipped with external rotor single phase asynchronous motor.

#### **b) Cabinet Inline Fans (Above 1000 CFM capacity)**

The Cabinet of the cabinet inline fans should be manufactured in galvanized steel & shall be with insulated housing for lower noise levels. The Mounting brackets and access panel should be fitted as per manufacturer standard. The impeller of the fans should be with high efficiency forward/backward curved DIDW/SISW type. The scroll of the fans should be fabricated with galvanized sheet steel. The motor of the fans shall be Squirrel cage induction type with bearings sealed for life. The motor shall be energy efficient suitable for single phase electrical supply. The cabinet of the fan shall be of double skin construction with acoustically lined with 25 mm glass wool with perforated GI sheet from inside. Fan noise level shall not be more than 60dBA at 3 meters distance in hemispherical reverberant room conditions.

#### **13.14.4 PERFORMANCE DATA**

All fans shall be selected for the lowest operating noise level. Capacity ratings, power consumption, with operating points clearly indicated, shall be submitted and verified at the time of testing and commissioning of the installation.

#### **13.14.5 TESTING**

Capacity of all fans shall be measured by an anemometer. Measured air flow capacities shall conform to the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current.

#### **13.14.6 INSTALLATION**

- i) The EPC Contactor shall supply all required bolts, base frame (wherever required), vibration isolators any other accessories and shall assure that the components are placed securely in proper position.
- ii) Vibration isolators shall be provided with an efficiency of not less than 80%.

#### **13.14.7 Duct Insulation & Duct Lining**

##### **13.14.7.1 SCOPE**

The scope of this section comprises the supply and application of insulation conforming to these Specifications.

### 13.14.7.2 MATERIAL

#### (i) Mat finished Al foiled Closed cell Elastomeric Nitrile Rubber

Closed cell Elastomeric Nitrile Rubber, having a uniform density not less than 40-60 Kg/cu. m. and with a 'K' value in the range of 0.035 watt/ meter Kelvin to 0.039 watt/ meter Kelvin for temperature ranging from 0 degree C to 40 degree C respectively. Material shall have temperature range of -40 degree C to +105 degree C for pipe insulation &

-10 degree C to +60 degree C for duct insulation. The insulation material shall be fire rated for Class 0 as per BS 476 Part 6 : 1989 for fire propagation test and for Class 1 as per BS 476 Part 7, 1987 for surface spread of flame test. Water vapour permeability shall be not less than

0.024 per inch ( $2.48 \times 10^{-13}$  Kg/m.s.Pa i.e.  $\mu > 7000$ : Water vapour diffusion resistance) as per IS/ EN 12086 & EN13469. All joints shall be sealed properly with adhesive, which shall provide similar vapour barrier as the original insulating material. 19mm thick insulation to be provided over duct inside building and 25mm thick insulation for exposed ducts.

### 13.15 Duct Insulation Application

Duct insulation shall be applied as follows:

- Apply CPRX compound of Shalimar Tar Products over the surface after cleaning the ducts.
- Measurement of surface dimensions shall be taken properly to cut insulation sheets to size with sufficient allowance in dimension.
- Material shall be fitted under compression & no stretching of material shall be permitted. A thin film of adhesive, as specified, shall be applied on the back of the insulating material sheet & then on the metal surface. When adhesive is tack dry, insulating material sheet shall be placed in position & pressed firmly to achieve a good bond. All longitudinal & transverse joints shall be sealed properly
- Apply PVC packing straps at regular intervals of 450mm onto GI corners.

### 13.16 Duct Lining

Open cell Nitrile rubber-12mm thick insulation for VRF/ Ductable split while 25mm thick insulation for modular DX AHU.

### 13.17 AHU ROOM ACOUSTIC:-

Product: GLASSWOOL ACOUSTIC BOARD

**Density:** 70-80 Kg/cu.m

**Thickness:** 25 mm

**Lamination:** One Side Aluminium Foil and Other side Black Glass Cloth

**Size:** 2.5 m x 1.2 m

The insulation should conform to non-combustibility, Class-P (not easily ignitable), Class 1 (surface spread of flame NIL), and Class 'O' rating as per BS 476 standards.

### 13.18 Installation guidelines:

- The surface shall be cleaned and friction fixed in 610mm X 610 mm frame of 25X25X18 mm made out of 22 G thick GI sheet U shaped channel or else it can be installed on the wall with screw bit.
- If wall surface is smooth it is preferable to install acoustic board with screw bit.
- The Acoustic board should be placed in such a way that black glass cloth is visible from inside the AHU /Plant room. Complete as required and as per specifications.

### 13.19 Air Distribution

#### a) SHEET METAL WORK AND INSULATION:

This section comprises of supply, fabrication, installation and testing of all sheet metal ducts and supply, installation, testing and balancing of grilles, registers and diffusers, in accordance with these specifications and the general arrangements shown on the drawings.

### 13.20 DUCT MATERIAL

All ducts shall be fabricated from galvanized steel sheets of the following thickness:

Round Ducts	20 Gauge	1.00mm thickness
Rectangular ducts up to 750mm	24 Gauge	0.63mm thickness
Rectangular ducts greater than 750 mm and up to 1500mm	22 Gauge	0.80mm thickness
Rectangular ducts greater than 1500mm and up to 2250mm	20 Gauge	1.00mm thickness
Rectangular ducts greater than 2250mm	18 Gauge	1.25m thickness

#### 13.20.1 DUCT FABRICATION

All Galvanized ducts shall be factory fabricated from lock form grade galvanized sheet steel zinc coated conforming with IS: 277, coating grade 120 or aluminium sheets conforming to ISS: 737- 1955 (wherever aluminium ducts are specified).and installed in a workman like manner, generally conforming to IS: 655-1963 (Revised) - Round exposed ducts shall be die formed for achieving perfect circle configuration.

Ducts shall be straight and smooth on the inside with neatly finished joints. All joints shall be made airtight by applying sealant during the assembly of the ductwork, Sealing of the seams shall be accomplished by using approved sealant. Transverse joints shall be made using sponge rubber sulphur-free foam rubber gasketing (3mm thick and 20mm wide) All exposed ducts within conditioned spaces shall have only slip joints and no flanged joints. The internal ends of slip joints shall be made in the direction of Air flow.

Changes in dimensions and shape of ducts shall be gradual. Curved elbows, unless otherwise approved, shall have a center line radius equal to one and half times the width of the duct. Air turns shall be installed in all abrupt elbows and shall consist of curved metal blades or vanes, arranged to permit the air to make the turns without appreciable turbulence.

All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, bracing to be as per IS:655-1963 tees or angles of ample size to keep the ducts true to shape and to prevent buckling, vibration or breathing.

All sheet metal connections, partitions and plenums required to confine the flow of air to and through the filters and fans, shall be constructed out of 18-gauge galvanized steel sheet, thoroughly stiffened with 25mm x 25mm x 3mm angle iron braces and fitted with all necessary doors, to give access to all parts of the apparatus. Doors shall not be less than 45cm x 45cm in size.

Volume control dampers wherever indicated on the drawings shall be installed as a minimum. The final duct design may call for additional volume control dampers based on final duct configuration.

#### **13.20.2 DUCT INSTALLATION**

All ducts shall be installed generally as per the drawings and in strict accordance with approved shop drawings prepared by the Contractor.

The contractor shall provide and neatly erect all sheet metal work as may be required to carry out the intent of these specifications and drawings. This work shall meet with the approval of the Engineer-in-charge in all its parts and details.

All necessary allowances and provisions shall be made by the contractor for beams, pipes, or other obstructions in the buildings, whether or not the same are shown on the drawings. Where it becomes necessary to avoid beams or other structural work, plumbing or other pipes, and/or conduits, the ducts shall be transformed, divided or curved to one side, the required area being maintained as approved or directed by the Engineer-in-charge.

If a duct cannot be run as shown on the drawing, the contractor shall install the duct between the required points by any path available, subject to the approval of the Engineer-in-charge.

All duct work shall be independently supported from building elements or as required by the Engineer-in-charge. All horizontal ducts shall be rigidly and securely supported, in an approved manner, within hangers formed of MS rods and angle iron under ducts not greater than 2 meter centres. All vertical duct work shall be supported by structural members at each floor.

Ducting on top of the ceiling shall be supported from the slab above, or from beams, after obtaining approval of the Engineer-in-charge. In no case shall a duct be supported from the ceiling hangers or be permitted to rest on a hung ceiling.

All metal work in dead or closed down spaces shall be erected in time to occasion no delay to other contractors in the building.

All ducts shall be totally free from vibration under all conditions of operations. Whenever duct work is connected to fans, that may cause vibrations in the duct, ducts shall be provided with two flexible connections located close to the unit in mutually perpendicular directions. Flexible connection shall be constructed of fire resistant flexible double canvas sleeves at least 10 cm long, secured properly and bolted at both ends. Sleeve shall be made

smooth and the connecting duct work rigidly held by independent supports on both ends. The flexible connection shall be suitable for pressures at the point of installation.

The two mating flanges of the ducts being joined with each other shall be made air tight by providing 3mm thick 20mm wide Sulphur-free foam rubber gasket on mating flanges.

#### **13.20.3 DAMPERS**

All dampers shall be of Galvanised iron construction with louver dampers of robust construction and tightly fitted. The design, method of handling, and control shall be suitable for the location and service required.

Dampers shall be provided with suitable links, levers and quadrants as required for their proper operation; control or setting devices shall be made robust, easily operable and accessible through suitable access doors in the ducts. Every dampers shall have an indicating device clearly showing the damper position at all times.

Dampers shall be placed in ducts and at every branch of supply air duct connections, whether or not indicated on the drawings, for the proper volume control and balancing of the system.

All the dampers at grille collars shall be of extruded aluminium construction with louver dampers of robust construction and tightly fitted.

#### **13.20.4 FIRE DAMPERS**

The ducts shall be provided with approved fire damper of at least 1 1/2 hours fire rating as shown on the drawing.

Fire damper blades shall be single piece folded type high strength galvanised steel construction. In normal position these blades shall remain parallel to air stream providing maximum air passage and preventing passing air currents from creating noise or chatter. The blades shall be held in position through a non spring return motor. Access doors are required at all damper locations and wherever indicated on the drawings. All access doors to be fabricated of the same material as the duct work and shall have a minimum of two hinges. Hinges shall be zinc plated, pins shall be of brass. Minimum dimension of the door shall be 300 x 300mm where duct sizes permit.

In case of fire, the signal from the smoke detector / thermister shall be utilised to close the fire damper as well as the AHU/ High Static ductable Unit.

Fire damper sleeves and access doors shall be provided within the ducts in accordance with the manufacturer's recommendations.

Rates being quoted for shall include fire dampers wiring etc. as required

#### **13.21 SUPPLY AIR REGISTERS**

Supply air registers shall be of approved make and of aluminium construction with individually adjustable bars. Supply air registers shall be double deflection type, with removable key-operated volume control dampers. The outer frame should be made out of 20-G and louvers of 24-G.

All registers shall be selected in consultation with the Engineer-in-charge, Different spaces shall require horizontal or vertical face bars, and different width of margin frames.

All registers shall have a soft, continuous rubber gasket between the periphery of the register and the surface on which it has to be mounted. The effective area of the registers shall not be less than 80 percent.

Registers shall be adjustable pattern as such grill bar shall be pivotable to provide pattern with 0 to 100 degree horizontal arc and up to 30 degree deflection up or down. Bars shall hold deflection settings under all conditions of velocity and pressure.

Bars longer than 45 cm shall be reinforced by a set back vertical member.

Registers shall be given a rust inhibiting prime coat and factory applied powder coated finish of approved colour.

### **13.22 SUPPLY AIR DIFFUSERS**

Diffusers shall be of approved make and of Aluminium construction, square / rectangular in shape with flush fixed pattern or adjustable flow pattern. Diffusers for different spaces shall be selected in consultation with the Engineer-in-charge.

All supply air diffusers shall be equipped with removable key-operated volume control dampers. Anti-smudge ring may be required in specific applications. The outer shell and diffusing assembly shall be made out of 18 and 24G respectively.

#### **a) OUTSIDE AIR LOUVERS**

Exhaust/Fresh air louvers of 80 mm thick high performance (55% free area) drainable fixed louver type powder coated Aluminium frame and blades. Mullions to be sliding interlock type with integral internal drain. Jamb and mullion drains to be open on front face in order to direct water away from inside of louver. Blades to be one piece extrusions with gutters design to catch and direct water to jumb and mullion drains. Fasteners to be aluminium. Louvers to have framed 13 mm mesh removable mill finish aluminium bird screens

#### **b) TESTING AND BALANCING**

After completion of the installation of the complete air distribution system, all ducts shall be tested for air leaks. Before painting the interiors, air distribution system shall be allowed to run continuously for 48 hours for driving away any dust or foreign material lodged within ducts during installation.

The entire air distribution system shall be balanced using approved anemometer. Air quantities at the fan discharge and at various outlets shall be identical to, or less than 5 percent in excess of, those specified and quoted. Leakage in each air distribution system shall be within 3 percent so that supply air volume at each fan shall be identical to, or no greater than 3 percent in excess of, the total air quantity measured at all supply outlets served by the fan. Branch duct adjustments shall be made by volume or splitter dampers. Dampers shall be permanently marked after air balance is complete so that these can be restored to their correct position if disturbed at any time. Complete air balance report shall be submitted to the Engineer-in-charge for scrutiny and approval, and six copies of the approved report shall be provided with completion documents.

### **c) EYE BALL JET\* DIFFUSER**

Jet diffusers shall be designed to handle high air flow rates and provide relatively long throws which makes them particularly suitable for conditioning of large spaces such as halls, auditoria, terminal buildings. The diffusers shall be versatile in application by virtue of the novel “reversible and rotatable” core design which allows the air jet to be adjusted for both pattern and deflection. Units may be mounted individually or in banks in bulkhead arrangements or directly into stub ducts.

Units shall be constructed from aluminium spinnings supported on a studding and spacer assembly. The core may be rotated through 180 degrees to expose either a straight or diffused core assembly. In addition, the diffuser spigot may be rotated within the mounting plate (if supplied) to enable a full 360-degree adjustment, by releasing the tension bolts.

It should have following Features:

- Simple and effective air diffusion for large spaces.
- Long throw characteristics.
- High air handling capacity.
- Easy to install and adjust.
- Reversible core to produce long throw jet or short throw diffuser patterns.
- Core rotatable through 360 degrees for “eyeball” jet direction.
- Jet may be deflected off axis by up to 15 degrees.

The **JET NOZZLE** shall be aerodynamically designed powder coated aluminium construction double skin eye ball type with double flap butterfly damper, mounted on steel face plate suitable for side wall installation. Nozzle shall be deep drawn in one single pc with discharge nozzle and face cover ring crimped on nozzle base to avoid the misplacing of ring problem. The Nozzle shall be housed in a specially designed housing with a mounting flange with holes for fastening the nozzle and aesthetic trim ring with snap locking arrangement to cover fasteners and give blemish free appearance. The color shade shall be as desired by Architect.

Type- jet nozzles eye ball

Draft length- 30mtr (as per requirement) Deflection – 0 to 40 degree

Type of finish – powder coated

Noise level – 30 NC

Housing – aluminium finish with snap locking face ring.

### **13.23 FLEXIBLE DUCTING**

Insulated/uninsulated flexible duct should be IS/UL with double lamination of tough polyester which encapsulates steel helix wire forms the air tight inner core, double layer core wrapped in a multiple thickness of fiberglass wool with R Value 4.2, Green guard certification of fiberglass wool must. Reinforced and sheathed in a rugged and durable tridirectionally reinforced metalized polyester jacket. Flexible duct connections should be made as per IS/UL181 listing procedure with proper flexible right forming brace connection allowing right connections for flexible duct into energy efficient. and Strapping the flexible duct connections with flexible duct strap ties.

#### **Flexible Canvass Connections (For Fans, AHUs etc.)**

Flexible canvass connections to isolate vibrations produced by Air handling units, Axial Flow fans and other air moving equipments when these are to be connected to air ducts where ever specified. Canvass connections shall be of the same cross-sectional area as the mating fan inlet/outlet or duct section.

Duct work connections to the fan inlets / outlets shall be concentricity aligned so that the flexible connections are not subjected to any strain

Flexible Duct connector shall be tested and certified in accordance with BS 476 part 7 for class 1 and NFPA -701 from NABL accredited lab

### **13.24 VAQ STATION (DEMAND CONTROL VENTILATION SYSTEM)-**

Demand control ventilation system for controlled fresh air based on CO2 demand shall have heavy gauge extruded aluminium of 1.5 mm nominal thickness complete with Zero leakage (aero foil construction) extruded aluminium profile volume control damper, Rapid Average Pitot tube; Air Flow Straightener (Honey-comb Patterned) with Motorized Assembly for Dampers with programmable single space DCV Controller combined with integrator; differential pressure sensor; & step down transformer of 24V. IVAQ system shall communicate through Modbus, BACnet & LON open protocol provide signal to VSD of air handle/ fan section unit. The system should complete in all respect including control panel/integrator, CO2 sensor, thermostat, actuator, all wiring, conduiting between sensor, actuator and to connect with VSD shall be included.

DCV system shall be interlocked & controlled with BMS system. Indoor air quality monitor having temperature and humidity sensor; carbon dioxide sensor; capacitive touch button with large display; 3.3V power supply and wired control port.

### **13.25 SPLIT AIR CONDITIONING UNITS WITH INVERTER TECHNOLOGY)**

#### **13.25.1 Scope**

The scope of this section comprise the supply, erection, testing and commissioning of Air Cooled Split Units conforming to these specifications.

### **13.25.2 Type**

The Split Units (Cassette / Hi-Wall/ ductable) shall be BEE 5 star rating (applicable as on date of supply of item) consist of Inverter compressor, motor, air cooled condenser, integral refrigerant piping and wiring, all mounted on a steel frame.

13.25.3 Indoor unit to be installed for Split Unit within building, shall be housed in insulated cabinet consisting of cooling coil, blower with motor, filter & insulated drain pan. Split unit must deliver specified capacity after taking into account losses due to piping length & site conditions.

### **13.25.4 Capacity**

The refrigeration capacity of split unit shall be as per actual requirement work out by EPC Contractor.

### **13.25.5 Compressor and Motor**

Compressor shall be inverter type and shall have dual pressure stat, and an operating oil charge. The motor shall be suction gas cooled and shall be sealed against dirt and moisture. The motor shall be suitable for  $415\pm10\%$  volts or  $230\pm10\%$  volts, 50 Hz, A.C. supply.

### **13.25.6 Refrigerant Piping and Controls**

Refrigerant piping and fittings interconnecting compressor condenser shall be all copper and valves shall be brass / gunmetal construction. The refrigerant used shall be ozone friendly HFC R410A/ R-32 or green refrigerant.

### **13.25.7 Casing**

The indoor & outdoor units shall be sectionalized / cabinet construction. Indoor units shall be consisting of fan section, coil section, filter section, and drain pan. Outdoor unit shall consist of condenser coil, fan & compressor. The compressor shall be mounted with the outdoor units. Each section shall be constructed of thick sheet steel all welded / bolted construction, adequately reinforced with structural members and provided with sufficient access panels for proper lubrication and maintenance. Base panel shall be constructed of fabricated steel structure provided with an under frame suitably braced. Drain pan shall extend under coil and fan sections with drain connections. Removable panels in fan and coil sections shall provide access to all internal parts.

### **13.25.8 Fan Motor and Drive**

Fan motor shall be suitable for  $415 \pm 10\%$  volts or  $230\pm10\%$  volts, 50 Hz, A.C. Supply, Single phase, motors shall be provided with permanent capacitor. Motors shall be especially designed for quite operation.

### **13.25.9 Fan**

Fan wheels and housing shall be fabricated from heavy gauge steel. Fan wheels shall be of double-width, double inlet forward-curve, multi-blade type enclosed in a housing and mounted on a common shaft. Fan housing shall be made of die-formed steel sheets with stream-lined inlets to ensure smooth air flow into the fans, fan shaft bearing shall

be oil/grease lubricated. All rotating parts shall be dynamically balanced individually, and the complete assembly shall be statically and hydraulically balanced.

### **13.25.10 Cooling Coil**

Cooling coils shall be of fin and tube type having aluminium fins firmly bonded to copper tubes assembled in zinc coated steel frame. Face and surface areas shall be such as to ensure rated capacity from each unit and air velocity across each coil shall not exceed 100 meters per minute. The coil shall be pitched in the unit casing for proper drainage. Each coil shall be factory-tested at 21 Kg. per sq.cm air pressure under water. Water coils shall be designed for a maximum working pressure of 10 kg/sq.cm. Tube shall be mechanically

/ hydraulically expanded for minimum thermal contract resistance with fins. The number of fins per cm. shall be 4 to 5.

### **13.26 Vibration Isolators**

The indoor and outdoor units shall be provided with ribbed rubber pad vibration isolators.

#### **13.26.1 Painting**

Shop coats of paint that have become marred during shipment or erection shall be cleaned off with mineral spirits, then coated with enamel paint to match the finish over the adjoining shop-painted surface.

#### **13.26.2 Performance Rating**

The unit shall be selected for the lowest operating noise level.

### **ULTRAVIOLET GERMICIDAL IRRADIATION (UVGI) SYSTEM**

Ultra Violet Germicidal Irradiations, (UVGI) System to be installed inside the AHU/Duct for Improvement of Indoor Air Quality and or Energy Saving (when installed inside the AHU's) as per Specifications. The Average Life of UV lamps shall be 12000 hrs.

The UVGI System shall consist of UV lamps, parabolic reflector (Reflector only in case of AHU mounting) with its mounting assembly and control panel. The Control Panel shall be mounted outside the AHU and should Consist of ballast, hour meter, MCB (or disconnect switch), Indicating Light. The Prices to include inter connected wiring (UV resistant) between the UVGI lamps and its panel.

The UVGI System should be designed to achieve at least 90% kill rate per pass of all air borne bacteria and virus. The design intensity of the lamp should be based on wavelength 254 nm. It should be ensured the lamp should not perform at ultra-low wavelength 180 nM or lower, to ensure no uncontrolled and unmodulated ozone is put out by the lamp.

UV lamp shall be fabricated out of special high transmission Quartz Glass and of the high output. UV lamp shall not produce ozone or other secondary contamination and to substantiate this the lamps shall be tested by an approved Indian lab for output performance of 254 nm. Lamp manufacturer to submit the certificate from this lab. The lamp shall be high output type and should not be lower than 800 mA.

The EPC contractor shall submit the Coil Size and CFM for AHU mounted application and Duct size with CFM for Duct mounted application. The length of straight duct should be provided by the Contractor at site.

#### COMPREHENSIVE AIR PURIFICATION SYSTEM

To improve Indoor air quality by using combination of Needle point , Tube Type & Carbon Brush Type Bi-polar Ionization technology, which produces a natural Bio Climate rich in positive and negative ions. The Needle Point and Carbon Brush type Bipolar Ionizers should not have any consumables and should have a life of 10 years. System should be fitted with Fine Filter Media with very less static drop acceptable upto 5 mm wg of Initial pressure drop wherever requires, Along with indoor Air quality monitor to measure Air quality parameters including PM2.5, PM 10, TVOC, CO2, Humidity and Temperature. This monitor should be a 3 tier architecture including sensor Hardware, secure cloud infrastructure, monitoring apps including dashboard, android/IOS apps, where ever requires. Project design should meet standard ASHRAE 62.1 IAQ Procedure for energy saving. System should kill microorganism and pathogens, remove odour, VOC and reduce dust particle /particulate matter / PM2.5 /PM 10. The product should be UL / Intertek listed. Product should have minimal or negligible pressure drop & low power consumptions. Product should have UL 867 and UL 2998 certification (for zero ozone emission).

#### ELECTRICAL INSTALLATION:-Refer detailed Electrical specifications and as per CPWD specification.

ANNEXURE :- HEAT LOAD SUMMARY & EQUIPMENT SELECTION FOR CLUB AT PLOT 1															
BASIS OF DESIGN				DESIGN DATA SUMMARY				EQUIPMENT SELECTION							
S. NO.	CONDITIONED SPACE	AREA	MAX LOAD	MAX DEHUMIDIFIED CFM	OUTDOOR AIR REQUIRED	UNIT TYPE	UNIT TR	UNIT CFM	QTY	TOTAL TR	TOTAL CFM	VRF ODU	ODU QTY (*)	TOTAL ODU CAPACITY	
		S.FT	TR	CFM	CFM		TR	CFM	NOS.	TR	CFM	HP	NOS.	HP	
1	GROUND FLOOR														
1.1	COMMUNITY HALL @ PLOT A	4319	40.6	14391	1699	DX TYPE FM AHU	42.0	16000	1	42.0	16000	52	1	52	
1.2	GREEN ROOM 1	102	0.5	177	21	HI WALL	1.0		1	1.0					
1.3	GREEN ROOM 2	102	0.5	202	21	HI WALL	1.0		1	1.0					
1.4	ADMIN ROOM	99	0.5	190	21	HI WALL	1.0		1	1.0					
1.8	RECEPTION 7 PASSAGE	1091	4.5	1843	165	CS DUCTABLE	6.4		1	6.4					

					CS DUCTABLE	4.5		1	4.5					
1.5	REST ROOM	240	0.7	282	24	1-WAY CASSETTE	1.6		1	1.6		10	1	10
1.6	LIVING/DINING/PLAYROOM	573	6.0	1481	388	CS DUCTABLE	4.5		1	4.5				
1.7	STUDY ROOM	217	0.9	389	28	1-WAY CASSETTE	1.6		1	1.6				
1.9	FRESH AIR					CS TFA	4.0	741	1	4.0	741			
<b>2</b>	<b>FIRST FLOOR</b>													
2.1	DOUBLE HEIGHT ENTRANCE LOBBY	701	4.3	1796	142	CS DUCTABLE	4.5		1	4.5		24	1	24
2.2	2400 MM WIDE CORRIDOR	683	3.0	1314	91	CS DUCTABLE	4.5		1	4.5				
2.3	TT ROOM	444	2.7	903	125	CS DUCTABLE	4.0		1	4.0				
2.4	GYM	610	6.8	1528	410	CS DUCTABLE	6.4		1	6.4				
2.5	FRESH AIR					CS TFA	4.0	741	1	4.0	741	10	1	10
	<b>TOTAL</b>	<b>9182</b>	<b>70.9</b>	<b>24497</b>	<b>3136</b>				<b>15</b>	<b>91</b>				<b>114</b>

\* Minimum out door unit 8 Nos. is required i.e. 20+20+12+18+10+12+12+10

ANNEXURE :- HEAT LOAD SUMMARY & EQUIPMENT SELECTION FOR CLUB AT PLOT 2														
BASIS OF DESIGN			DESIGN DATA SUMMARY			EQUIPMENT SELECTION								
S. NO.	CONDITIONED SPACE	AREA	MAX LOAD	MAX DEHUMIDIFIED CFM	OUTDOOR AIR REQUIRED	UNIT TYPE	UNIT TR	UNIT CFM	QTY	TOTAL TR	TOTAL CFM	VRF OD U	ODU QTY (*)	TOTAL ODU CAPACITY
		S.FT	TR	CFM	CFM		TR	CFM	NOS.	TR	CFM	HP	NOS.	HP
1	GROUND FLOOR													
1.1	COMMUNITY HALL @ PLOT B	4327	42.7	15630	1700	DX TYPE FM AHU	42.0	16000	1	42.0	16000	52	1	52
1.2	GREEN ROOM 1	102	0.5	194	21	HI WALL	1.0		1	1.0				
1.3	GREEN ROOM 2	102	0.5	207	21	HI WALL	1.0		1	1.0				
1.4	ADMIN ROOM	99	0.5	190	21	HI WALL	1.0		1	1.0				
1.5	RECEPTION & PASSAGE	972	4.6	1916	158	CS DUCTABL E	4.5		1	4.5				
						CS DUCTABL E	4.5		1	4.5				
1.6	MALE CHANGING ROOM					CS DUCTABL E	3.3		1	3.3				
1.7	FEMALE CHANGING ROOM					CS DUCTABL E	3.3		1	3.3				
1.8	REST ROOM	257	1.3	642	25	1-WAY CASSETTE	2.0		1	2.0				
1.9	LIVING/DINING/PLAYROOM	696	8.0	2315	470	CS DUCTABL E	4.5		1	4.5				
1.10	STUDY ROOM	218	1.5	743	28	1-WAY CASSETTE	2.0		1	2.0				
1.11	FRESH AIR					CS TFA	4.0	741	1	4.0	741			
2	FIRST FLOOR													
2.1	DOUBLE HEIGHT ENTRANCE LOBBY	701	4.8	2107	142	CS DUCTABL E	4.55		1	4.6				
2.2	2400 MM WIDE CORRIDOR	570	3.9	1316	178	CS DUCTABL E	4.55		1	4.6				
2.3	TT ROOM	482	3.6	1433	132	CS DUCTABL E	4.0		1	4.0				
2.4	GYM	1018	10.6	2841	583	CS DUCTABL E	6.4		1	6.4				
2.5	FRESH AIR					CS TFA	4.0	741	1	4.0	741	10	1	10
	<b>TOTAL</b>	<b>9545</b>	<b>82.6</b>	<b>29533</b>	<b>3480</b>				<b>17</b>	<b>97</b>				<b>120</b>

\* Minimum out door unit 9 Nos. is required i.e. 20+20+12+12+12+10+12+12+10

## ANNEXURE :- HEAT LOAD SUMMARY &amp; EQUIPMENT SELECTION FOR PLOT A

BASIS OF DESIGN			DESIGN DATA SUMMARY			EQUIPMENT SELECTION			
S. NO.	CONDITIONED SPACE	AREA	MAX LOAD	MAX DEHUMIDIFIED CFM	OUTDOOR AIR REQUIRED	UNIT TYPE	UNIT TR	QTY	TOTAL TR
		S.FT	TR	CFM	CFM		TR		
1	PLOT-A								
1.1	CARETAKER OFFICE	178	0.9	433.0	26	HI-WALL SPLIT	1.5	1	1.5
1.2	BANK ENGINEER OFFICE	151	0.9	400.6	24	HI-WALL SPLIT	1.0	1	1.0
1.3	DOCTOR CONSULTATION ROOM	161	1.0	461.5	25	HI-WALL SPLIT	1.5	1	1.5
1.4	DISPENSARY	212	1.3	565.5	38	HI-WALL SPLIT	2.0	1	2.0
1.5	EPBAX/CCTV/CONTROL ROOM	200	1.2	592.4	27	HI-WALL SPLIT (1W+1S)	2.0	2	4.0
	<b>TOTAL</b>	<b>901</b>	<b>5.3</b>	<b>2453</b>	<b>139</b>			<b>6</b>	<b>10.0</b>

ANNEXURE :- HEAT LOAD SUMMARY & EQUIPMENT SELECTION FOR PLOT B									
BASIS OF DESIGN			DESIGN DATA SUMMARY			EQUIPMENT SELECTION			
S. NO.	CONDITIONED SPACE	AREA	MAX LOAD	MAX DEHUMIDIFIED CFM	OUTDOOR AIR REQUIRED	UNIT TYPE	UNIT TR	QTY	TOTAL TR
		S.FT	TR	CFM	CFM		TR	NOS.	TR
1	<b>PLOT-B</b>								
1.1	EPBAX/CCTV/CONTROL ROOM	194	1.2	591	27	HI-WALL SPLIT (1W+1S)	2.0	2	4.0
1.2	DISPENSARY	216	1.2	496	38	HI-WALL SPLIT	2.0	1	2.0
1.3	DOCTOR CONSULTATION ROOM	161	0.9	428	25	HI-WALL SPLIT	1.5	1	1.5
1.4	ENGINEER OFFICE	162	0.8	378	25	HI-WALL SPLIT	1.5	1	1.5
1.5	CARETAKER OFFICE	162	0.8	378	25	HI-WALL SPLIT	1.5	1	1.5
	<b>TOTAL</b>	<b>895</b>	<b>5.0</b>	<b>2271</b>	<b>139</b>			<b>6</b>	<b>10.5</b>

**Note:** The firm will be required to provide items/material/ capacity mentioned in above is indicative herein. The EPC agency to design as per parameters mentioned above. The department reserves the right to accept items/materials with richer specifications as available in the market/ with manufacturer due to technological upgradations/ model updating, without any extra cost implication with the approval of Engineer in charge.

## **Package C– 14.A**

### Water Treatment Plant

- 14 The scope of **Water Treatment Plant** (WTP) shall consist of providing all labour, materials, equipment, appliances, technology as specified and required to install all sheet metal and other allied works (Civil, Electrical and Mechanical) to make the Water Treatment Plant ready for operation as per drawings, Flow diagram and specifications. However, the plant capacity shall not be less than **20M<sup>3</sup> /Hr and minimum following criteria.**

**14.1 FILTER FEED PUMP – 02 Nos. (1W+1S)**

MOC	CI
Capacity	20m <sup>3</sup> /hr
Head	35 Mtr.

**14.2 OXIDATION CHEMBER WITH FRONTAL PIPING & VALVES, INLET & OUTLET PR. GAUGE- 01 No**

Vessel Dia	1000 MM
Vessel Height	1500 MM
Shell Thickness	4 MM
Disc Thickness	5 MM
Design Pressure	3.5 Kg/cm2
Frontal Pipe Size	10MM
Frontal Valve	5 Nos (Butterfly Type)
Air Release Valve with Pipe	01 No
Pressure Gauge	02 Nos
Sampling Cock	02 Nos
Media	
MNO2	1000 Kgs
Filtering Sand	16x32-350 Kgs
Pebbles	40x 25-150 Kgs
Pebbles	20x12-150Kgs
Crushed Gravels	6x2-125 Kgs
Course silex	100 Kgs
Fine Silex	100 Kgs
Painting	Internal Black Bituminous and outside 2 coat enamel
Backwash Frequency	When DP more than 0.6 kg/cm2

**14.3 DUEL MEDIA FILTER WITH FRONTAL PIPING & VALVES, INLET & OUTLET PR, GAUGE – 01 NO.**

Vessel Dia	1700 MM
Vessel Height	1500 MM
Shell Thickness	5 MM
Disc Thickness	6 MM
Design Pressure	3.5 Kg/cm2
Frontal Pipe Size	100MM
Frontal Valve	5 Nos (Butterfly Type)
Air Release Valve with Pipe	01 No
Pressure Gauge	02 Nos
Sampling Cock	02 Nos
Media	
Anthracite	650 kg
Filtering Sand	16x32-1600 Kgs
Pebbles	40x 25-400 Kgs
Pebbles	20x12-400Kgs
Crushed Gravels	6x2-300 Kgs
Course silex	300 Kgs
Fine Silex	300 Kgs
Painting	Internal Black Bituminous and outside 2 coat enamel
Backwash Frequency	When DP more than 0.6 kg/cm2

**14.4 ACTIVATED CARBON FILTER WITH FRONTAL PIPING & VALVES, INLET & OUTLET PR, GAUGE – 01 NO.**

Vessel Dia	1800 MM
Vessel Height	1500 MM
Shell Thickness	5 MM
Disc Thickness	6 MM
Design Pressure	3.5 Kg/cm2
Frontal Pipe Size	100MM
Frontal Valve	5 Nos (Butterfly Type)
Air Release Valve with Pipe	01 No
Pressure Gauge	02 Nos
Sampling Cock	02 Nos
Media	
Activated Carbon	1400 kg
Pebbles	40x 25-450 Kgs
Pebbles	20x12-450Kgs
Crushed Gravels	6x2-350 Kgs

Course silex	350 Kgs
Fine Silex	350 Kgs
Painting	Internal Black Bituminous and outside 2 coat enamel
Backwash Frequency	When DP more than 0.6 kg/cm <sup>2</sup>

#### 14.5 HYPO DOSING SYSTEM

Pump Type	Electronics Diapharm Type
Pump Capacity	0-6 LPH
Dosing Tank	01 No, HDPE/ 100 Ltr

##### 14.5.1 pH DOSING SYSTEM

Pump Type	Electronics Diapharm Type
Pump Capacity	0-6 LPH
Dosing Tank	01 No, HDPE/ 100 Ltr

#### 14.6 Electrical Panel – 01 No.

Type	MCC
MOC	MS Poder Coated

The Panel should be as per CPWD General specifications for electrical work Part-I-(Internal) 2023, Part-II (External)2023 and Part-IV (Substation). The panel should have compatible to BMS system and should have RS 485 port.

#### 14.7 Installation

The machinery shall be accurately installed to correct dimensions, alignments, levels, etc., all as indicated on the final shop drawings.

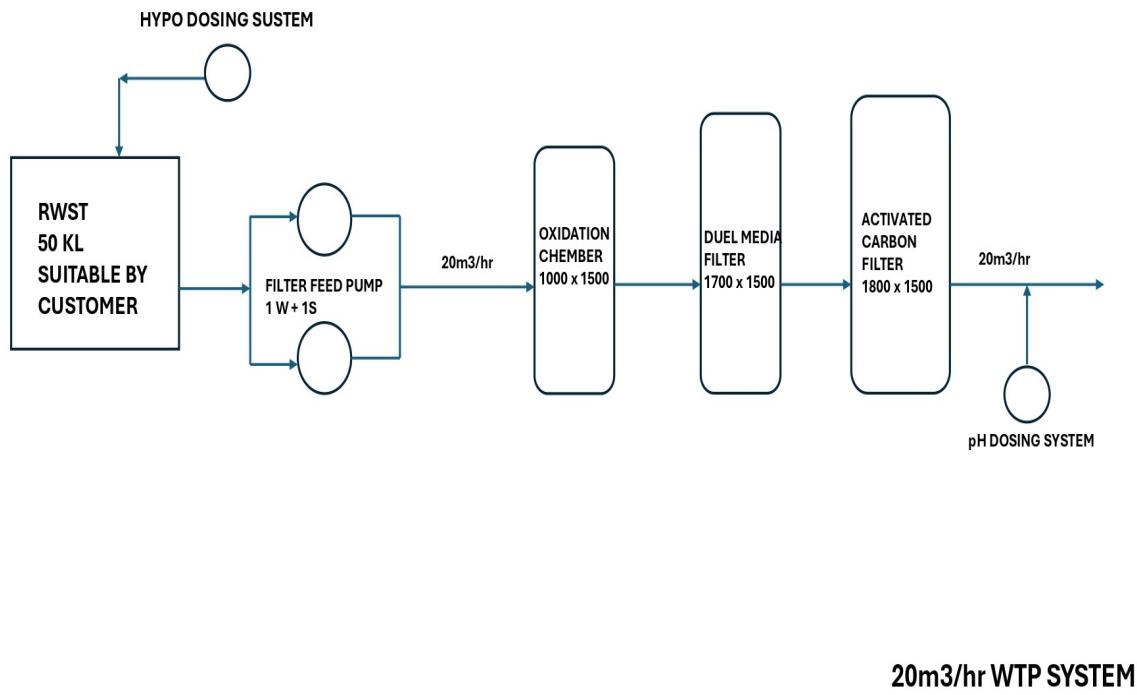
#### 14.8 Testing and Hand over

The performance of the system shall be demonstrated by taking hourly samples of the non-filtered water and final filtered water over a twelve-hour period.

#### 14.9 Training

Provide training facilities courses to ensure that the employer's staff may acquire full knowledge and appreciation of all aspects, day-to-day operation, breakdown and routine maintenance, and fault diagnosis of all plant, equipment and systems.

Training to the employer's staff shall be held as appropriate at the Agency's or manufacturer's premises and on site.



### Package C– 14.B

**(Water Treatment & Filtration Plant for Swimming pool and Lighting in swimming pool)**

14.B The scope of **Water Treatment & Filtration Plant** (WTP) for **Swimming pool** shall consist of providing all labour, materials, equipment, appliances, technology as specified and required to install all sheet metal and other allied works (Civil foundation, Electrical and Mechanical) to make the Water Treatment Plant ready for operation as per drawings, Flow diagram, specification. However, the plant should have minimum following criteria.

**14.B.1 Side Mount Bobbin Wound Pool Filter – 02 Nos.**

Capacity of Filter	Suitable capacity as per pool standard.
Max. Working Pressure	3.5 Bar
Factory Testing Pressure	4.5 Bar
Max. Operating Temp.	50°C
MOC	Filament wound with Isophthalic resin UV protection. FRP Liner
Size	As per manufacturer standard.
Filer Media (Coarse)	Silica Sand with suitable size mesh.
Qty of media (Coarse)	Not less than 530 Kg for each filter.
Filer Media (Fine)	Silica Sand with suitable size mesh.
Qty of media (Coarse)	Not less than 770 Kg for each filter.

**14.B.2 SWIMMING POOL PUMP – 03 Nos. (2W+1S)**

H.P.	5 HP
Capacity	Suitable capacity to fulfill pool requirements
Head	Suitable
Supply Voltage	3 phase, A.C. Supply.
Special feature of pump set	Hydraulic isolator separates priming water
	Dual-compartment motor
Seal	Diamond seals made of oxidation-resistant, self-retaining EPDM rubber

**14.B.3 CHEMICAL DOSING SYSTEM**

Pump Type	Dosing pump
Nos of Pump	2 Nos.
Pump Capacity	0-6 LPH against 8 Bar.
Flow and Adjustment	Constant flow and manual adjustment.
Dosing Tank	02 No, HDPE 100 Ltrs capacity.
Dosing chemical	TCCA-90 (Tri chloroisocyanuric Acid, 90% chlorine)- 50 Kg.

## 14.B.4 Electrical Panel – 01 No.

The Panel should be as per CPWD General specifications for electrical work Part-I-(Internal) 2023, Part-II (External)2023 and Part-IV (Substation). The panel should have computable to BMS system and should have RS 485.

The panel board should have sufficient nos. suitable capacity switchgears, staters, aluminum bus-bar of suitable capacity, measuring & protection instrument, earth bar etc.

## 14.B.5 Piping

Necessary pipe line work with suitable size pipe for connection and interconnection, valve etc as required to complete the work in true shape.

## 14.B.6 Installation

The machinery shall be accurately installed to correct dimensions, alignments, levels, etc., all as indicated on the final shop drawings.

## 14.B.7 Testing and hand over

The performance of the system shall be demonstrated by taking hourly samples of the non-filtered water and final filtered water over a twelve-hour period.

## 14.B.8 Training

Provide training facilities courses to ensure that the employer's staff may acquire full knowledge and appreciation of all aspects, day-to-day operation, breakdown and routine maintenance, and fault diagnosis of all plant, equipment and systems.

Training to the employer's staff shall be held as appropriate at the Agency's or manufacturer's premises and on site.

14.C **Swimming pool Lighting**

14.C.1 The work shall be carried out as per CPWD General Specifications for Electrical Works Part-I 2023 as amended and corrected up to date, Part-II (External) 2023 as amended and corrected up to date, relevant IE rules, IS standard, NBC 2016 amended and corrected up to date, Contractor will enable the consultant for obtaining fire NOC, rectify the defects and shortcomings, if any, pointed by the inspecting authority and arrange inspection/ testing of the scheme as required for this purpose.

14.C.2 The scope of Swimming pool Lighting shall consist of providing all labour, materials, equipment, appliances, technology as specified in drawings and required to install all sheet metal and other allied works (Electrical and Mechanical) to make the pool ready for operation as per drawings, Flow diagram, specification. However, the plant should have **minimum** following Lighting and accessories.

**14.C.3 LUMINARIES (Minimum 16 Nos.)**

Parameter	Rage / Technical data
Type of Light	RGBW LED under water light
Wattage	18 W
Mounting arrangement	Surface mounting.

Lux level	Minimum 100 Lux
Protection	IP 68 or above.
Environment	IP20. 0°C - 50°C
Body of fittings	Anti rust, metal body

#### 14.C.3 DMX controller (Minimum 1 No.)

Parameter	Rage / Technical data
Input Power	5-5.5V DC 0.6A
Output Protocol	DMX512 (x2)
Programmability	PC, Mac, Tablet, Smartphone
Connections	USB-C, 2x XLR3, 2x HE10
Memory	100KB flash
Environment	IP20. 0°C - 50°C
Buttons	2 buttons to change scene 1 button to change dimmer
Dimensions	79x92x43mm 120g
Complete Package	140x135x50mm 340g
OS Requirements	Mac OS X 10.13 + Windows 10/11
Standards	Low voltage, EMC, and RoHS

#### 14.C.3 Power Supply Unit (Minimum 3 Nos.)

Parameter	Rage / Technical data
Max. output	200 W
Input Voltage	176-264 V (AC)
Output Voltage	Constant, 24 V
Output current	0-8.4 A
Power factor	0.97 (240 V AC & Full load)
THD	<10%
Surge immunity	DM 6KV, CM 10 KV
Protection	IP67
Warranty	5 Years

14.C.4 Cabling shall be DMX Control Cable of suitable length and size.

**Scope of Maintenance of Electrical & Mechanical Works during defect liability period of 3 years:**

1. Defect Liability Period / Warranty period for all equipments shall be guaranteed for a period of 3 (Three) years after the date of actual completion of work as recorded by the Engineer-in-charge 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 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 attending the defect / fault removed, 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. The firm will be required to attend to the breakdowns calls as and when required from RBI authority. However, the RBI authority shall carry out daily routine maintenance and operation after handing over the site to RBI authority in working conditions.
2. The contractor has to maintain the installation as per terms & condition and scope of work in the CAMC Annexures 3 to Annexure 10 for the services such as Centralized Intercom system including EPABX System & Video phone, IPCCTV system, Fire Alarm System, Lifts, UPS system, Solar Power system, Air Condition system and STP for three year defect liability period without any additional cost. The rate quoted for CAMC shall be paid to him for maintenance of above services after three year defect liability period.
3. During DLP, the main contractor has to be deployed minimum one Skilled person & one unskilled person 24 x 7 in each shift for look after the E&M installation installed by main agency for the remaining services (except given in Sr.No.2). No extra payment shall be made for the same.
4. Qualification and experience:
  - (i) Wireman should possess class II license for wireman issued by electricity authority or 2-years ITI in relevant trade with minimum 3 years' experience in maintenance and electrical installation.
  - (ii) Khalasi should be physically and mentally fit to work, should be able to read and write and three years and have educational qualification of Matriculation or equivalent experience in assisting the wireman in the electrical work.
5. If any staff remain absent from duty during DLP, recovery shall be made at following rate:

Sl. No.	Designation	Minimum wages	Recovery Rates (per day per shift per persons)
1.	Skilled person – 1No.	Rs. 893.00	Rs. 1,786.00
2.	Unskilled – 1 No.	Rs. 674.00	Rs. 1,348.00

6. The balance fifty percent (50%) security deposit shall be released after completion of defect liability period.
7. The scope of work, shall include cost of spares, provision of repair component and replacement of items as required. Nothing will be paid extra to the contractor on this account.
8. The contractor has to maintain stock of new materials (switch, socket, regulators, MCB's, RCCB's, MCCB's, wires, internal and external LED lights, sprinkler heads, detectors, filters etc.)
9. The agency shall make necessary arrangement for lodging of complaints through phone / intercom, attending the same and record upkeep and provide required manpower and

hardware to successfully operate system. They shall take prompt action to attend any complaint assigned to him through site order book/verbal instruction.

10. No delay complaints of emergent nature (such as electricity not being available) shall be attended within 4 hours.
  - i. Minor complaints shall be attended within 24 hours.
  - ii. Major complaints shall be attended within 15 days or as decided by Engineer-in-Charge.
11. Dismantled materials received at site, after replacement, shall be the property of agency.

## Package C – 15

### **Comprehensive Annual Maintenance Contract (CAMC)**

The various services are executed according to the scope of work outlined in the above packages. The services are tested and commissioned as per the terms and conditions of the contract. Thereafter, upon a successful trial run, the services shall be handed over to the client, and the supplementary agreement shall be drawn between the service provider/OEM with RBI as per the quoted rates and escalation as per the formulae given in this package.

**Comprehensive Annual Maintenance Contract (CAMC)** for maintenance and services of Centralized intercom system including EPABX & Video Phone System, IPCCTV system, Fire Alarm System, Lifts, UPS system, Solar Power system, Air Condition system and STP etc. in RBI's Quarters at Zoo- Narengi Road Colony, Guwahati, Assam.

#### **Definitions-**

S. No.	Terminology	Definitions
1	Service provider	OEM or their authorizer service agent or system installer who installed system in this agreement.
2	Bank (RBI)	Any person duly authorized by Reserve Bank of India to act in this matter.
3	Main contractor	L1 tenderer to whom the main work is awarded.
4	DLP	Defect liability period (3 years)
5	CAMC	Comprehensive annual maintenance contract

**Summary:** The RBI Complex Building at Zoo- Narengi Road Colony, Guwahati, Assam will come up as a comprehensive project together with Civil works, E&M works and all Services included. For smooth and efficient maintenance of various specialized electrical installations/equipment (Centralized Intercom system including EPABX System & Video phone, IPCCTV system, Fire Alarm System, Lifts, UPS system, Solar Power system, Air Condition system and STP, henceforth called “Respective Equipment/system”), the contractor is required to ensure that these systems are maintained by the respective OEM or the system integrator who has installed the respective system in the Bank (hereafter referred as “Service Provider” or “Maintenance Contractor”) for their minimum expected life including defect liability period. The successful tenderer shall ensure that **bi-partite agreement(s)** is/are to be executed between the Bank and the respective Service Provider **at the time taking over of the system by the Bank** for carrying out the maintenance during DLP and CAMC period of referred equipment(s).

**Broad Parameters:** For this purpose, 50% of PG of the main contractor will be released only after the signing of CAMC by the System integrator/OEM/Service Provider with RBI. The supplementary bi-partite agreement shall be signed for maintenance of services such as Centralized intercom including EPBAX &Video Door Phone System, IPCCTV system, Fire Alarm System,

Lifts, UPS system, Solar Power system, Air Condition system and STP etc. for their useful life, henceforth called “Respective Equipment”, Together with the successful signing of the CAMC contract with the RBI, the Service Provider shall submit an equivalent Bank Guarantee of 10% of the Capital Cost of the respective equipment as quoted. On showing proof for the same, the 50% PG shall be released by the CPWD.

On completion of the main contract, if the service provider (s) do not enter the bipartite agreement with the bank then the main contract shall be considered as not performed and, in such a situation, the 10% amount withheld above by CPWD from the main contractor shall be forfeited by the Engineer-in-charge and shall be absolutely at the disposal of Govt. Further, the bank shall be at liberty to get the CAMC done by any other means. Such a service provider who fails to sign a bi-partite agreement with the bank may be debarred by CPWD for 2 years to execute the works throughout India.

The first year rates of the CAMC after DLP shall be quoted in the relevant sections of the BOQ and shall be part of the Bid. The Rates for the CAMC for the further period shall be renewed as per the formula given later for operationalising the contract between the Bank and the maintenance contractor / service provider.

The minimum expected life of these systems will be considered as given below:

S. No.	Equipment / System	Minimum Expected Life (years)
1)	Fire Alarm System	8
2)	Lifts	20
3)	Centralized intercom system including EPABX and Video Door phone	8
4)	Solar Power System and heating system	10
5)	Air conditioning system	5
6)	IPCCCTV system	8
7)	UPS system	8
8)	STP	10

#### **Additional conditions for the CAMC.**

- Undertaking from the Service Provider:** The successful tenderer shall submit an undertaking from the OEM/System integrator from whom the above captioned works are intended to be executed **before the approval of that agency (Service Provider) by CPWD** in the attached format given at Annexure-1.
- The successful tenderer shall ensure that **A bipartite agreement (s)** as per the format given at Annexure 2 is executed between the Bank and the Service Provider for carrying out the CAMC of respective equipment(s) **at the time of taking over the system by the Bank.**

3. **Submission of Bank Guarantee (BG) by Service provider:** The successful tenderer shall ensure that in addition to the bipartite agreement, service provider submits an irrevocable BG (issued by a scheduled Bank) to the Bank for the performance of CAMC of the respective system for an amount of 5% of capital cost of that system valid for a period of 5 years from the date of handing over of the system to the Bank. The BG shall be submitted along with the bipartite agreement to the Bank.
4. **Rate of comprehensive CAMC:** The rates of CAMC for the above systems for the first year shall be quoted in the tender, and the same should not be more than 7% of the quoted capital cost of the respective system/equipment. In case a tenderer quotes more than this limit, the CAMC shall be executed at the herein-mentioned limit of 7 % only.

(a)	Period of CAMC	Expected life of the system as indicated excluding DLP
b)	Payment terms of CAMC	Quarterly payment after satisfactory completion of the service

- i. **Renewal of Rate of comprehensive CAMC:** The rate of CAMC for the further period till the expected minimum life as given above shall be renewed based on the following formula :

		A <sub>P</sub>	EPC	WIC
		A <sub>C</sub> = -----X( 15+ 70 x ----- + 15 x ----- )		
		100	EPP	WIP
	A <sub>C</sub>	=	The contract amount for the current year.	
	A <sub>P</sub>	=	The contract amount for the previous year.	
	EPC	=	Wholesale Price Index for electrical products 6 months before the commencement date of the contract for the current year.	
	EPP	=	Wholesale Price Index for electrical products 6 months before the commencement date of the contract for the previous year.	
	WIC	=	Consumer Price Index for industrial workers (respective location of installation city) 6 months before commencement date of contract for the current year.	

		WIP	=	Consumer Price Index for industrial workers, respective location of installation city, 6 months before commencement date of contract for the previous year.
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- ii. **Scope of CAMC:** During the CAMC of the above systems, the same shall be maintained by Service Provider as per the scope indicated in the Annexure.
- iii. **Penalty provisions for non-performance of CAMC:** During the CAMC of the above systems / equipments, the same shall be maintained as per the scope indicated in the Annexure-3 to 10.
- iv. **Terms of payment during CAMC:** Quarterly payment shall be made subject to statutory deductions, penalties, etc., if any, by the Bank directly to the Service Provider after rendering satisfactory services during the previous quarter by the service provider, subject to submission of bill along with requisite service reports, etc. as required.

**(To be submitted by the respective Service Provider (OEM or the system integrator who have installed the EPABX System/ IPCCTV system/ Fire Alarm System/Video Phone/ Lifts/ UPS system/ Solar Power system/ Air Condition system/STP) on their letter head)**

Undertaking for the CAMC of .....(Name of respective equipment).....

To CPWD

Dear Sir/Madam

Comprehensive Annual Maintenance Contract (CAMC) for maintenance and services of EPABX System, IPCCTV system, Fire Alarm System, Video Phone, Lifts, UPS system, Solar Power system, Air Condition system and STP etc. in RBI's Quarters at Zoo- Narengi Road Colony, Guwahati, Assam.

We hereby confirm that we have understood the following in respect of the Comprehensive Maintenance Contract (CAMC) of above-referred system:

1. The system provided shall be maintained by us during the defect liability period of three years and thereafter under a Comprehensive Annual Maintenance Contract (CAMC) for a **minimum period of .....**(Expected life of the system, excluding three years of DLP) years after handing over the system to the Bank.
2. We have understood the **detailed scope of CAMC** and its terms and conditions and agreed to abide by the same.
3. The rates for the first year of CAMC after three years of DLP will be (as per BOQ), Totalling Rs.....(Rates quoted by the main contractor) per annum, and the rates of CAMC for the further period till the expected minimum life as given above shall be renewed as per the provision indicated in the attached bipartite agreement.
4. We agree to enter into a bipartite agreement with the Bank for the execution of the said CAMC as per the enclosed draft. The cost of the agreement (charges for stamp paper as per Stamp Act and other charges) shall be borne by us. A signed copy of the draft agreement in support of having accepted the Scope, terms and conditions of the CAMC is attached.
5. We agree to submit an irrevocable **Bank Guarantee** to the Bank of the required amount and required validity, along with the bipartite agreement for CAMC, as a performance guarantee for the fulfilment of the terms of CAMC for the specified period.

Yours faithfully,

(Seal and signature)

Enclosure: Signed copy of the draft bipartite agreement for the CAMC along with the annexure for the scope of work for the respective equipment.

**BIPARTITE AGREEMENT FOR COMPREHENSIVE ANNUAL MAINTENANCE  
CONTRACT (CAMC) FOR MAINTENANCE AND SERVICES OF EPABX System/  
IPCCTV system/ Fire Alarm System/Video Phone/ Lifts/ UPS system/ Solar Power system/  
Air Condition system/STP**

This agreement is made on this \_\_\_\_\_ day of \_\_\_\_\_ between M/s.

\_\_\_\_\_  
\_\_\_\_\_  
(*Name of CAMC vendor*), having its office at

\_\_\_\_\_  
hereinafter referred to as Service Provider, the party of the **FIRST PART**, (which expression, where the context admits, shall include its successors in interest and assigns);

And

**Reserve Bank of India**, constituted under the Reserve Bank of India Act, 1934, having its Central Office at Mumbai (hereinafter referred to as the “Bank”), through-----(*Name and address of the Bank’s office where the contract is being executed*), (hereinafter called the “Bank”) and collectively the party of the **SECOND PART**;

Whereas:

- (a) In terms of the MOU signed \_\_\_\_\_ between the Bank and the CPWD for the construction of the, **the Service Provider** herein was selected by the (*Name of the Main contractor*) vide Order No. \_\_\_\_\_ - \_\_\_\_\_ DATED

\_\_\_\_\_ after acceptance by CPWD for Supply, Installation, Testing and Commissioning of IPCCTV System / Fire Alarm System /Video Phone/ Lifts / UPS System / EPABX system for (*Name of the System as applicable*) and entered into an agreement with the Service Provider for the same including carrying out Comprehensive Annual Maintenance (CAMC) for a period of minimum ..... years (*as per expected life mentioned*) after three years of Defect Liability Period.

- (b) The Service Provider, being the Original Equipment Manufacturer (OEM) / system integrator of IPCCTV System / Fire Alarm System /Video Phone/ Lifts / UPS System / EPABX system has agreed to provide Comprehensive Annual Maintenance Contract (CAMC) for the system installed by them for the captioned project for a period of minimum ..... years (*as per expected life mentioned*) after expiry of DLP of three years in consideration of the amount of Rs.....Per Annum to be paid by the Bank subject to revision in the rates as per the formula indicated in this agreement.

AND

(c) Under the contract agreement with reference to the agreement Dated \_\_\_\_\_ between .....(Name of the main contractor) and the CPWD, a bipartite agreement(s) is required to be executed between the Bank and the Service Provider for smooth implementation of Comprehensive Annual Maintenance Contract (CAMC) of Video Door Phone , EPABX System, IPCCTV system, Fire Alarm System, Lifts, UPS system, Solar Power system, Air Condition system and STP etc. installed by it at the RBI's Quarters at Zoo- Narengi Road Colony, Guwahati, Assam on the terms and conditions as contained herein.

NOW THE PARTIES TO THIS AGREEMENT BEING DESIROUS OF REDUCING TO WRITING ALL THE TERMS AND CONDITIONS AGREE AS FOLLOWS:

**(A) General:**

1. The parties hereto shall respectively and faithfully abide by the terms and conditions and stipulations contained in this agreement and perform/discharge their part of the obligation of the agreement accordingly.
2. The Indian laws shall apply for the interpretation of this Agreement.
3. Four sets of this agreement shall be signed and one set each of this agreement shall remain with the Service Provider, .....(Main Contractor), Bank and the CPWD and the cost towards the stamp duty for all these agreements shall be borne by Service Provider.
4. The Parties hereto represent and warrant that the respective signatories are duly authorised to sign this Agreement and bind the respective parties.
5. All disputes arising out of or in any way connected with this agreement and the Work Order No.\_\_\_\_\_ (work order issued by Bank for this work), shall be deemed to have arisen at Guwahati, Assam and courts in Guwahati, Assam shall have jurisdiction to determine the same.
6. The scope of work and other terms and conditions of the CAMC shall be as per the attached Annexure.
7. The parties to this Agreement agree to settle their disputes arising under this Agreement, by mutual consultations at the first instance with the aid of an escalation matrix, failing which the parties agree to settle their disputes by way of arbitration by a sole arbitrator to be appointed by mutual consent. However, the person to be appointed as the sole arbitrator shall be adequately qualified and experienced to resolve the dispute sought to be raised before the said arbitrator. The place of arbitration shall be Guwahati, Assam.
8. Where the business or undertaking of the service provider, is taken over by any other person in any legally recognized mode of take-over, then unless the service provider is entitled to continue to provide to the Bank the services contemplated under this Agreement, it shall be duty of the service provider to ensure that such other person is obligated to provide the

services contemplated under this Agreement under the same terms and conditions. In case the service provider does not so ensure and consequently maintenance services are not provided or the successor of the service provider fails to honour the terms of this Agreement, then –

- a. Any sums due to the service provider towards CAMC shall be liable to be forfeited and successors of the service provider shall not be entitled to claim any money due to the service provider; and
- b. The Service Provider shall arrange to get the CAMC services through their successor or any other service provider mutually agreed with the Bank, at the risk and cost of the Service Provider/ successor, as the case may be.
- 9. The Bank shall have the right to forfeit the CAMC performance Bank Guarantee submitted by the Service Provider in case of failure by the Service Provider to provide satisfactory services even after expiry of the written notice period of 15 days to comply with the above.

**(B) Obligations of the FIRST PARTY (SERVICE PROVIDER):**

- 1. The FIRST PARTY shall provide all-inclusive Comprehensive Annual Maintenance for the system which includes periodic routine/preventive and breakdown maintenance, and also any number of breakdown calls, along with the supply of all spares and labour involved as per the Original Equipment Manufacturer's O&M Manual for the supplied/installed equipment and its accessories, in order to ensure proper functioning of the system. The CAMC period will commence from expiry of defects liability period and accordingly shall be valid for a period of..... years (*as per expected life mentioned*).
- 2. The Service Provider shall make good for any direct damages/loss caused to the Bank due to the actions/omissions of persons employed by it or because of its actions/omissions during the execution of the contract.
- 3. The Service Provider shall submit an irrevocable BG issued to the Bank for the performance of CAMC of the respective system for an amount of 5% of capital cost of the system for a period of 5 years from the date of start of CAMC. The BG (issued by a scheduled Bank) shall be submitted to the Bank at least 15 days before the expiry of DLP.
- 4. The service provider shall ensure that the required spares etc. for proper maintenance are readily available with them for the complete life span of the equipment.
- 5. The complaints lodged by the Bank/CPWD/(Name of the main Contractor) in respect of the equipment for any repair or break down (any number of breakdowns) must be attended at top most priority by the Service Provider.
- 6. The Complaint/Message may be sent to the address/Telephone Number/ email of the service provider

7. While submitting the invoice towards annual maintenance to the Bank, the Service Provider has to furnish satisfactory working service reports from the Bank. The certification given by the Bank is final and shall not be subject to any question.
8. The Service Provider has to replace any defective parts with the Manufacturer's genuine parts under intimation to the Bank's authorized personnel.
9. The service provider shall be responsible for taking and accordingly obtaining all the insurance required for its employees carrying out the CAMC works under this agreement, such as Workmen's Compensation or any other requisite and necessary insurance.
10. The Service provider shall keep the Bank indemnified in case any action is taken against them by any Authority on account of contravention by the Service Provider or its employees, of any of the provision of any act or rules made there under about maintenance of the equipment(s). If the Bank is made liable to pay or reimburse any amount due to non-observance, if any, on the part of the Service Provider, of any provision stipulated in the notification by law/act/rules/regulations, etc., then Bank shall have the right to deduct any money due to the Service Provider under this Agreement.
11. The Service Provider shall deploy adequate number of qualified and duly experienced service engineers and such other skilled personnel with necessary certification wherever necessary for carrying out the services under this Agreement and considering the nature of working of the Bank, shall ensure the availability of its maintenance personnel as and when required.
12. The Service Provider shall only employ its own employees for rendering the services contemplated under this Agreement. The service provider shall ensure that all the personnel deployed by it act with proper demeanour and in case the Bank notifies the service provider that any of its personnel need to be replaced for any reason, the service provider shall promptly act upon such notice by the Bank or college and replace the concerned personnel.
13. The Service Provider shall familiarise itself and fully comply with the provisions of all the Acts/Rules/Regulations and orders of the State/Central Government applicable to the work, including the Payment of the Wages Acts, Workman's Compensation Acts, Contract Labour (R&A) Act etc. and shall be fully responsible and liable for due observance of the same.
14. The Service Provider shall abide by all existing or future labour related enactments and rules and regulations made thereunder, notifications issued, etc., by the State or Central Govt. or Local Authorities.

(C) **Obligations of the SECOND PARTY (Bank):**

1. **Terms of Payment:** Bank shall be responsible for making all payments to Service Provider

during the CAMC period for rendering satisfactory maintenance services as per scope of works stated herein. **Quarterly payment** shall be made by the Bank to the service provider after rendering of satisfactory services during the quarter by the service provider, subject to submission of bill alongwith requisite service reports.

2. **Renewal of the Rate of comprehensive CAMC:** The rate of CAMC for the further period till the expected minimum life as given above shall be renewed based on the following formula.

$$AC = \frac{AP}{100} \times \left( 15 + \frac{70 \times EPP}{WIP} + 15 \right)$$

AC	=	The contract amount for the current year.
AP	=	The contract amount for the previous year.
EPC	=	Wholesale Price Index for electrical products 6 months before the commencement date of the contract for the current year.
EPP	=	Wholesale Price Index for electrical products 6 months before the commencement date of the contract for the previous year.
WIC	=	Consumer Price Index for industrial workers (respective location of installation city) 6 months before the commencement date of the contract for the current year.
WIP	=	Consumer Price Index for industrial workers respective location of installation city) 6 months before the commencement date of the contract for the previous year.

The parties hereto agree that the several parts of this contract have been read by all of them and have fully understood, in witness whereof the parties have hereunto set and subscribe their respective hands and seals at \_\_\_\_\_ on the date, month and year above written.

Signed and Delivered

**By the said Second Party**

Signature

Name:

Address:

**By the said First Party**

Signature.

Name:

Address:

1) Witness & Signature

Address:

### **Annexure for the Bipartite agreement for the CAMC of Lifts**

The scope of work shall include the following:

- a. Comprehensive AMC of the Lifts **shall include the complete lift system** including all hardware and software etc. installed by the service provider. The Comprehensive Maintenance of Lifts should be carried out through Manufacturers / Authorized Service Agencies.
- b. **Preventive Maintenance/ Routine servicing/ troubleshooting/ setting/ adjustments/ cleaning/ lubrication/ checking of safeties etc.** at least once per month to ensure smooth running and trouble-free working of the lift.
- c. **Repairs/ replacement** to the lift including re-loading software etc. in the event of any breakdown including replacement of spares/ components/ sub-system/ cards/ motors/ ropes and any other component, part or whole, which may need replacement/ repairs.
- d. The rates quoted should include for repair/replacement of the any of component of the lift in case it develops any defect including re-loading software etc. In case of any defect in the any of its component, the same shall be repaired within specified period including replacement of spares/ components/ sub-system/ cards and any other component, part or whole, which may need **replacement/ repairs**. **In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank. During such period of repairs or replacement, the service provider shall provide similar standby/spare equipment temporarily for keeping the system in proper working condition. The existing parts required to be replaced shall be replaced with existing make of the part and dismantled material will not be returned the department.
- e. Keeping the **sufficient stock** (including imported, if any) of the spares at site as well as at their service center / site as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.
- f. All **manufacturers preventive maintenance schedules/ replacement periodicity of** components like ropes, electrical/ electronic parts including checking of safety devices, protections like rope slip, load testing etc. shall be strictly followed as per the manufacturer's periodicity or as required in addition to the scope of maintenance indicated above.
- g. The scope of maintenance in addition to periodic maintenance will also include **attending to /any number of breakdown calls**. The complaint regarding defect / non-operation of the lift shall be lodged over telephone with the OEM and the same will be entered in the logbook. The said complaint must to be attended within 24 hours and defect any shall be rectified by the OEM
- h. The firm shall be responsible to carry out the following free of cost during maintenance contract replacement of:  
All parts of main control panel i.e. relay, relay coils, moving contact/fixed contact, landing locks, rectifiers, resistance, transformer, indicating light, rewinding of motor, transformer and other items covered under maintenance.  
Replacement/repair of control board of lift, DC motor, AC motor, gear box, DC generator, safety devices of all lift's indication lamps, guide rail, steel ropes, flywheel sheave. Replacement of battery for ARD as and when required shall be within the scope of the agreement.
- i. 24x7 support should be made available by the service provider for all the equipments.
- j. The payment towards AMC charges will be made every quarter after satisfactory completion of the service.
- k. During the DLP and the currency of the Comprehensive Annual Maintenance Service Contract, all care shall be taken so that the downtime of the lift is kept minimum and in any case, the lift shall be attended immediately and maximum within 3 hours of receiving the complaint.

#### **(B) Penalty for delay in service during defect liability period (DLP) and CAMC period:-**

- a. In case, the lift remains under breakdown for more than a day (requiring repair other than major repair), then a penalty equivalent to 4 times the daily rate of Comprehensive AMC charges shall be recovered from the payment due to the contractor during CAMC period and the warranty period (DLP) will be extended by 4 times the number of days of delay in rectification of the defects during DLP.
- b. If any major repair resulting in stoppage of the lift is not rectified within 3 days then a penalty equivalent to 4 times the daily rate of Comprehensive AMC charges shall be recovered from the payment due to the contractor during CAMC period and the warranty period (DLP) will be extended by 4 times the number of days of delay in rectification of the defects during DLP.  
For the purpose of penalty, the following items will be considered as Major repair:
  - i. Rewinding of motor
  - ii. Replacement of rope
  - iii. Replacement of bearings, gears etc. in gear box
  - iv. Replacement of guide shoes for the car and counter weight
  - v. Replacement of trailing cables/ control wiring
  - vi. VVVF Controller replacement

**Note:** Notwithstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

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### **Annexure for the Bipartite agreement for CAMC of UPS systems**

(A) The scope of work shall include the following:

a. Comprehensive AMC of the UPS systems shall include all its components, cards, rectifier,

inverters, filters, cables of all types including all hardware and software etc. provided for functioning of UPS systems **except the batteries**. The comprehensive maintenance included keeping all ups in 100% working conditions by doing preventive maintenance, breakdown maintenance etc. All labour/Technician/ Engineer and material/Component/Spares required for keeping all UPS Systems in working system are included in the scope of work. Routine maintenance of all electrical accessories related with battery bank, DC, Circuit Breaker, cabling, battery racks are included in the scope of work.

The scope of work includes monthly checking of individual battery and submission of report on healthiness of each battery.

- b. All software updates, releases, Version upgrades, New Versions etc. as and when required for smooth functioning of the system shall be included in the scope in scope of CAMC, The service provider shall have to provide all software (IOS) updates, releases, Version upgrades, New Versions etc. of all the Application Software and Custom Software including renewal of all licences provided for this system. The service provider will also undertake to carry out implementation / operationalization / customisation of such software updates, releases, Version upgrades, New Versions etc. Accordingly, the service provider should include the cost for the above in the quoted cost for the CAMC.
- c. 24x7 support should be made available by the service provider for all the equipments.
- d. **Preventive maintenance** at least once per fortnight shall be carried out to ensure that the system is running under proper working condition. The servicing shall also include cleaning of the UPS, removal of dirt and dust etc.
- e. During the DLP and the currency of the Comprehensive Annual Maintenance Service Contract, all care shall be taken so that the downtime of the system is kept minimum and, in any case, not more than the allowed time for attending to repairs as under:
  - i. Any defects in the UPS affecting the services of UPS partially shall be rectified / repaired **within 24 hours** from the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also be treated as complaints in writing).
  - ii. Any defects in any of the UPS leading to complete breakdown of the system, shall be repaired **within 8 hours** from the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also treated as complaints in writing).

- f. The rates quoted should include for repair/replacement of the equipment in case it develops any defect including re-loading software etc. In case of any defect in the UPS the same shall be repaired within specified period including replacement of spares/ components/ sub-system/ cards and any other component, part or whole, which may need **replacement/ repairs**. **In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank. During such period of repairs or replacement, the service provider shall provide similar standby/spare equipment temporarily for keeping the system in proper working condition.
- g. The service provider shall keep the **sufficient stock** of the spares at site as well as at their service center as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.
- h. The scope of maintenance in addition to preventive maintenance will also include attending to any number of breakdown calls.

(B) **Penalty for delay in service** during defect liability (DLP) and CAMC period:

If the down time exceeds the above mentioned period **during defect liability period and CAMC period**, penal recovery shall be made from any payments due to the service provider at the following rates:

- i. **Partial outage of UPS services** – @ Rs 1000/- per day beyond the authorized maintenance period.
- ii. **Partial outage of UPS services leading to failure of entire system** - @ Rs 1000/- per day beyond the authorized maintenance period.

**Note:** Notwithstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

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### **Annexure for the Bipartite agreement for the CAMC of IPCCTV System**

- (A) The scope of work shall include the following:
- a. Comprehensive AMC of the IPCCTV system shall include all cameras, servers, monitors, network switches, storage devices, cables of all types and all hardware and software etc. provided for IPCCTV system.
  - b. All software updates, releases, Version upgrades, New Versions etc. as and when required for smooth functioning of the system shall be included in the scope in scope of CAMC, The service provider shall have to provide all software (IOS) updates, releases, Version upgrades, New Versions etc. of all the Application Software and Custom Software including renewal of all licenses provided for this system. The service provider will also undertake to carry out implementation / operationalization / customization of such software updates, releases, Version upgrades, New Versions etc. Accordingly, the service provider should include the cost for the above in the quoted cost for the CAMC.
  - c. 24x7 support should be made available by the service provider for all the equipments.
  - d. **Preventive maintenance** at least once per month shall be carried out to ensure that the system is running under proper working condition. The servicing shall include cleaning of the system, cameras, Lens proper adjustments and setting of cameras and their field of view, software up gradation etc.
  - e. During the DLP and the currency of the Comprehensive Annual Maintenance Service Contract, all care shall be taken so that the downtime of the system is kept minimum and, in any case, not more than the allowed time for attending to repairs as under:
    - i. Any defects in any of the cameras shall be repaired **within 24 hours** from the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also be treated as complaints in writing).
    - ii. Any defects in any of the servers, switches, routers etc., leading to complete breakdown of the system, shall be repaired **within 8 working hours** from the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also treated as complaints in writing).
    - iii. Any defects/ problems associated with the software shall be attended to immediately, but **not later than 4 hours** from the time of the problem being noticed/ reported.
  - f. The scope of work shall also include all the labour, tools etc. **for relocation / shifting of any camera** from one place to another within the Bank's Premises as per Bank's requirements and instructions. For such relocation or shifting, if additional cable/item is required, the cost of the additional cable/item only shall be paid as per the rates quoted

by the firm in the tender after applying necessary escalation as per the escalation formula for CAMC in the tender and no other cost shall be paid. For ascertaining the reasonability of the rates so arrived, current market cost of same/similar item will be submitted by the service provider and lesser of the two rates will apply.

- g. The rates quoted should include for repair/replacement of the equipment in case it develops any defect including re-loading software etc. In case of any defect in the camera, switch, Storage system, Hard disk, server, monitor or any other equipment etc, the same shall be repaired within specified period including replacement of spares/ components/ sub-system/ cards and any other component, part or whole, which may need **replacement/ repairs**. **In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank. During such period of repairs or replacement, the service provider shall provide similar standby/spare equipment temporarily for keeping the system in proper working condition.
- h. The service provider shall keep the **sufficient stock** of the spares at site as well as at there service center as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.
- i. The scope of maintenance in addition to preventive maintenance will also include attending to any number of breakdown calls.
- j. The **additional requirement** of the equipments during the DLP and CAMC shall be met by procuring the equipments form the system integrator based on the quotes rates and variations on the exchange rate, prices indices etc. In case the rates so offered are not found acceptable by the Bank due to any reason, the Bank may procure the same directly from the market and the same shall be handed over to the system integrator alongwith all the warranty documents etc. for installation, testing and commissioning.  
The items so installed will be an integral part of the IPCCTV system and the system integrator shall maintain alongwith entire IPCCTV system. After installation, these items shall remain under warranty for three years from their installation and thereafter shall be covered under CAMC. During first year CAMC, the CAMC charges for these items will be paid to the system integrator on pro rata basis (based on the cost of such additional installation) at rate the quoted by the system integrator in their tender.

Example:

Capital Cost of IPCCTV system : Say Rs.10,00,000/-

CAMC Charges quoted by the firm in their tender : Say Rs. 60,000/-

Cost of Additional installation : Say Rs.1,00,000/-

The pro rata CAMC Charges for additional hardware : Rs.6,000/-

The CAMC charges will be revised for further years as per the renewal formula in the tender.

**(B) Penalty for delay in service** during defect liability (DLP) and CAMC period:

If the down time exceeds the above-mentioned period **during defect liability period and CAMC period**, penal recovery shall be made from any payments due to the service provider at the following rates:

- i. Non-functional cameras – @ Rs 1000/- per camera per day beyond the authorized maintenance period.
- ii. Non-functional server/switch leading to entire system failure - @ Rs 2000/- per day beyond the authorized maintenance period
- iii. Non-functional server/switch leading to failure of a few cameras/ components - @ Rs 1500/- per day beyond the authorized maintenance period
- iv. Non-functional software leading to system failure - @ Rs 3000/- per day or part thereof beyond the authorized maintenance period

**Note:** Notwithstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

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**Annexure for the Bipartite agreement for the CAMC of Fire Alarm System  
FIRE ALARM SYSTEM:**

(A) The scope of work shall include the following:

- a. Comprehensive AMC of the Fire Alarm system shall include all detectors, Panels, Control modules, Hooters, Monitor modules, cables of all types and all hardware and software etc. provided for Fire Alarm system.
- b. All **software updates**, releases, Version upgrades, New Versions etc. as and when required for smooth functioning of the system shall be included in the scope in scope of CAMC, The service provider shall have to provide all software (IOS) updates, releases, Version upgrades, New Versions etc. of all the Application Software and Custom Software including renewal of all licences provided for this system. The service provider will also undertake to carry out implementation / operationalisation / customisation of such software updates, releases, Version upgrades, New Versions etc. Accordingly, the service provider should include the cost for the above in the quoted cost for the CAMC.
- c. 24x7 support should be made available by the service provider for all the equipments.
- d. During DLP and CAMC period, full servicing and cleaning of devices **once in a quarter** shall be done including attending to ANY NUMBER of breakdown calls.

The System will be required to be checked by deputing a competent, trained service engineer on **WEEKLY basis** by creating a fire / smoke simulation in the loops

Critical area detectors viz server rooms/UPS rooms etc. should be invariably included and checked during the weekly and quarterly visits. Suitable log register indicating faults, rectification done with date & time of breakdown should be maintained and got signed from the security/Fire officer. Bank will not provide any assistance in the form of men/materials. The service provider will have to make their own arrangements for deputing a helper to skilled personnel including all necessary spares for rectification of the defects reported/observed.

- e. During the DLP and the currency of the Comprehensive Annual Maintenance Service Contract, all care shall be taken so that the downtime of the system is kept minimum and in any case, not more than the allowed time for attending to rectify as under:

		Rectification time*	Penalty
(a)	Any defects resulting in total failure of the system	12 hours	Rs.2000/- per day
(b)	Any defects in independent devices, components, cables which may not result in total failure of the system	24 hours	Rs.500/- per day

\* From the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also be treated as complaints in writing).

- f. The scope of work shall also include all the labour, tools etc. **for relocation / shifting of any detector / device** from one place to another within the Bank's Premises as per Bank's requirements and instructions. For such relocation or shifting, if additional cable/item is required, the cost of the additional cable/item only shall be paid as per the rates quoted by the firm in the tender after applying necessary escalation as per the escalation formula for CAMC in the tender and no other cost shall be paid. For ascertaining the reasonability of the rates so arrived, current market cost of same/similar item will be submitted by the service provider and lesser of the two rates will apply.
- g. The rates quoted should include for **repair/replacement of the equipment** in case it develops any defect including re-loading software etc. In case of any defect(s) in the detectors, Panels, Control modules, Hooters, Monitor modules, cables etc, the same shall be repaired within specified period including replacement of spares/ components/ sub-system/ cards and any other component, part or whole, which may need **replacement/ repairs**. **In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank. During such period of repairs or replacement, the service provider shall provide similar standby/spare equipment temporarily for keeping the system in proper working condition.
- h. The service provider shall keep the **sufficient stock** of the spares at site as well as at their service centre as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.
- i. The **additional requirement** of the equipments during the DLP and CAMC shall be met by procuring the equipments form the system integrator based on the quotes rates and variations on the exchange rate, prices indices etc. In case the rates so offered are not found acceptable by the Bank due to any reason, the Bank may procure the same directly from the market and the same shall be handed over to the service provider alongwith all the warranty documents etc. for installation, testing and commissioning, The system integrator will be paid 5% of the cost of procured material for installation and configuration of the additional items.

The items so installed will be an integral part of the Fire Alarm system and the service provider shall maintain alongwith entire Fire Alarm system. After installation, these items shall remain under warranty for three years from their installation and thereafter shall be covered under CAMC. During first year CAMC, the CAMC charges for these items will be paid to the system integrator on pro rata basis (based on the cost of such additional installation) at rate the quoted by the system integrator in their tender.

Example:

Capital Cost of Fire Alarm system : Say Rs.10,00,000/-

CAMC Charges quoted by the firm in their tender : Say Rs. 60,000/-

Cost of Additional installation : Say Rs.1,00,000/-

The pro rata CAMC Charges for additional installation : Rs.6,000/-

The CAMC charges will be revised for further years as per the renewal formula in the tender.

- i. The scope of work, shall include cost of spares, provision of repair component and replacement of items as required.
- ii. Following routine and preventive maintenance shall be carried out:

**(a) Daily checks:**

- (i) Check the power supply of all the panels in buildings/floors.
- (ii) Check the healthiness of battery and battery water/electrolyte as required.
- (iii) Check the fault indication of the panel and rectify the same.
- (iv) Check whether signals of fire and fault condition is transmitted from detector / devices on main control panel.

**(b) Weekly Checks:**

- (i) Operate a call point and detector to test the system. Each week choose a different detector/device so that all detectors may be tested.
- (ii) Check the fault circuit of each loop/zone from the panel.
- (iii) Check the talk back units/PA system circuits and remove faults if any.
- (iv) Check the all glands/valves at the terrace and prevent leakage, if any.
- (v) Check healthiness of the power supply of main control / starter panel, voltage, fuses, remote starters, contactors, power, connection etc.
- (vi) Check the working condition of all pump sets.

**(c) Monthly Checks:**

- (i) Checks and test the performance of all the hooters/ alarms/ speakers/ talkback unit.
- (ii) Check the performance of the manual call points. Check its glasses.

j) All tests/ checks are to be carried out as per the demand of the installation and/ or, as per direction of Engineer-in-Charge and proper logbook should be maintained and got test check by the Engineer-in-Charge or his authorized representatives.

k) For making the users familiar with the system, Fire drill shall be carried out. Local fire service and nodal officers in charge of various parts of the building shall be involved in conducting fire drill. Operation of the system shall be demonstrated so that all users are confident of the system and aware of their duties and responsibility during fire.

l) The Healthiness of the system shall be checked through fortnightly testing. During the fortnightly testing a particular block shall be taken up all internal hydrants and adjoining yard hydrant of all the building shall be operated and checked.

m). During the subsequent fortnightly different blocks shall be selected so as to ensure that all the internal hydrants and yard hydrants of all the blocks is checked once in six months.

n). The details of such fortnightly testing shall be conducted in presence of departmental in-charge/his authorized representative to the extent feasible and shall be recorded in register along with date timing and findings.

**Note:** Notwithstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

**Annexure 7**

**Annexure for the Bipartite agreement for the CAMC of Centralized intercom system  
including EPABX and Video Door Phone System:**

(A) The scope of work shall include the following:

- a. Comprehensive AMC of the Centralized intercom system including EPABX and Video Door Phone System shall include all its component, cards, all type hardware and software etc. provided for functioning of the whole system.
- b. The service provider will have to provide, at no additional cost to the Bank, all software updates, releases, Version upgrades, New Versions etc. as and when required for smooth functioning of the system.
- c. Routine preventive maintenance shall also be carried out during the CAMC period at least quarterly in accordance with the Bank's requirements. All performance checks should be undertaken and recorded in the system log book. As a minimum, the following performance checks must be undertaken on each maintenance visit.
  - i. Remove dust and dirt from the exterior of the above system (Inside & outside) using a soft brush or a lint cloth. A solvent which is harmless to the finishes of metal and plastic may be applied to more stubborn stains.
  - ii. Examine the exterior of the enclosure for any signs of damage or loose cable glands and rectify any faults found.
  - iii. Remove any dust or dirt form the interior of the Centralized intercom system including EPABX and Video Door Phone System equipment(s) using a soft brush or a vacuum cleaner.
  - iv. Examine the printed circuit boards for signs of over-heating, dry joints and/or damaged tracks.
- d. The system shall be maintained by the service provider for a minimum period of 5 years under CAMC, after the completion of Defect Liability Period (DLP) of three years, at the rate quoted and terms and conditions.
- e. 24x7 support should be made available by the service provider Centralized intercom system including EPABX and Video Door Phone system.
- f. The system shall be serviced regularly and maintained in proper working condition round the clock.
- g. The contractor shall keep the sufficient stock of the spares at site as well as at their service centre as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.

- h. The scope of maintenance will also include attending to any number of breakdown calls in addition to preventive maintenance schedule.
- i. The rates quoted should include for repair/replacement of the equipment in case it develops any defect including the defect while re-loading software etc. In case of any defect in the Centralized intercom system including EPABX and Video Door Phone System, its Card etc, the same shall be repaired within specified period including replacement of spares/ components/ sub-system/ cards and any other component, part or whole, which may need **replacement/ repairs**. **In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank.
- j. **Software upgrades and Renewal of License's to be provided:** The service provider shall have to provide all software updates, releases, Version upgrades, New Versions etc. of all the Application Software and Custom Software included in the Products including renewal of all licences provided. The service provider will also undertake to carry out implementation / operationalization / customization of such software updates, releases, Version upgrades, New Versions etc. Accordingly the service provider should include in his quoted cost the following:
  - i. The rate shall include for providing required software upgrades released by the OEM and the same should be provided.
  - ii. The rate shall include the cost of renewal of licenses, if any, for **all the software provided by the service provider** for the entire system and for all the users and such renewal should be done well in time.
- k. During the DLP and the currency of the Comprehensive Annual Maintenance Service Contract, all care shall be taken so that the downtime of the system is kept minimum and in any case, not more than the allowed time for attending to repairs as under:
  - i. Any minor defects in the system not resulting in complete failure of the exchange shall be responded within 2 hours and shall be repaired **within 12 working hours** from the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also be treated as complaints in writing).
  - ii. Any defect resulting in failure of exchange leading to complete breakdown of the system, shall be responded within 2 hours and shall be repaired **within 12 working hours** from the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also be treated as complaints in writing).

**(B) Penalty for delay in service during the Defect liability period and the CAMC period:**

Any defects/ problems associated with the software or hardware of Centralized intercom system including EPABX and Video Door Phone System shall be attended by the service provider as per above schedule, failing which the penalties as below may be imposed. And the recovery shall be made from any payments due to the service provider at the following rates:

Sr. No.	Defect	Rectification time	Penalty
1	Defects resulting in failure of exchange	12 working hours	Rs.500/- per day
2	Any other minor defect	12 working hours	Rs.200/- per day

**Note:** Notwithstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

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**Annexure for the Bipartite agreement for the CAMC of Solar Photo Voltaic Power Generation and Water Heating System**

- a. The scope of work shall also include all the labour, tools etc. for relocation / shifting of any SPV module from one place to another within the Bank's Premises as per Bank's requirements and instructions. For such relocation or shifting, if additional cable/item is required, the cost of the additional cable/item only shall be paid as per the rates quoted by the firm in the tender after applying necessary escalation as per the escalation formula for CAMC in the tender and no other cost shall be paid. For ascertaining the reasonability of the rates so arrived, current market cost of same/similar item will be submitted by the service provider and lesser of the two rates will apply.
- b. The rates quoted should include for **repair/replacement of the equipment** in case it develops any defect etc. In case of any defect(s) in the SPV module, Solar control panel, AC/DC cables etc., the same shall be repaired within specified period including replacement of spares/ components/ sub-system and any other component, part or whole, which may need **replacement/ repairs**. **In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank. During such period of repairs or replacement, the service provider shall provide similar standby/spare equipment temporarily for keeping the system in proper working condition.
- c. The service provider shall keep the **sufficient stock** of the spares at site as well as at their service centre as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.
- d. The **additional requirement** of the equipments during the DLP and CAMC shall be met by procuring the equipments form the system integrator based on the quotes rates and variations on the exchange rate, prices indices etc. In case the rates so offered are not found acceptable by the Bank due to any reason, the Bank may procure the same directly from the market and the same shall be handed over to the service provider alongwith all the warranty documents etc. for installation, testing and commissioning, The system integrator will be paid 5% of the cost of procured material for installation and configuration of the additional items. The items so installed will be an integral part of the Solar Power system and the service provider shall maintain alongwith entire system. After installation, these items shall remain under warranty as per OEM conditions from their installation and thereafter shall be covered under CAMC. During first year CAMC, the CAMC charges for these items will be paid to the system integrator on pro rata basis

(based on the cost of such additional installation) at rate the quoted by the system integrator in their tender.

*Example:*

Capital Cost of Solar Power system : Say Rs.10,00,000/-

CAMC Charges quoted by the firm in their tender : Say Rs. 60,000/-

Cost of Additional installation : Say Rs.1,00,000/-

The pro rata CAMC Charges for additional installation : Rs.6,000/-

The CAMC charges will be revised for further years as per the renewal formula in the tender.

**Note:** Notwithstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

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**Annexure for the Bipartite agreement for the CAMC of Air Conditioning System.****Air Conditioning System:**

(A) The scope of work shall include the following:

- a. Comprehensive AMC of the **Air Conditioning System** shall include all Split AC, VRF systems with AHU, Ventilation system, Ducting, Copper Tubes, Insulation, cables of all types and all hardware etc. provided for **Air Conditioning System**.
- b. 24x7 support should be made available by the service provider for all the equipments.
- c. During DLP and CAMC period, full servicing and water cleaning of **Air Conditioning System once in a quarter** shall be done including attending to ANY NUMBER of breakdown calls.

The System will be required to be checked by deputing a competent, trained service engineer on **WEEKLY basis**.

**Air Conditioning System** of Club Houses and all other places should be invariably included and checked during the weekly and quarterly visits. Suitable log register indicating faults, rectification done with date & time of breakdown should be maintained and got signed from the security. Bank will not provide any assistance in the form of men/material. The service provider will have to make their own arrangements for deputing a helper to skilled personnel including all necessary spares for rectification of the defects reported/observed.

- d. During the DLP and the currency of the Comprehensive Annual Maintenance Service Contract, all care shall be taken so that the downtime of the system is kept minimum and, in any case, not more than the allowed time for attending to rectify as under:

		Rectification time*	Penalty
(a)	Any defects resulting in total failure of the system	12 hours	Rs.2000/- per day
(b)	Any defects in independent devices, components, cables which may not result in total failure of the system	24 hours	Rs.500/- per day

\* From the time of reporting complaint in writing (complaints through SMS, e-mails, fax etc. shall also be treated as complaints in writing).

- e. The scope of work shall also include all the labour, tools etc. **for relocation / shifting of any Indoor/Outdoor Unit of Air Conditioning system from** one place to another within the Bank's Premises as per Bank's requirements and instructions. For such relocation or shifting, if additional cable, insulations, copper tube, etc. item is required, the cost of the additional items only shall be paid as per the rates quoted by the firm in the tender after applying necessary escalation as per the escalation formula for CAMC in the tender and no other cost shall be paid. For ascertaining the reasonability of the rates so arrived, current market cost of same/similar item will be submitted by the service provider and lesser of the two rates will apply.
- f. The rates quoted should include for **repair/replacement of the equipment** in case it develops any defect etc. In case of any defect(s) in the system, the same shall be repaired within specified period including replacement of spares/ components/ sub-system and any other component, part or whole, which may need **replacement/ repairs**. **In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank. During such period of repairs or replacement, the service provider shall provide similar standby/spare equipment temporarily for keeping the system in proper working condition.
- g. The service provider shall keep the **sufficient stock** of the spares at site as well as at their service centre as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.
- h. The **additional requirement** of the equipments during the DLP and CAMC shall be met by procuring the equipments form the system integrator based on the quotes rates and variations on the exchange rate, prices indices etc. In case the rates so offered are not found acceptable by the Bank due to any reason, the Bank may procure the same directly from the market and the same shall be handed over to the service provider alongwith all the warranty documents etc. for installation, testing and commissioning. The system integrator will be paid 5% of the cost of procured material for installation and configuration of the additional items. The items so installed will be an integral part of the system and the service provider shall maintain alongwith entire system. After installation, these items shall remain under warranty as per OEM conditions from their installation and thereafter shall be covered under CAMC. During first year CAMC, the CAMC charges for

these items will be paid to the system integrator on pro rata basis (based on the cost of such additional installation) at rate the quoted by the system integrator in their tender.

**Comprehensive Maintenance of HVAC units:**

- i. Quarterly visit and check the operating parameters of the systems.
- ii. Quarterly review the previous months operating log records and alarm history.
- iii. Quarterly physically inspect the unit for any unusual vibration, noise etc.
- iv. Quarterly check for sign of refrigerant leakage.
- v. Quarterly check the proper functioning of microprocessor.
- vi. Attending break down calls of the HVAC units as and when required.
- vii. Carryout the cleaning of indoor/outdoor units to a maximum of twice in a year, if required.
- viii. Annual inspection of the refrigerant and topup the same, if required, subject to maximum once during the contract period.
- ix. Supply of spares if required for attending and troubleshooting any breakdown.

**Air Handling Unit (AHU)/FCU**

- i. Quarterly greasing of bearing at AHU blower end.
- ii. Quarterly greasing of bearing at AHU motor end.
- iii. Quarterly checking and doing the alignment of shaft.
- iv. Quarterly servicing of all AHU motor.
- v. Quarterly checking and doing alignment of AHU belt.
- vi. Quarterly cleaning of AHU coil.
- vii. Quarterly servicing of AHU electrical panel.
- viii. Quarterly tightening of terminal of motors.
- ix. Replacement of bearing as and when required.
- x. Replacement of V-belt as and when required.
- xi. Repairing and replacement of pulleys as and when required.
- xii. Re-metaling of AHU shaft if required.
- xiii. Rewinding of AHU motor if burn out.
- xiv. Replacement of AHU motor terminal in case of burn out.
- xv. Replacement of MCCB and contactor of AHU electrical panel if required.
- xvi. Replacement of motors (supplied by customer).
- xvii. Replacement of AHU pre filters (supplied by customer).

**Air Handing Unit (AHU):**

- i. Supply of AHU pre filters.
- ii. Supply and replacement of VFD.
- iii. Supply and replacement of water line valves.
- iv. Supply and replacement of mixing valve and its actuator.
- v. Supply of new motor.
- vi. Supply and replacement of shaft or blower.
- vii. Supply of incoming cable.
- viii. Any supply, repairing and replacement work on electrical breaker for AHUs.

- ix. Supply and replacement of grilles, diffusers, jet nozzles, fire dampers.
- x. Internal cleaning of HVAC duct.

*Example:*

Capital Cost of Air Conditioning system	: Say Rs.10,00,000/-
CAMC Charges quoted by the firm in their tender	: Say Rs. 60,000/-
Cost of Additional installation	: Say Rs.1,00,000/-
The pro rata CAMC Charges for additional installation	: Rs.6,000/-

The CAMC charges will be revised for further years as per the renewal formula in the tender.

Note: Notwithstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

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**Annexure for the Bipartite agreement for the CAMC of Performance Guarantee for STP.**

A) The scope of work shall include the following:

- a) Comprehensive AMC of the STP **shall include the complete MBR Technology base STP system** including all hardware and software etc. installed by the service provider.
- b) **Preventive Maintenance/ Routine servicing/ troubleshooting/ setting/ adjustments/ cleaning/ lubrication/ checking of safeties etc.** at least once per month to ensure smooth running and trouble free working of the STP.
- c) **Repairs/ replacement** to the STP including re-loading software etc. in the event of any breakdown including replacement of spares/ components/ sub-system/ motors/ Pump and any other component, part or whole, which may need replacement/ repairs.
- d) The rates quoted should include for repair/replacement of the any of component of the STP in case it develops any defect including re-loading software etc. In case of any defect in the any of its component, the same shall be repaired within specified period including replacement of spares/ components/ sub-system/Pump/motor set/Dosing system/Cleaning system and any other component, part or whole, which may need **replacement/ repairs. In case the repair is not possible** due to any reason what so ever, then the defective item/equipment shall be replaced with the new equipment without any additional cost to the Bank. During such period of repairs or replacement, the service provider shall provide similar standby/spare equipment temporarily for keeping the system in proper working condition and guaranteed of suitable reuseable water.
- e) Keeping the **sufficient stock** (including importing, if required) of the spares at site as well as at their service centre / site as required for proper functioning of the system. Non availability of spares/standby units/components will not be accepted as a reason for waiving of penalty towards delay in rendering prompt service.
- f) The scope of maintenance in addition to periodic maintenance will also include **attending to /any number of breakdown calls.**
- g) 24x7 support should be made available by the service provider for all the equipments.
- h) The payment towards AMC charges will be made every quarter after satisfactory completion of the service.

- i) During the DLP and the currency of the Comprehensive Annual Maintenance Service Contract, all care shall be taken so that the downtime of the STP is kept minimum and in any case, the STP shall be attended immediately and maximum within 12 working hours of receiving the complaint.
- j) The scope of work to keep the STP in working condition and repair/replace the parts if found defective and to ensure that the desired results shall be achieved for which STP installed. The water testing shall be done once in a fortnight from the approved lab. If the results of treated water is not in the prescribed limit then the suitable recovery shall be made from the bill.
- k) The scope of work, shall include cost of spares, provision of repair component and replacement of items as required.
- l) Agency has to ensure cleaning of plant room, equipment's and other accessories of plant, cleaning of filters and carry out other standard activities.
- m) In addition to the operation of STP& OWCP any repair, replacement of parts, rewinding of motor, repair/replacement of valves, rectification of leakage in the pipe line, welding, repair/replacement of starter, all consumables etc. are included in the scope of work.
- n) The firm should install real time online monitoring system as per Pollution control Board guidelines. The agency should get the plant tested for required parameters as per Pollution control Board guidelines time to time and keep the parameters in desired limits.
- o) The contractor shall clean all tanks as per requirement at site within the scope of the work and nothing extra shall be paid on account of these. Also, the contractor disposes the sludge (due to cleaning, if any) at the specified place of local bodies/municipal, within the scope of the work and nothing extra shall be paid on account of this. If the contractor fails to clean/dispose of sludge, then a penalty of Rs. 2,000/- per each default shall be deducted from his bill.
- p) The contractor is required to ensure the quality of finally treated effluent in conformity with specifications and in the limits as mentioned by following parameters for which nothing extra shall be paid on this account.
  - i. PH-, 6.5-7.5
  - ii. BOD - Less than 5 Mg/L
  - iii. TSS- Less than 5 Mg/L
  - iv. COD - Less than 30 Mg/L
  - v. Oil & Grease – Less than 2 Mg/L
  - vi. Ammoniacal Nitrogen- Less than 5 Mg/L

vii. Dissolved Phosphate as P (mg/l)- Less than 2 Mg/L

- q) Hence, once in every 3 months, the contractor shall submit the treated effluent analysis report from department approved labs or as per the direction of Engineer in charge. If there is any deviation of parameters in the test report, contractor has to maintain/restore the required parameters within 10 days after the receipt of test report in case the contractor fails to achieve above mentioned result/parameters then the contractor shall be liable for a penalty of Rs. 500/- per day of delay from his bill until the satisfactory result/parameters are achieved as per lab report. Also, if the contractor fails to submit the test report of treated effluent analysis as per above schedule, then the contractor shall be liable for a penalty of Rs. 1000/- per day of delay from his bill until submission of the above report.
- r) The scope of work i/c repairs/ servicing & replacement of defective/worn-out electrical, electromechanical, mechanical parts and equipment and associated accessories of STP plant during the currency of work within a reasonable time (one day for switch gear and associated electrical accessories of LT panel and UV tube/lamp, three days for motor/ pump and valves repair and replacement). In case of total failure/shut down of the plant due to not attending break down complaints/ faults then the contractor shall be liable for a penalty of Rs. 2000/- per day of delay from his bill beyond 3 days.
- t) The agency shall arrange fortnightly visit of Technician/Engineer to inspect all the equipment or as & when required & shall submit service report otherwise a recovery for Rs.1000/- per service report shall be deducted from the contractor's bill.

**(B) Penalty for delay in service during defect liability period (DLP) and CAMC period:-**

- a. In case, the STP remains under breakdown for more than a day (requiring repair other than major repair), then a penalty equivalent to 2 times the daily rate of Comprehensive AMC charges shall be recovered from the payment due to the contractor during CAMC period and the warranty period (DLP) will be extended by 2 times the number of days of delay in rectification of the defects during DLP.
- b. If any major repair resulting in stoppage of the STP is not rectified within 2 days then a penalty equivalent to 2 times the daily rate of Comprehensive AMC charges shall be recovered from the payment due to the contractor during CAMC period and the warranty period (DLP) will be extended by 2 times the number of days of delay in rectification of the defects during DLP. For the purpose of penalty the following items will be considered as Major repair:
  1. Rewinding of motor
  2. Replacement of Pump/Motor
  3. Repairing of dosing system etc.
  4. Repairing of cleaning system etc.
  5. Replacement of spare parts of pump motor sets.
  6. Replacement of cables/ control wiring.
  7. Repair/ Replacement of electrical panel.

Note: Not withstanding the above penal provisions, in addition to the penalty, the Bank reserves the right to encash the BG submitted for the due fulfilment of the terms and obligations the DLP and CAMC contract.

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### **UNDERTAKINGS**

#### **(TO BE SUBMITTED ON OEM / MANUFACTURER / AUTHORIZED SERVICE PROVIDER LETTER HEAD)**

**To,**

**The RBI Authority, Guwahati**

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**Name of Work :**Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]

**NIT No. :- \*\*/NIT/CE/GHY/2025-26**

#### **Name of Specialize job/work:**

It is undertaken that :-

- a) I/ We hereby undertake that we will carry out Annual Comprehensive Maintenance for ..... (name of special E&M component) for use useful life of the system.
- b)
- c) I/ We hereby undertake that we will provide all the spares required for healthy functioning of the equipment for the stipulated life mentioned in this agreement.

Date: date:

Place: Place:

**Signature of representative of  
OEM/Manufacturer/  
Authorized Service Provider  
Stamp  
Company Name:  
Designation:  
Mobile No :-**

NOTE: - A copy of agreement between OEM and Agency for comprehensive maintenance must be deposited with Engineer-in-Charge/RBI Authority for record. The number of maintenance staff

defined under different category are only minimum required. The agency shall be responsible for operation, maintenance and upkeep of all the E&M services and shall have to deploy staff as required as per the need for specific services within the quoted cost, as per the directions of Engineer in charge.

**LIST OF ACCEPTABLE MAKES FOR ELECTRICAL AND MECHANICAL PACKAGES**

**Name of Work:-** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parking including all development works for Civil, E&M, Horticulture and services on EPC (Mode-III) basis]

SN	List of Materials	Approved Make.
<b>Package - 1 (Internal Electrical Installation)</b>		
1	Cross- Linked Halogen Free Flame Retardant Copper conductor (class-2) cables (ISI marked)	Havells / KEI / Finolex / RR Kabel/Polycab / Fort Gloster
2	Cross- linked XLPE insulated LT& HT Armoured Aluminium/ Copper cable	Finolex/ RR Kabel / KEI / Fort Gloster/ Havells/Polycab.
3	Cable(Control, Signal & COMMUNICATION, PA system)	Finolex/ RR Kabel/ KEI /Havells/Polycab.
4	Heavy Duty PVC conduit and accessories - duly ISI marked	BEC/Precision/Finolex/Astral/ Supreme /AKG
5	Modular Type Switch/Socket /Fan Regulator/Telephone Socket/ TV Socket/ Bell Push and GI Boxes etc (Same make GI Box and wiring accessories)	Legrand (Arteor) / Schneider (Livia) / Honeywell (Aspect) / Havells (Murano)/ Panasonic (Europa)/ LK (Entice)/North West (Artisa)
6	MCB/RCBO/Isolator /RCCB	Legrand(DX3)/Siemens (Betagard) / LK (Exora) /Schneider(Acti-9)/ ABB( SB-200M).
7	MCB DB's (Same make MCB DB and MCB's)	Legrand(Ekinoxe-3)/Siemens(Betagard) / LK (Exora) /Schneider(Acti-9)/ ABB(Itus).
8	MCCB's	Legrand(DPX3 ) / Siemens (3VA) / LK (L&T)(D-sine) /ABB(XT) / Schneider (NSX).
9	ACB's	Legrand (DMX3 ) / Siemens (3WA) / LK (L&T) (Omega -U power) / ABB (Emax2) / Schneider (MTZ).
10	GI Hot Deep Cable trays (perforated)	BEC / RMCON/Apex/Slotco/Steelways/Pilco /AKG /Indiana
11	DLP Trucking / Floor Trunking (UPVC / GI)	Legrand/ Schneider/ MK/ OBO-Betterman
12	Video Door Phone	Legrand/ Honeywell-MK/ Havells/ Panasonic/Godrej.

13	LED indoor light fitting like LED tube/LED Panellight / Bulkhead/ LED strip	Philips / Wipro / Jaquar/ Havells/ Trilux/ Lighting Technology/Regent
14	LED Wall Bracket	Philips / Wipro / Jaquar/ Havells/ Lighting Technology/Decon
15	LED outdoor light fitting.	Philips / Wipro / Jaquar/ Havells/Trilux/ Lighting Technology/Regent
16	Solar LED light fitting.	Philips/Havells/Jaquar/ Wipro
17	LED Bollard light fitting.	Philips/Havells/Jaquar/ Wipro/ Hi-lite
18	Occupancy sensor for Light Control	ABB/Honeywell/Schneider/Siemens/Hager/Lutron.
19	Decorative Ornamental Powder Coated metallic pole and fittings	K-lite / Bajaj/ Home Décor/ Hi-lite/ Jaquar
20	G.I. Octagonal Pole	Bajaj / Transrail / Valmont/Crompton
21	Chandelier Lights	Jaquar/ Philips/Wipro/ Hybec/LT.
22	Ceiling Fan(BLDC) & Exhaust fan	Usha/ Havells / Orient/ Atomberg/Bajaj.
23	Call Bell	Anchor /LK / CONA/ Havells
24	Co-axial TV cable	Finolex/ RR Kabel / KEI / Polycab/ Havells.
25	Horizontal Geyser BEE 5 Star Rated	Jaquar/ Usha/Havells/Crompton/AO smith/ Racold
26	Weather proof Junction box	Hensel/ OBO Bettermann/ Cape Spelsberg/ Rittal/ Anchor/ Havells
27	DWC HDPE PIPE	Sudhakar/ Finolex/ REX/ VIJAY /Ashirvad Precision/ Supreme / Astral/Sri Tulsi
28	Raceway	Legrand/Honeywell/OBO-Betterman
29	Cable lugs & Glands	Comet/Dowells/Gripwel/Raychem
30	Exit Signage	Prolite/Autoglo/Cooper/ Lifeguard
31	Aviation Obstruction Light	Any reputed make having ICAO (International Civil Aviation Organization) and FAA (Federal Aviation Agency) compliance.

#### **Package-2 (Fire Fighting system)**

1	Fire Pumps	Grundfos / Kirloskar /Wilo/Beaconwier/Xylem Mather & Platt / KSB
2	Pressurization (Jockey Pump)	Grundfos / Kirloskar /Wilo/Beaconwier/Xylem Mather & Platt / KSB
3	Diesel Engine for Fire Pump	Cummins/ KOEL/ Caterpillar/Perkins/Ashok Leyland/ Mather & Platt/ Greaves
4	Terrace Pump	Grundfos / Kirloskar /Wilo/Beaconwier/Xylem Mather & Platt / KSB
5	Electric Motors	Siemens / Kirloskar /Crompton / ABB/Bharat Bijlee/ Mather & Platt/ Stamford.
6	Anti-Vibration Mounting	Resistoflex / Dunlop / Easy flex / Vimpa Flexionics
7	Starters	Siemens/LK(L&T)/ABB/ Schneider/Merlin Gerin/BCH.
8	Sluice Valve(ISI marked)	SANT / Kirloskar /Advance/Audco/ Zoloto
9	Gunmetal - Gate Valve/ NRV(ISI marked)	Leader / Kirloskar /Advance/Audco/ Zoloto
10	CI Sluice Valve(ISI marked)	Leader / Kirloskar /Advance/Audco/ Zoloto
11	Valves/ Check Valves(ISI marked)	Leader / Kirloskar /Advance/Audco/ Zoloto
12	Butterfly Valve/ Air Release Valve(ISI marked)	Leader / Kirloskar /Advance/Audco/ Zoloto
13	Y-type Strainer	Emerald/SANT/Kartar/Leader/Advance/Audco/ Zoloto

14	GI Pipes/ MS Pipes	Jindal (Hissar)/ TATA / Sail (ISI Marked)
15	Pressure gauge	H Guru / Fiebig / Danfoss/ Indfoss / Emerald
16	Hydrant Valve	Safex/ Minimax / Cease Fire /Tyco/Newage.
17	Branch Pipe	Safex/ Minimax / Cease Fire /Tyco/Newage.
18	Drum of Hose Reel	Safex/ Minimax / Cease Fire /Tyco/Newage.
19	Hose Coupling	Safex/ Minimax / Cease Fire /Tyco/Newage.
20	Fire Hose Pipe/ Hose Box	Safex/ Minimax / Cease Fire /Tyco/Newage.
21	First-AID Rubber Reel	Safex/ Minimax / Cease Fire /Tyco/Newage.
22	First Aid Hose Reel	Safex/ Minimax / Cease Fire /Tyco/Newage.
23	2 way/ 4 way FBC	Getech/Safe Guard /Omxex /Life Guard.
24	Sprinkler Heads	New Age/ Minimax / Cease Fire / Fire shield/ Tyco/HD.
25	Alarm Control Valve	HD / Omex/Viking/Tyco
26	Anchor Fastener	Fischer / Hilti / OBO
27	Fire Extinguisher	Cease Fire / Fire shield / Minimax/ Safex
28	Pressure Switch	System Sensor/ Indfoss/Danfoss / Honeywell / Viking.
29	LED signage	Hochiki/ Cooper lighting & Safety/ Aldo LED/ Bajaj / Prolite.
30	Pipe protection pypcoat (Aw4)wrapping	IWL/ Taxa/ Mac-polycoat

**Package-3 (Automatic Fire Alarm system & PA System)**

1	Manual/ Conventional Smoke Detectors/ optical cum Thermal Detectors/ Thermal Detectors/ Manual call Points/ Main Fire Alarm Control Panel with Battery Backup/Repeater panel/Mimic Panel/ Monitor Module / Control Module/ Response indicator/ Low Intensity Hooters	Agni/System Sensor/Ravel/ Apollo/Edward
2	Public address components like amplifiers, gooseneck microphone, speakers	Bosch/JBL/ Crown /Honeywell
3	Speaker cable	Krystal / JAD/ Belden/ DAC/ Monster
4	Telephone Cable	Havells / Finolex/ RR Kable/ Polycab /KEI
5	Wall Mount Rack	Valrack / Rittal/APC/APW

**Package- 4 (LIFT)**

1	Lift	The OEM shall be selected as per guideline of CPWD vide DM No: DG/ SE(E)TAS/ PPP- MII order/22 dt; 28/09/2020. The agency has to give at least 3 options of OEM as per above guidelines for lift and the department has right to select any one of them.
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**Package- 5 (Sub-station)**

1	Transformer	Voltamp (Vadodara)/Hitachi/ ABB/ Kirloskar/ Crompton Greaves/ Schneider/Siemens
2	HT Panel	ABB/ Kirloskar / Crompton/ Schneider-Electric/ Siemens ( <b>Panel Shall be tested at OEM manufacturing plant</b> )
3	MV Panel (TTA Panel) for Sub substation area / Synchronization Panel / APFC Panel/ Fire Fighting Panel	Siemens – Siepan-8PU/ Legrand-XL3/ LK(L & T)-Ti/ ABB- ArTuK/ Schneider Electric – Blokset
4	Outdoor feeder pillar & LT Panel, meter panel for building blocks	Siddhi Vinayak Power Solution / Brahmaputra Power & Control / Mariana / Amit Project Powers & Controls ( <b>The manufacturer must have CPRI test certificate of appropriate rating not older than 5 years from the date of call of tender</b> )
5	APFC Relay/ Reactor /Thyristor module	LK (L&T)/Enercon/ Siemens/ Schneider Electric
6	Capacitor	LK (L&T)/ Legrand /Siemens/ABB/ Schneider
7	MCCB's	Same make as subhead -I
8	ACB's	Same make as subhead -I
9	Sandwich bus duct and accessories (Rising Main/ Bus-duct)	Schneider / C & S / Legrand / LK(L&T)/ABB
10	Bus coupler	Same make as ACB
11	Rubber Mat	Tata rubber/padam prabhu/Voltech India/ Jyoti/ Vardhman
12	Multi function meter/Digital Ammeter/ Volt meter	Schneider/Conzerve /LK(L&T)/ Sceure/AE/ ABB/ Siemens
13	Selector Switches	Kaycee / LK(L&T) / AE / Legrand/Salzer/ Rass Control/ C&S
14	Current Transformer, Potential transformer	AE / Kappa / L&T/ ABB/Siemens
15	Indicating Lamp/Push Button/LED	LK( L&T) / Raas Control / Schneider / C&S/ ABB/Siemens
16	Contactors, Relays, Timer	LK(L&T) / Siemens /ABB/Siemens
17	Lugs/Thimble	Dowell's / Comet / Braco / Raychem / Johnson
18	Cable Gland / Termination	Dowell's / Comet / Braco / Raychem / Johnson
19	DWC / HDPE PIPE	Sudhakar/ Finolex/ REX/ VIJAY /Ashirvad Precision/ Supreme / Astral/Sri Tulsi

**Package - 6 (D. G. set and UPS)**

1	Diesel engine	Cummins / KOEL/ Caterpillar/ Cater Pillar/ Perkins /TATA
2	Alternator	Stamford/ Leroy Somer / Crompton Greaves/ Kirloskar/ Cooper
3	AMF panel	OEM / OEA of Diesel engine
4	Acoustic Enclosure	OEM / OEA of DG Set
5	Anti Vibrations Mountings	Resistoflex / Dunlop / Easy flex / Vimpa Flexionics / Emerald.
6	Batteries for DG Set/ UPS	Exide / Amara Raja /Amron or as per OEM Standard
7	UPS	Schneider (APC)/ Legrand (Numeric)/ Liebert (Emerson)/ Fuji / Siemens
8	SMF battery	Exide / Amaron / Okaya
9	Battery Mounting Rack	As per OEM of UPS

**Package – 7 (CCTV & Surveillance System)**

1	All Type Network Camera	Axis / Pelco/Tyco/Zyxel/ Bosch/ Avigilon
2	NVR	Axis / Pelco/Tyco/Zyxel/ Bosch/ Avigilon
3	All hardware's for CCTV Surveillance system	Axis / Pelco/Tyco/Zyxel/ Bosch/ Avigilon
4	Professional Display	Panasonic / Sony/LG / Samsung
5	OFC cable	Siemon / Systimax / Beldon / Molex / Panduit / Derwiser
6	OFC Patch Cord and LIU	Siemon / Systimax / Beldon / Molex / Panduit / Derwiser
7	Cat 6A / CAT 6 UTP cable	Siemon / Systimax / Beldon / Molex / Panduit / Derwiser
8	Patch Panel	Siemon / Systimax / Beldon / Molex / Panduit / Derwiser
9	CAT6A / Cat 6 UTP Patch Cord	Siemon / Systimax / Beldon / Molex / Panduit / Derwiser
10	I/O Box and Face Plate	Siemon / Systimax / Beldon / Molex / Panduit / Derwiser
11	Wall Mount Rack	Valrack / Rittal/APC/APW
12	POE switches Layer 2/3	Cisco/Juniper/Arista/Alcatel
13	Wi-Fi Access Point	Cisco/Juniper/Arista/Alcatel
14	Workstation	IBM / Lenovo / Dell / HP

**Package – 8 (Centralized Intercom System)**

1	Intercom System	Crystal / Polycomm / ALCATEL / Cisco / Avaya / Tadiran
2	Telephone instrument	BEETEL /BPL/ ORPAT/ PANASONIC
3	Telephone junction boxes	MDF/Krown jewel/Malson/GE/ADC krone
4	Armoured jelly filled cable	Finolex /RR Kabel /APAR/KENTER
5	Corded Telephone Instrument	Beetel M71N/ BPL (Model: F1002-GSM) / ALCATEL(Model: T56) / PANASONIC (Model: Kx tsc 62 sxw)
6	Speaker cable	Krystal / JAD/ Belden/ DAC/ Monster
7	Telephone Cable	Belden/ Finolex/ RR Kabel /Havells
8	Digital Amplifiers	Bosch/JBL/ Crown /Honeywell.
9	Speaker	Bosch/JBL/ Crown /Honeywell.

**Package – 9 (Solar Photovoltaic Power Generation And Solar Water Heater)**

1	Solar cell and solar module(MNRE approved)	Tata power solar system/ B.H.E.L / Waaree Energies Pvt. Ltd./ Vikram Solar Pvt. Ltd. / Adani
2	ACDB & DCDB	As per OEM
3	String combiner Box(S.C.B)/ String Monitoring Box	Solaris/Geeysys/ Hensel/ Syntex / Hensel / Statcon
4	Data Logging system with remote monitoring	Statcon / Solaris / Dataglen / Aeron / Vortex
5	P.C.U (Power Conditioning Unit)(Solar inverter)	Delta / Siemens / A.B.B / S.M.A (Germany) / Schneider-Electric/Sungrow
6	Lightning Arrestor	JMV / Electro power / Stemon/ ABB
7	Solar Water Heater	Racold / Tata solar/ Bosch/ V-Guard – MNRE Approved solar panel
8	Insulation of Hot Water Pipes	K-Flex/ Armaflex/ Thermafлекс
9	Material for structure	Tata/Jindal Hissar/Sail

**Package - 10 (Domestic And Flushing Water Pumps)**

1	Hydro Pneumatic Pump set	Grundfos / Kirloskar / Mather & Platt / KSB/ Wilo /Xylem/Beacon
2	Motorized Solenoid Valve	Advance/ Honeywell/ Belimo/ Danfoss
3	Butterfly Valve/ Balancing Valve/ Isolation Valve/ Gate Valve/ Non-Return Valve etc. all other Valves	Belimo / Kirloskar /Advance/Audco/ Zoloto/Castle/Victaulic
4	Liquid Level Controllers/ Indicators	Minilac/ Radar/ Advance/ Famac/ Switzer
5	PLC system	Schneider/ Siemens/ ABB/ GE/ Honeywell/ Mitsubishi

**Package - 11 (Sewage Treatment Plant)**

1	GI/MS/SS pipes (IS: 1239 and IS:3589)	TATA/Jindal Hissar/ SAIL
2	GI/MS/SS pipes Fittings	Pot/Unik
3	PVC Pipe Sch80/Sch40	Astral/Supreme/Finolex
4	GM / Forged Brass Ball Valves	Intervalve / Audco/Sant
5	Sluice Valves	Kirlosakar/Ivc/Sant/ Leader/ Audco
6	Butterfly Valve	Audco / Intervalve / Bray /Sant
7	Wafer Type Check Valve	Advance / Intervalve / Bray /Sant
8	Multiport Valve	Pharer (U.S.A)/ Flack (U.S.A) / Initiative / Aventura
9	Isolation Ball / Gate / Globe Valve	Sant/Hawa/Honeywell/Lehry
10	Air Release Valve	Sant/ Watts/ Studor/Honeywell
11	Y Strainer	Honeywell/ Emerald/ Sant / Vtm/Audco (LK)/Kirloskar
12	Submersible Pumps	Grundfos / Xylem / Wilo / Ebara/ Pullen/KSB
13	Sludge Pumps/MBR feed pumps and other pumps	Johnson / Wilo / Ebara / Grundfos/KSB
14	Mixer	Wilo / Grundfos / Xylem
15	Clear Water Pumps & HSCF Pumps	Grundfos / Xylem / Suzler/ Kirloskar
16	Centrifuge	Alfa Level / Hiller / Humbolt / ADINO Technologies
17	Mechanical Seal	Burgmann / Sealol
18	Anti Vibration Mounting	Dunlop / Resistoflex/ Easyflex
19	Pressure Gauge	Waree / Baumer/ Ashcroft
20	Water Meter (Mechanical Type)	Actaris . Capstan - Woltman / Kranti
21	Electromagnetic Flow Meter	Emerson / E&H / Siemens / Jumo
22	Pressure Transmitter	Siemens/ Emerson/ E&H/ Jumo
23	DO Transmitter	Emerson /ABB /E&H /Hach
24	Turbidity Transmitter	Emerson/ABB/E&H/Hach
25	Level Switch / controller	Pune Techtrol/ Nolta / Jumo
26	Level Indicator	Levcon / Pune Techtrol/ cirrus
27	Paints	Asian Paints / Berger / ICI /Jotun
28	F.R.P Pressure Vessel	Pentair / Structural / Equivalent Fabricated
29	UV unit	Alfa UV / Wallance& Tiernan/ Aquatech / Sukrut
30	MBR Modules	Toray/GE/Kubota/Ovivo / Hydronautics/ Coke Membrane/ AlfaLaval
31	Dosing Pumps	Milton Roy/ prominent/ grundfos
32	MSEP Filter Vessel	OEM Fabricated
33	Mechanical Screen	Ovivo / Aquaseptence / Jash / Auric
34	HDPE Tanks	Reno / Sintex / Infra
35	Air Diffusers	Ovivo / OTT / EDI
36	Air Flow Rotameter	Eureka ind / Aster / Tansa
37	HDPE Pipe	Noble / Reliance.

38	Filter Press	Pharma / Royal / Thorat / Sachin / ADINO Technologies
39	Screw Pumps/Filter Press feed pumps	Rotomac / Alfa / Roto/Minimax/Helyflow
40	Agitator	Remi / Fluidyme
41	Air Compressor	Ingersol Rand / ELGI
42	Electrical Actuators Valves	Cair / Jonson / Auma / Honeywell
43	Air Blower	Aerzen / Ingersol Rand / TMVT /Everest/Beta
44	Welding Rods	As per make list of Fire fighting SH - 4
45	Fasteners	Hilti / Fisher/ Wurth
46	Online Monitoring	Pratham Enviro/Siemens/Hach/Potence Controls
47	Non Return Valve (Reflux Valve/Check Valve)	IVC/R&D Multiples/HAWA/Kirloskar
48	Ductile Iron pipe & Fittings	Jindal/Electrotherm/Electrosteel/TATA Mitaliks
49	Expansion Bellow	Precise Engineers/ B.D Engineers
50	Motor	Siemens / Kirloskar /Crompton / ABB/As per OEM standard
51	Any other item	As per the make list of other subhead

**Package – 12 (Boom Barrier)**

1	Boom Barrier	Motwane /Neptune/ Godrej/ Realtime
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**Package – 13 (VRF System and Pressurization System)**

1	VRF System	Hitachi/ Daikin/Mitsubishi/ O-General/ Toshiba / Voltas / Bluestar / Carrier / LG
2	Indoor Units	Hitachi/ Daikin/Mitsubishi/ O-General/ Toshiba / Voltas / Bluestar / Carrier / LG
3	TFU	Hitachi/ Daikin/Mitsubishi/ O-General/ Toshiba / Voltas / Bluestar / Carrier / LG.
4	Copper Tubes/ Pipe	Mexflow/ Rajco/ Mandev Tubes/ Jindal Refrigeration / RR Shramik
5	Nitrile Rubber	Armaflex/ Aflex / K-Flex / Aerocell
6	UPVC/ CPVC AC Drainage Pipe	Oriplast/ Finolex/ Supreme/ Astral (ISI Marked)
7	GI Pipe	Tata/ Jindal Hissar/Sail (ISI Marked)
8	AHU	Zeco/Edgtech/VTS/Luftech
9	Auto air Vent with stop valve	Rapid cool/ Anergy/ Honeywell/ Johnson & Control
10	Grill/ Diffuser / Fire Dampers / Louvers / Volume Control Damper / Duct Damper	Titus/ Trox/ System air/ Trio/ Dynacraft / Air Flow/ Conair/ Carriaire
11	Motorized Fire Damper	Titus/ Trox/ System air/ Mapro/ Airmaster/ Conair/ Carriaire
12	Volume Control Damper, Fresh/ Exhaust air Louver	Titus/ Trox/ System air/ Mapro/ Airmaster/ Conair/ Carriaire
13	Actuator for Fire Damper	Siemens/ Honeywell/ Belimo/ System air
14	Cabinet Type Centrifugal Fans / Tube & Vane Axial Fans	Kruger / Greenheck / Nicotra
15	In-line Fans	Kruger / Greenheck / Nicotra / Ostberg / Caryaire
	Propeller fans	Crompton / Khaitan / GE Alstom / Bajaj / GE / Caryaire / Kruger / Nicotra
16	Pressurized/ Expansion Tank / Air	Anergy/ Emerald/ Rapid Cool/ KEPL

	Separator	
17	GI Sheet for Ducting	Tata/ Sail/ Jindal Hissar
18	Pre fabricated Duct	Zeco/Rollastar/ Ductofab
19	CO / CO2 Sensor	Danfoss/ Honeywell/ Johnson & Control/ Belimo

**Package - 14 (A & B) (Water Treatment Plant)**

1	Water Filtration Plant (Drinking water & Swimming pool) OEM	Ion Exchange/Thermax/Pentair
2	All Types Pumps	Grundfos/ Kirloskar / Mather & Platt / KSB/ Wilo /Xylem/Beacon
3	Motor	Siemens / Kirloskar /Crompton / ABB
4	Filter	Ion Exchange/ Thermax/ Pentair
5	Air Blower	Everest/ Beta/ Nicotra/ Kuger
6	Air Diffuser	EDI/ USA/ Equivalent
7	UV system	Ion Exchange/ Alpha/ Eureka Forbes/ Pentair/ Thermex

**Swimming Pool light Make**

1	18 W LED under kight	Goldwyn/Philips/K-Lite/Home Décor/Jaquar
2	DMX controller	As per OEM of LED under water light
3	200 W Power Supply Unit	As per OEM of LED under water light

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## **PART-D**

### **SCOPE & SPECIFICATION FOR HORTICULTURE WORKS**

## Section-I

### **1.0 Specifications for Horticulture works:**

- 1.1 The Scope of horticulture work is to provide the whole residential complex with lush green lawns, trees, hedges, shrubs and beautiful flowers so as to provide an excellent ambience of residential-environment and at the same time makes the residential complex environmentally friendly and to make a good impression on the residents and public. The agency has to undertake all such jobs/activities required to maintain the Residential premises in a presentable condition and in above mentioned spirit at all the time whether such activities are elaborated hereunder or not.
- 1.2 The above scope of work includes designing and its approval from Engineer-in- Charge and executing the work as per drawings.

### **2.0 Landscaping & plantation works:**

- 2.1 While undertaking this work, the agency shall develop the lawn area, plantation of trees, shrubs and hedges etc. and other activities mentioned below and as shown in the tender drawings.
- 2.2 The Agency shall submit the detailed working drawings to Engineer-in-Charge along with the layout, material and the execution plan for approval before commencing the work.

### **3.0 Plantation works: -**

The plants should be as per following specifications: -

- 3.1 The plants should be full of fresh and healthy foliage.
- 3.2 The plants should be free from insect, pest and disease.
- 3.3 Plant should be healthy and vigorous growth
- 3.4 The plants should be well settled and should not be newly shifted.
- 3.5 The plants should be true to the variety and named Variety should be tagged.
- 3.6 The rejected plants materials should be removed from the site immediately.
- 3.7 Moss stick should be covered with the plants in case of plants supplied with moss stick.
- 3.8 The Plant should be well stabilised and good spread.
- 3.9 Good earth and manure used for filling the pot/poly bag free from any inert material and mixed to proper ratio.
- 3.10 Pot/ poly bag used for filling the plants should be proper size good quality not damaged.
- 3.11 There should be proper drainage in pots for plants if supplied in pots.
- 3.12 The flowering plants should also have proper flowering and should be true to the variety.
- 3.13 All plant should have the tendency of growth and should not be stunted type.
- 3.14 There should be no stagnation of water on the ground where plantation is to be done.

### **4.0 Land Scaping:**

The unpaved area in the campus shall be aesthetically landscaped by providing grass, shrubs, trees hedge etc. Mounds as per approved drawing may be created for landscaping. The gazebo with necessary sitting arrangements in complete set may be constructed as per

approved landscaped drawing. The entire work may be done as per the drawing prepared by the Agency consultant and approved by Engineer-in-Charge.

#### **5.0 Irrigation work:**

Agency shall provide water as per landscape, plantation and other horticulture work. Agency shall provide robust irrigation system which can sustain in all weathers.

**6. Manure and Fertilizers:** Cattle manure/ compost shall be well decayed (should be at least 6 months covered in dump), free from grits and any other unwanted materials. The contractor shall also provide and spread manure (cow dung manure/compost) for healthy growth of the plants & trees under his maintenance. Depending upon requirement to maintain the nutrients level of the soil, necessary application of chemical fertilizers (NPK) and other micro nutrients should be done.

7. Watering should be done in such a way that optimum level of moisture content for healthy growth of plants and trees is maintained, and at no time, moisture content should fall below the wilting point. Inadequate or excessive watering is to be avoided. During the dry season, watering should be carried out at least 3 times in a week summer & twice a week in winter or as per requirement of the tree plant/ shrub. The water should be sourced from STP (Sewerage Treatment Plants). In case of emergency, the source other than STP can be used provided that prior approval of Engineer –in–Charge has been obtained.

**8. Weeding and Hoeing:** The work includes maintaining areas close to the base of the trees and shrubs free from weeds within 300mm radius from the stem of the trees / 150mm radius from the stem of the plants. Weeding has to be carried out once in a month. All weeds are to be disposed off from the site with all leads and lifts.

**9. Pruning and Trimming:** All dead or injured twigs, water shoots, unwanted branches are to be removed. Trees, shrubs and ground cover should be pruned to maintain natural shape. The hedges and shrubs shall be given special shapes and sizes to give aesthetic appearance of the greenery at regular intervals.

**10. Pest and Disease control:** All trees/plants are to be inspected once in a month to determine any disease or pest infections. Once the infection is identified adequate control measures are to be taken.

11. The contractor shall maintain the plants, hedges, trees, shrubs and lawns in good and healthy condition during construction period as well as free maintenance period of one year. This will include Complete maintenance of the entire garden features of the garden area i.e. lawn, trees, shrubs, hedge, potted plants, flowers beds, creepers etc. and other garden feature including watering hoeing, making of plants basic manuring, trimming and cleaning of hedges / plants, Beds, spraying of insecticides, fungicides, weeding, mowing, and top dressing of lawn with good earth and manure and hedge clipping and removal of the garden waste, composting of green waste from plants, trees, lawn mowing, etc. as per direction and satisfaction of the officer-in-charge. **Nothing shall be paid to the agency on this account.**

#### **GENERAL TERMS AND CONDITIONS FOR HORTICULTURE WORK:**

1. The work shall be carried out as per C.P.W.D. Specification - 2019 Vol. - I to II & Hort. Specification 2025 with up to date correction slips and as per CPWD Yard stick.
2. The contractor shall be responsible for arrangement of all necessary tools and plants required at site of work for which nothing shall be provided by the department.

3. The contractor shall make his own arrangements for obtaining electric/water connections, if required, and make necessary payment directly to the Department concerned.
4. The Department shall not be responsible for any injury partial or permanent or death of any workers at site due to accident or mal functioning of the equipment or by negligence of the staff.
5. The contractor shall at his own expense arrange for safety provision as per CPWD safety code.
6. No compensation shall be payable to the Contractor for any damage caused by rains, storms, earthquakes and other calamity during the execution of work.
7. It shall be the sole responsibility of the Contractor to ensure before undertaking the maintenance work that number of trees/shrubs/hedge/ lawn area all are in healthy conditions no casualty and deficiency of plants exist at site and he has to bring the same into the notice of the Dy. Director of Hort. within 3 days of undertaking of the maintenance work failing which, it shall be presumed that there were neither casualty nor deficiency of the plants in the entire area being undertaken for maintenance.
8. If any damage caused for public conveniences/services, the same shall have to be repaired instant, failing which necessary recovery shall be made from the Contractors bill. If any Building, Road and Channels, Cable /Electrical fitting etc. damaged by the contractor the same will have to repair or made good by the contractor at his risk and cost, otherwise the complete cost will be recovered as intimated by the division/department Concerned.
9. Unless otherwise provided in the Schedule of Quantities/Specifications, the rates tendered by the contractor shall be all inclusive and shall apply to all height, lifts, leads and depths of the work and nothing extra shall be payable to him on account of the same. The rates will be derived in accordance with clause 12 of the agreement, if not already specified.
10. Some restrictions may be imposed by the security staff etc. on the working and for movement of labour, materials etc. The contractor shall be bound to follow all such restrictions/instructions and nothing extra shall be payable on account of the same.
11. The contractor shall fully comply with all legal orders and directions of the Public or local authorities of municipality and abide by their rules and regulations and pay all fees and charges for which he may be liable in this regard. Nothing extra shall be paid/reimbursed for the same.
12. The contractor will make his own arrangement for accommodation of labourers and nothing shall be paid on this account.
13. The contractor shall be responsible for removal of garden waste from the site and disposed off at designated dumping area as per specified Items of work which includes all leads and lifts as per directions of Officer-in-Charge.
14. Minimum workers shall be deputed by the contractor as per approved yard sticks of Horticulture Maintenance Manual 2023 and not below the age of 18 years.
15. The contractor shall have to arrange all required tools & plants & other stock items like Bamboo, Sutli, Hessian cloth. Tokari etc. for the proper development & maintenance of garden feature. Repair cost of tools & plant items shall be borne by the contractor & nothing shall be paid extra on this account.
16. In lieu of technical staff required as per clause 32, contractor has to engage one no. supervisor having smart phone enabled with whatsapp. The supervisor has to send photos to concern SO/AD of daily labour deployment and all day-to-day major activities. Nothing extra to be paid for this. The photograph showing the maintenance/development work shall be submitted by the contractor at the end of

- every month from the date of start to date of completion covering all garden activities feature otherwise recovery shall be made as per clause 32 of the Agreement.
17. The Engineer- in- charge reserve the right to change the site/location/execution of works.
  18. No claim for the idle Labour, machinery and establishment on account of suspension/stoppages of work for any reason whatsoever shall be admissible under any circumstances.
  19. The site shall be cleared and the surplus material / horticulture waste / rubbish etc. shall be disposed off as directed by The Engineer-in-Charge.
  20. Royalty at applicable rate and all other incidental expenditure shall have to be paid by the contractor on all material like cattle manure, good earth, sand, sludge etc. collected by him for execution of the work.
  21. There shall be no burning of leaves, plastic etc. at site, otherwise Contractor shall be solely responsible for any penalty for this offence.
  22. The agency should ensure that at prevailing minimum wages rates of Central Government are paid to the workers. In this regard, following procedure to be adopted.
    - (a) Wages due to every worker shall be paid to him direct by contractor through Bank or ECS or Online transfer to his Bank Account.
    - (b) It shall be the duty of the contractor to ensure the disbursement of wages through bank account of labour.
  23. No contractor /Builder or any person would be permitted to store /dump Horticulture waste/material or debris on metalled road. All precautions to be taken to ensure that no dust particles are permitted to pollute the air quality as a result of such storage. Any material dumped on matallic road shall be removed immediately from it otherwise same shall be removed by department and recovery from bill at the double rate to the cost of removal shall be done from contractor bill.
  24. The basin of each shrub/plant shall be of required size so as to retain required quantity of water in a time, otherwise it will be presumed that sufficient watering to plants has not been done by the contractor, less watering to plants is not acceptable.
  25. The contractor shall maintain the attendance of staff/labour deployed at site through Authentic Proof of attendance of workers, which shall be provided by the contractor at his own cost and daily attendance shall be submitted to the Sub-Division and nothing shall be paid to the agency on this account.
  26. All the engaged workers are to be equipped with photo identity cards issued by the contractor and contractor will maintain their particulars (i.e. Name, Father's Name, Local Address and permanent address etc.). A copy of the same will be provided to the Officer-in-charge before start of Work. The expenditure on this account will be borne by contractor and nothing will be reimbursed for it.
  27. In order to ensure the suitability of good earth supplied for Horticulture purpose, lab test will be required for every 300 cum of good earth supplied.
  28. The contractor shall follow provision of contract labour (Regulation and Abolition) ACT- 1970 & minimum wages ACT.
  29. GST as applicable.
  30. Any damage/ mis-happenings/ legal proceedings/ compassion occurred during the executing of the contract shall be borne by the contractor & department shall not be responsible for any such occurrence.
  31. All expenditure to be incurred for testing of samples e.g. packing, sealing, transportation, loading, unloading etc. including testing charges shall be borne by the contractor. (As per Office Memorandum No. DG/MAN/410 Dated: 22.10.2021).

32. The contractor or his representative should be available at site on every visit, of officer-in-charge as well as visit of senior officers.
33. For execution of Horticulture work, the main agency has to associate with CPWD registered contractor in appropriate Horticulture category dully approved by Engineer-in-charge.
34. The agency will be responsible for healthy growth of plants, trees, shrubs and grasses during construction stage and maintenance up to one year. Nothing shall be paid to the agency on this account.

The following activities are covered under this contract.

S.No.	Item of work	Nos./Qty./Frequency Required
(i)	Pruning & trimming of trees/shrubs creepers etc.	Quarter Yearly / need based
(ii)	Hedges Cutting	Monthly
(iii)	Any other item (Horticulture, Civil, Elect, U/F water supply) required for proper maintenance	On need basis
(iv)	Irrigation	Thrice a week during summer season and twice a week during winter and need based
(v)	(i) Manuring (ii) Fertilization	a) Trees/palms – once in every three months b) shrubs/grounds cover –monthly c) Grass –once every three months.
(vi)	Lawn Mowing & trimming of shrubs	Monthly or as and when required.
(vii)	Plant Protection	Pest control -Fortnightly Disease control-Fortnightly during rainy season and monthly in other seasons
(viii)	Cultivation & Weeding	Monthly or earlier as per the requirement.
(ix)	Seasonal Flowers	Wherever feasible
(x)	Top dressing with soil &/or manure	Yearly
(xi)	Repair & replacement of plants, leveling etc.	As and when required

The following conditions shall be followed:

21.1 In case, any causality of shrubs, trees or any other plants has been found during maintenance, the Agency should replace the trees/ shrubs/ other plants of the same height and specification by another at his risk and cost and nothing extra shall be paid for the same in this regard. In case of any delay recovery of Rs 60/- per shrubs, Rs. 250/- trees plants, Rs.140/- for other foliage/ decorative plants and Rs. 100/- per Sqm. For lawns per month shall be made. The decision of the E-in-C shall be final and binding in this regard.

21.2 In case, if it is observed that the maintenance is not healthy and to the required standard, no payment shall be made of the specific area for the period over which the maintenance has

been found to be neglected. The decision of the E-in-C shall be final and binding in this regard.

The required quantity of insecticides/ Pesticides will be arranged by the agency for proper maintenance (only during the maintenance period) if needed.

21.4 The rejected & substandard material should be removed from the site of work immediately; the Department shall not be responsible for any damage/ loss of rejected material. If the same will not be removed within five days after issuing notice in writing by E-in-C, then necessary recovery shall be made @ Rs. 2000 per day.

## Section-II

S.no.	Description of item	Qty	Unit
<b>A</b>	<b>Development of lawn</b>		
1	Trenching in ordinary soil up to a depth of 60 cm including removal and stacking of serviceable materials and then disposing of surplus soil, by spreading and neatly levelling within a lead of 50 m and making up the trenched area to proper levels by filling with earth or earth mixed with sludge or / and manure before and after flooding trench with water (excluding cost of imported earth, sludge or manure).	1981	Cum
2	Removal of excavated mulba by mechanical transport I/c loading, unloading & stacking upto 10 km lead	330	Cum
3	Supplying and stacking of good earth at site including royalty and carriage upto 5 km lead complete (earth measured in stacks will be reduced by 20% for payment).	991	Cum
4	Supply and stacking of well decayed cattle manure at site including royalty and carriage upto 5 k.m. lead complete (cattle manure measured in stacks will reduced by 8% for payment).	330	cum
5	Spreading of sludge, dump manure and/or good earth in required thickness as per direction of officer-in-charge (cost of sludge, dump manure and/ or good earth to be paid separately)	1321	cum
6	Fine dressing the ground.	13207	Sqm
7	Supplying & Stacking of Selection No.1 doob grass turf at site fresh & free from weeds having proper roots in green including loading, unloading, carriage and all taxes paid etc.and as per direction of officer in charge.	1148	Sqm
8	Grassing with selection No. 1 Doob grass including watering and maintenance of the lawn for 30 days or more till the grass forms a thick lawn, free from weeds and fit for mowing including supplying good earth, if needed (the grass and good earth shall be paid for separately).		

8.1	In rows 5 cm apart in both directions	5738	Sqm
9	Providing and laying Neelgiri/Mexican grass turf with earth 50mm to 60mm thickness of existing ground prepared with proper level and ramming with tools wooden (Dhurmox) and than rolling the surface with light roller make the surface smoothen and light watering with sprinkler and maintenance for 30 days or more till the grass establish properly, as per direction of officer-in-charge	5738	Sqm
	<b>Provision for Tree Plants</b>		
10	Providing and stacking of Azadirachta indica ( Neem ) height 120-130cm in polybag size 25 cm as per direction of the officer-in-charge.	40	Nos.
11	Providing and stacking of Bottle palm ht. 270-300 cm bottom girth 40- 50 cm well developed in big HDPE bag as per direction of the officer-incharge.	75	Nos.
12	Providing and stacking of Cassia fistula (Amaltash) height 120-135 cm. in poly bag size 25 cm as per direction of the officer-in-charge.	21	Nos.
13	Providing and stacking of Foxtail palm ht. 180-210 cm bottom girth 25- 30 cm well developed in big size HDPE bag as per direction of the officer-in-charge.	75	Nos.
14	Providing and stacking of Millingtonia hortensis height 150-165 cm. in poly bag size 25 cm as per direction of the officer-in-charge.	10	Nos.
15	Providing and stacking of Nauclea cadamba (Kadam) height 150-165 cm. in poly bag size 25 cm as per direction of the officer-in-charge.	12	Nos.
16	Providing and stacking of Plumeria alba height 165-180 cm. with 3-4 branches and thick stem in big size HDPE bag as per direction of the officer-in-charge.	95	Nos.
17	Cycus revoluta in 35 cm challi, specimen plant, having 30 to 40 with fresh and healthy, leaves having 25 cm to 30 cm circumfrance of base stem well developed.	30	Nos.
18	Ficus black vivion piller Topiary (Cylinder type) well developed with fresh & healthy 180 cm to 210 cm ht in 40 cm Cement Pot/ Plastic pot.	30	Nos.
	<b>Provision for Shrub Plants</b>		
19	Providing and stacking of Ficus benjamina (green) height 120-135 cm. with 6-8 branches and lush green foliage in gunny bag size 25 cm as per direction of the officer-in-charge.	1872	Nos.
20	Providing and stacking of Calliandra hybrida of height 105-120 cm., well branched, bushy in big size HDPE bag as per direction of the officer-incharge.	41	Nos.

21	Providing and Stacking of ficus panda plant of height 90 cm to 105 cm multi branches, well developed in poly bag of size 25 cm as per direction of the officer-in-charge.	100	Nos.
22	Providing and stacking of Hamelia patens (Dwarf ) of height 30-45 cm. with 3-4 branches in earthen pot of size 20 cm as per direction of the officer-in-charge.	898	Nos.
23	Providing and stacking of Malpighia coccigera of height 30-45 cm., multibranched in earthen pot of size 20 cm as per direction of the officer-in-charge.	3670	Nos.
24	Providing and stacking of Tecoma gaudichaudi of height 90-105 cm., bushy in big size HDPE bag as per direction of the officer-incharge.	122	Nos.
25	Providing and stacking of Thuja compacta of height 75-90 cm., conical shaped, well formed with healthy foliage in earthen pot of size 30 cm as per direction of the officer-in-charge.	100	Nos.
26	Providing and Stacking of Karonda of ht. 45 cm to 60 cm in Poly bag of size 25 cm as per direction of the officer-in-charge.	6	Nos.
27	Syzygium myrtifolium (Eugenia oleina) having 90 cm to 120 cm height, well developed with fresh, healthy & shining foliage in 30 cm Earthen Pot/Plastic Pot.	100	Nos.
	<b>Provision for Ground Cover/Hedge Plants</b>		
28	Providing and stacking Duranta Golden, having ht.12 cm to 15 cm bushy shape with fresh and healthy leaves in Poly Bag and as per direction of the officer-in-charge.	4000	Nos.
29	Providing and stacking Iresine herbstii, of height 10 cm to 12 cm. full of branches well developed in Poly Bag and as per direction of the officerin- charge.	2000	Nos.
30	Providing and stacking Ophiopogon, Green/Black full of leaves in 15 cm size of Earthen Pot / Plastic Pot and as per direction of the officerin- charge.	1000	Nos.
31	Providing and stacking Syngonium (Butterfly) variegated with 2 to 3 suckers healthy foliage in Earthen Pot/Plastic Pot of size 20 cm and as per direction of the officer-in-charge.	1000	Nos.
32	Providing and stacking Wadelia trilobata, full of leaves in Poly Bag and as per direction of the officer-in-charge.	2000	Nos.
33	Plantation of Trees, Shrubs, and Hedge at site i/c watering and removal of unserveiceable material's as per direction of officer in charge (excluding cast of plant & water)		
33.1	Trees Plant	438	Nos.
33.2	Shrubs Plant	6909	Nos.

33.3	Hedge Plant /Ground cover	10000	Nos.
	<b>Provision for providing and displaying of potted plants Plants</b>		
34	Providing, stacking and Displaying Aglaonema Snow White hybrid plant (three in one), having ht. 30 cm & above with 6 to 8 leaves, bright colour, well developed, fresh and healthy in 25 cm size of Earthen pot / Plastic pot (Specimen Plant) and as per direction of the officer-in-charge.	50	Nos.
35	Providing, stacking and Displaying Araucaria cookie having ht. 60 cm to 75 cm, straight, well developed, fresh and healthy with lush green leaves from bottom to top in 20 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.	50	Nos.
36	Providing, stacking and Displaying Areca Palm having ht. 90 cm to 1.20 m with 4 to 5 suckers, well developed, fresh and healthy with lush green foliage in 25 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.	50	Nos.
37	Providing, stacking and Displaying Croton Petra having ht. 45 cm & above with 2 to 3 branches, well developed, fresh and healthy leaves in 25 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.	50	Nos.
38	Providing, stacking and Displaying Dracaena ‘Song of India’ plant (three in one), having ht. 30 cm and above, multibranched, well developed with fresh and healthy leaves in 25 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.	50	Nos.
39	Providing, stacking and Displaying Rhapis Palm having ht. 45 cm to 60 cm with 5 to 7 suckers, well developed, full of fresh and healthy leaves in 25 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.	50	Nos.
40	Providing, stacking and Displaying Seaforthia Palm having ht. 90cm to 1.20 m with 6-8 suckers, well developed, fresh and healthy lush green leaves from bottom to top in 20 cm size of Earthen pot / Plastic pot and as per direction of the officer-in-charge.	50	Nos.

41	Providing, stacking and Displaying Ixora dwarf different colour having 10 cm to 15 cm ht., well developed with fresh & healthy foliage with bloom in 15 cm Earthen Pot/Plastic Pot and as per direction of the officer-in-charge.	250	Nos.
42	Providing, stacking and Displaying Ixora singaporenensis different colour having 30 cm and above ht., well developed with fresh & healthy foliage with bloom in 25 cm Earthen Pot/Plastic Pot and as per direction of the officer-in-charge.	250	Nos.
43	Providing, stacking and Displaying Malpighia plants of ball shape of 60 cm to 75 cm ht. with 190 cm to 210 cm circumference in middle, supported by GI wire frame, having 5-6 plants with fresh & healthy foliage in 35 cm Cement pot/Plastic Pot and as per direction of the officer-in-charge.	25	Nos.
44	Providing, stacking and Displaying Malpighia plants of conical shape of 160 cm to 180 cm ht. with 140 cm to 150 cm circumference in bottom, supported by GI wire frame, having 5 to 6 plants with fresh & healthy foliage in 40 cm Cement pot/Plastic Pot and as per direction of the officer-in-charge.	25	Nos.
45	Providing, stacking and Displaying Syzygium myrtifolium ( <i>Eugenia oleina</i> ) having 90 cm to 120 cm height, well developed with fresh, healthy & shining foliage in 30 cm Earthen Pot/Plastic Pot and as per direction of the officer-in-charge.	100	Nos.
46	Providing, stacking and Displaying Radermachera plant having 150 cm and above height well developed, multibranched with fresh and healthy bottom to top full of lush green foliage in 35 cm Cement pot/ plastic pot and as per direction of the officer-in-charge.	100	Nos.

**PART-E**  
**PAYMENT SCHEDULE**  
**&**  
**BILL OF QUANTITIES (BOQ)**

## PAYMENT SCHEDULE

*Correction...Nil* *Deletion... Nil* *Insertion...Nil* *Overwriting... Nil*  $\mathcal{AE}(C)$   $\mathcal{AE}(\mathcal{E})$   $\mathcal{EE}(C)$

**Name of work :** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parkings including all development works for Civil, E&M, Horticulture and services as per GFC drawings on EPC (Mode-III) basis].

The estimated cost of different type of buildings and activities are tabulated as below :

Sl. No	Description of Items	Qty	Unit	Rate	Amount
1	C/O Podium Parking (Officers)	1.00	Job	36,56,02,326.00	Rs. 36,56,02,326.00
2	C/O Podium Parking (Staff)	1.00	Job	29,76,83,237.00	Rs. 29,76,83,237.00
3	C/O Residential Towers (Grade A Quarter)	1.00	Job	51,44,67,837.00	Rs. 51,44,67,837.00
4	C/O Residential Towers (Grade B&C Quarters)	1.00	Job	57,49,02,024.00	Rs. 57,49,02,024.00
5	C/O Residential Tower (Grade D & Above Quarters)	1.00	Job	15,40,50,785.00	Rs. 15,40,50,785.00
6	C/O Residential Bungalow (RD Bungalow)	1.00	Job	2,61,36,674.00	Rs. 2,61,36,674.00
7	C/O Residential Towers (Class III Quarters)	1.00	Job	65,93,93,187.00	Rs. 65,93,93,187.00
8	C/O Residential Towers (Class IV Quarters)	1.00	Job	54,87,77,147.00	Rs. 54,87,77,147.00
9	C/O Amenities for Officers (Club Bldg., Creache & Changing Rooms)	1.00	Job	12,45,76,324.00	Rs. 12,45,96,496.00
10	C/O Amenities for Staff and Service Areas (Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room)	1.00	Job	11,18,00,957.00	Rs. 11,18,00,957.00
11	Development of Site (Electrical)	1.00	Job	7,88,32,449.00	Rs. 7,88,32,449.00
12	Development of Site (Civil)	1.00	Job	17,90,13,425.00	Rs. 17,44,59,539.00
13	Demolition charges of existing structures after adjusting salvage values	1.00	Job	13,96,917.00	Rs. 13,96,917.00
<b>TOTAL</b>					Rs. 3,63,66,33,289.00

## SCHEDULE OF STAGE PAYMENT

**Name of work :** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parkings including all development works for Civil, E&M, Horticulture and services as per GFC drawings on EPC (Mode-III) basis].

**1.0** Mode of measurement of plinth area shall be as per PAR'2025 of CPWD amended upto the last date of submission of bids.

**2.0** Clause on Interim Payments Based on Activity Percentage.

The tender has been invited on a percentage rate quoting basis with reference to the estimated cost put to tender. The estimated cost of each building has been worked out by the Department and further apportioned into various activities, each activity carrying a specified percentage share of the total cost of that building.

For the purpose of interim payments, the value of work executed by the Contractor shall be assessed with reference to the completion of such activities. The percentage weightage assigned to each activity shall be treated as the basis for payment, irrespective of the actual expenditure incurred by the Contractor for completing that activity. Payment shall be made on completion of any activity listed in the payment schedule, on the basis of the percentage cost of that activity adjusted with the percentage rate above or below quoted by the Contractor.

Interim payments shall be released to the Contractor proportionate to the percentage value of activities completed, subject always to the satisfaction of the Engineer-in-Charge regarding the quality and extent of work executed. Partial completion of an activity shall not entitle the Contractor to pro-rata payment unless specifically permitted in writing by the Engineer-in-Charge.

The activity-wise percentage breakup forming part of the tender document shall be final and binding on the Contractor. No claim whatsoever shall be entertained on account of variation in the actual cost incurred by the Contractor vis-à-vis the departmental allocation.

The final payment shall be made on completion of all activities of the work in accordance with the accepted tender, after due adjustment of all interim payments already released.

**3.0** For intermediate payments on “pro-rata basis” amount shall be worked out on the basis of fraction of work done out of total scope of work under each activity / Item in the table above. The assessment made by Engineer-in-Charge shall be final in this regard below.

**4.0** The total plinth area of a building shall be sum of plinth area at every floor including basement, if any.

- 5.0** Nothing extra shall be paid for testing of various materials, cost of materials used for testing, handling & transportation and related expenditure. The agency shall quote the rates taking this aspect also into consideration.
- 6.0** All duties, fees and other levies & taxes shall be payable by the Contractor and nothing extra shall be paid. The agency shall quote the rates taking this aspect also into consideration. Royalty paid to the Assam State Govt. will be deducted as per Sl. No. 31, Page No. 44 of this NIT, Part A.
- 7.0** The Stages are indicative and work shall be carried out as per detailed provision mentioned in this document.
- 8.0** All running / intermediate & final payment shall be made to the agency in accordance with the schedule given in the next page.

### Sl. No. 1 – PODIUM PARKING (OFFICERS)

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Podium Parking (Officers)	Rs. 32,81,92,903.00	Rs. 3,74,09,423.00	Rs. 36,56,02,326.00
Percentage Cost of Civil Component	89.77%		
Percentage Cost of Electrical Component	10.23%		

#### **Sub head 1. (Cost of Civil Component 89.77% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Completion of foundation up to plinth level i/c pile cap/raft, plinth level slab,		40.00%	40.00%
2	Completion of structure works (RCC/ structural works)		32.00%	72.00%
3	On completion of filler/masonry walls		4.50%	76.50%
4	On completion of all water proofing works		1.00%	77.50%
5	Completion of flooring, internal and external plaster work including cladding/dado.		5.50%	83.00%
6	On completion of all sanitary & water supply Plumbing work		3.00%	86.00%
7	On completion of internal and external painting, putty, polishing (except final coat of painting)		2.77%	88.77%
8.	Final coat of painting (0.5%) + Deep cleaning of area (0.5%)		1.00%	89.77%

#### **Sub head 2: (Cost of Electrical Component 10.23% of the quoted rates)**

<b>S. No.</b>	<b>Milestone /Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Installation of system of various E & M services		10.23%	
1.1	On supply of conduits, junction boxes, DBs etc.	0.50%		
1.2	On Completion of conduiting work	0.50%		
1.3	On Supply of wiring, DBs i/c switch board, switch, sockets and	2.18%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

	luminaries, i/c sensors			
1.4	On completion of above installation, testing and commissioning as per scope of work.	0.90%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, terrace pump, and other accessories as required.	2.50%		
1.6	On completion of above installation, testing and commissioning as per scope of work.	1.00%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.55%		
1.8	On completion of above installation, testing and commissioning as per scope of work.	0.35%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom at suitable locations	0.50%		
1.10	On completion of above installation, testing and commissioning as per scope of work.	0.15%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.08%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.02%		
1.13	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.00%		<b>10.23%</b>
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

## Sl. No. 2 – PODIUM PARKING (STAFF)

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Podium Parking (Staff)	Rs. 25,55,72,737.00	Rs. 4,21,10,500.00	Rs. 29,76,83,237.00
Percentage Cost of Civil Component	85.85%		
Percentage Cost of Electrical Component	14.15%		

### **Sub head 1. (Cost of Civil Component 85.85% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Completion of foundation up to plinth level i/c pile cap/raft, plinth level slab		25.00%	25.00%
2	Completion of structure works (RCC/ structural works)		45.00%	70.00%
3	On completion of filler/masonry walls		5.00%	75.00%
4	On completion of all water proofing works		2.00%	77.00%
5	Completion of flooring, internal and external plaster work including cladding/dado.		4.00%	81.00%
6	On completion of all sanitary & water supply Plumbing work		2.00%	83.00%
7	On completion of internal and external painting, putty, polishing (except final coat of painting)		1.85%	84.85%
8.	Final coat of painting (0.5%) + Deep cleaning of area (0.5%)		1.00%	85.85%

### **Sub head 2: (Cost of Electrical Component 14.15% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Installation of system of various E & M services		14.15%	
1.1	On supply of conduits, junction boxes, DBs etc.	0.75%		
1.2	On Completion of conduiting work	0.75%		
1.3	On Supply of wiring, DBs i/c switch board, switch, sockets and luminaries, i/c sensors	3.13%		

1.4	On completion of above installation, testing and commissioning as per scope of work.	1.12%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, terrace pump, and other accessories as required.	3.12%		
1.6	On completion of above installation, testing and commissioning as per scope of work.	1.21%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	1.02%		
1.8	On completion of above installation, testing and commissioning as per scope of work.	0.39%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom at suitable locations	0.63%		
1.10	On completion of above installation, testing and commissioning as per scope of work.	0.18%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.08%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.02%		
1.13	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.75%		<b>14.15%</b>
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

### Sl. No. 3 - RESIDENTIAL TOWERS (GRADE A QUARTER)

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Residential Towers (Grade A Quarter)	Rs. 42,84,49,322.00	Rs. 8,60,18,515.00	Rs. 51,44,67,837.00
Percentage Cost of Civil Component	83.28%		
Percentage Cost of Electrical Component	16.72%		

#### Sub head 1. (Cost of Civil Component 83.28% of the quoted rates)

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Completion of foundation up to plinth level i/c pile cap/raft, plinth level slab		17%	17%
1.1	Piling	4.50%		
1.2	Excavation & PCC	3.00%		
1.3	Pile cap/raft	4.00%		
1.4	On completion of Foundation & plinth beams, grade slab	5.50%		
2	Completion of super structure works (RCC/ structural works) of the building, from Ground/Podium Floor to 8th floor i/c terrace work like RCC water tank, machine room mumty room etc.		34%	51%
2.1	Ground floor to 1st floor ceiling slab,	8%		
2.2	2 <sup>nd</sup> floor slab to 3rd floor ceiling slab	8%		
2.3	4 <sup>th</sup> floor slab to 5th floor ceiling slab	8%		
2.4	6 <sup>th</sup> floor slab to terrace floor ceiling slab, and on completion of Terrace tanks, Mumty etc. complete	10%		
3	On completion of filler/masonry walls from Podium/ground floor to mumty, lift machine room including parapet walls		2.50%	53.50%
4	On completion of all water proofing works		2.00%	55.50%
5	Completion of flooring, internal and external plaster work including cladding/dado.		4.78%	60%

5.1	Ground floor to upto 3 <sup>rd</sup> floor	1.50%		
5.2	4 <sup>th</sup> floor upto 6 <sup>th</sup> floor	1.50%		
5.3	7 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty.	1.78%		
6	Completion of Door & Window work		5.30%	65.58%
6.1	Ground floor to upto 3 <sup>rd</sup> floor	1.75%		
6.2	4 <sup>th</sup> floor upto 6 <sup>th</sup> floor	1.75%		
6.3	7 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty.	1.80%		
7	On completion of all sanitary & water supply Plumbing work		6%	71.38%
7.1	Ground to 3 <sup>rd</sup> floor	1.80%		
7.2	4 <sup>th</sup> floor to 6 <sup>th</sup> floor	2.50%		
7.3	7 <sup>th</sup> floor slab to terrace floor, Mumty, lift machine room	1.50%		
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		4%	75.34%
8.1	Ground to 3 <sup>rd</sup> floor	1.30%		
8.2	4 <sup>th</sup> floor to 6 <sup>th</sup> floor	1.30%		
8.3	7 <sup>th</sup> floor slab to terrace floor, Mumty, lift machine room	1.36%		
9	On completion of internal and external painting, putty, polishing (except final coat of painting )		3%	78.34%
9.1	Ground to 3 <sup>rd</sup> floor	1.00%		
9.2	4 <sup>th</sup> floor to 6 <sup>th</sup> floor	1.00%		
9.3	7 <sup>th</sup> floor slab to terrace floor, Mumty, lift machine room	1.00%		
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting , building complete in all respect including cleaning of building and adjoining site.		1.84%	80.18%
11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and equipment's.		2.60%	82.78%
12.	Deep cleaning of the complete building to the satisfaction of the Engineer-in-charge and handing over of all buildings.		0.50%	83.28%

### Sub head 2: (Cost of Electrical Component 16.72% of the quoted rates)

*Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE(C) AE(E) EE(C)*

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Installation of system of various E & M services		<b>16.72%</b>	
1.1	On supply of conduits, junction boxes, DBs etc.	1%		
1.2	On Completion of conduiting work.	1%		
1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans, Purifier etc.	5.50%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	1.00%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, terrace pump, and other accessories as required.	1.00%		
1.6	On completion of above installation, testing and commissioning as per scope of work	0.75%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.75%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.50%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.50%		
1.10	On completion of above installation, testing and commissioning as per scope of work	0.08%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.04%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		
1.13	On Supply of all the lifts for the above Towers	2%		
1.14	On installation, testing and commissioning of Lifts.	0.50%		
1.15	On supply of photovoltaic panels,	0.45%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil

*AE(C)**AE(E)**EE(C)*

	inverter, solar water heating panels and its structure and accessories complete as required.			
1.16	On installation, testing and commissioning of solar photovoltaic plant and solar water heating system for both towers.	0.20%		
1.17	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.44%		16.72%
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

#### SI. No. 4 - RESIDENTIAL TOWERS (GRADE B&C QUARTERS)

Sub Head of work	Civil	Electrical	Total
Cost of Residential Towers (Grade B&C Quarters)	Rs. 47,27,18,274.00	Rs. 10,21,83,750.00	Rs. 57,49,02,024.00
Percentage Cost of Civil Component	82.23%		
Percentage Cost of Electrical Component	17.77%		

#### Sub head 1. (Cost of Civil Component 82.23% of the quoted rates)

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Completion of foundation up to plinth level i/c pile cap/raft, plinth level slab		15.00%	15%
1.1	Piling	3.50%		
1.2	Excavation & PCC	3.00%		
1.3	Pile cap/raft	4.00%		
1.4	On completion of Foundation & plinth beams, grade slab	4.50%		
2	Completion of super structure works (RCC/ structural works) of the building, from Ground/ Podium Floor to 11th floor i/c terrace work like RCC water tank, machine room mumty room etc.		34.23%	49%
2.1	Ground floor Roof Slab to 1st floor Roof slab,	6.50%		
2.2	2 <sup>nd</sup> floor Roof Slab to 3rd floor Roof slab,	6.50%		
2.3	4 <sup>th</sup> floor Roof Slab to 5th floor Roof slab,	6.50%		
2.4	6 <sup>th</sup> floor Roof Slab to 7th floor Roof slab,	6.48%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil

AE (C)

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EE(C)

2.5	8 <sup>th</sup> floor slab to terrace floor ceiling slab, and on completion of Terrace tanks, Mumty etc. complete	8.25%		
3	On completion of filler/masonry walls from podium/ ground floor to mumty, lift machine room including parapet walls		2.50%	51.73%
4	On completion of all water proofing works		2.00%	53.73%
5	Completion of flooring, internal and external plaster work including cladding/dado.		5.50%	59%
5.1	Ground floor to upto 4 <sup>th</sup> floor	1.80%		
5.2	5 <sup>th</sup> floor upto 9 <sup>th</sup> floor	1.80%		
5.3	10 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty room.	1.90%		
6	Completion of Door & Window work		5.50%	64.73%
6.1	Ground floor to upto 4 <sup>th</sup> floor	1.80%		
6.2	5 <sup>th</sup> floor upto 9 <sup>th</sup> floor	1.80%		
6.3	10 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty room.	1.90%		
7	On completion of all sanitary & water supply Plumbing work		6%	70.73%
7.1	Ground floor to upto 4 <sup>th</sup> floor	2.00%		
7.2	5 <sup>th</sup> floor upto 9 <sup>th</sup> floor	2.50%		
7.3	10 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty room.	1.50%		
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		4%	74.73%
8.1	Ground floor to upto 4 <sup>th</sup> floor	1.30%		
8.2	5 <sup>th</sup> floor upto 9 <sup>th</sup> floor	1.30%		
8.3	10 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty room.	1.40%		
9	On completion of internal and external painting, putty, polishing (except final coat of painting )		3%	77.73%
9.1	Ground floor to upto 4 <sup>th</sup> floor	0.90%		
9.2	5 <sup>th</sup> floor upto 9 <sup>th</sup> floor	1.00%		
9.3	10 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty room.	1.10%		
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting , building complete in all respect including cleaning of building and adjoining site.		2%	79.73%

11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and equipment's.		2.00%	81.73%
12	Deep cleaning of the complete building to the satisfaction of the Engineer-in-charge and handing over of all buildings.		0.50%	82.23%

**Sub head 2: (Cost of Electrical Component 17.77% of the quoted rates)**

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Installation of system of various E & M services		<b>17.77%</b>	
1.1	On supply of conduits, junction boxes, DBs etc.	1.03%		
1.2	On Completion of conduiting work.	1.03%		
1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans etc.	5.68%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	1.54%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, terrace pump, and other accessories as required.	1.46%		
1.6	On completion of above installation, testing and commissioning as per scope of work	0.56%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.46%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.18%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.70%		
1.10	On completion of above installation, testing and commissioning as per scope of work	0.18%		

1.11	On supply of illuminated signages and other signage, floor marking etc.	0.04%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		
1.13	On Supply of all the lifts for the above Towers	2%		
1.14	On installation, testing and commissioning of Lifts.	0.50%		
1.15	On supply of photovoltaic panels, inverter, solar water heating panels and its structure and accessories complete as required.	0.50%		
1.16	On installation, testing and commissioning of solar photovoltaic plant and solar water heating system for both towers.	0.20%		
1.17	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.70%		<b>17.77%</b>
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

### Sl. No. 5 - RESIDENTIAL TOWER (GRADE D & ABOVE QUARTERS)

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Residential Tower (Grade D & Above Quarters)	Rs. 12,75,88,476.00	Rs. 2,64,62,309.00	Rs. 15,40,50,785.00
Percentage Cost of Civil Component	82.82%		
Percentage Cost of Electrical Component	17.18%		

#### Sub head 1. (Cost of Civil Component 82.82% of the quoted rates)

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Completion of foundation up to plinth level i/c pile cap/raft , plinth level slab		19.50%	19.50%
1.1	Piling	6.50%		
1.2	Excavation & PCC	2.00%		
1.3	Pile cap/raft	5.00%		
1.4	On completion of Foundation & plinth beams, grade slab	6.00%		

2	Completion of super structure works (RCC/ structural works) of the building, from Podium/ Ground Floor to 7th floor i/c terrace work like RCC water tank, machine room mumty room etc.		30.00%	49.50%
2.1	Ground floor to 2 <sup>nd</sup> floor ceiling slab,	7.50%		
2.2	2 <sup>nd</sup> floor slab to 4 <sup>th</sup> floor ceiling slab	7.50%		
2.3	4 <sup>th</sup> floor slab to 6th floor ceiling slab	7.50%		
2.4	Terrace floor ceiling slab, and on completion of Terrace tanks, Mumty etc. complete	7.50%		
3	On completion of filler/masonry walls from Podium/ ground floor to mumty, lift machine room including parapet walls		2.50%	52.00%
4	On completion of all water proofing works		2.00%	54.00%
5	Completion of flooring, internal and external plaster work including cladding/dado.		5.96%	59.96%
5.1	Ground floor upto 3 <sup>rd</sup> floor	2.00%		
5.2	4 <sup>th</sup> floor upto 6 <sup>th</sup> floor	2.00%		
5.3	Terrace floor, Lift machine rooms, mumty room.	1.96%		
6	Completion of Door & Window work		5.50%	65.46%
6.1	Ground floor upto 3 <sup>rd</sup> floor	1.80%		
6.2	4 <sup>th</sup> floor upto 6 <sup>th</sup> floor	1.80%		
6.3	Terrace floor, Lift machine rooms, mumty room.	1.90%		
7	On completion of all sanitary & water supply Plumbing work		5.50%	70.96%
7.1	Ground floor upto 3 <sup>rd</sup> floor	2.00%		
7.2	4 <sup>th</sup> floor upto 6 <sup>th</sup> floor	2.00%		
7.3	Terrace floor, Lift machine rooms, mumty room.	1.50%		
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		4.70%	75.66%
8.1	Ground floor upto 3 <sup>rd</sup> floor	1.50%		
8.2	4 <sup>th</sup> floor upto 6 <sup>th</sup> floor	1.50%		
8.3	Terrace floor, Lift machine rooms, mumty room.	1.70%		

9	On completion of internal and external painting, putty, polishing (except final coat of painting )		3.10%	78.76%
9.1	Ground floor upto 3 <sup>rd</sup> floor	1.00%		
9.2	4 <sup>th</sup> floor upto 6 <sup>th</sup> floor	1.00%		
9.3	Terrace floor, Lift machine rooms, mumty room.	1.10%		
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting , building complete in all respect including cleaning of building and adjoining site.		2.40%	81.16%
11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and equipment's.		1.16%	82.32%
12	Deep cleaning of the complete building to the satisfaction of the Engineer-in-charge and handing over of all buildings.		0.50%	82.82%

**Sub head 2: (Cost of Electrical Component 17.18% of the quoted rates)**

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Installation of system of various E & M services		17.18%	
1.1	On supply of conduits, junction boxes, DBs etc.	1.00%		
1.2	On Completion of conduiting work.	1.00%		
1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans etc.	5.02%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	1.37%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves,	0.67%		

	Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, terrace pump, and other accessories as required.			
1.6	On completion of above installation, testing and commissioning as per scope of work	0.25%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.40%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.15%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.55%		
1.10	On completion of above installation, testing and commissioning as per scope of work	0.15%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.03%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		
1.13	On Supply of all the lifts for the above Towers	3.70%		
1.14	On installation, testing and commissioning of Lifts.	1.50%		
1.15	On supply of photovoltaic panels, inverter, solar water heating panels and its structure and accessories complete as required.	0.30%		
1.16	On installation, testing and commissioning of solar photovoltaic plant and solar water heating system for both towers.	0.08%		
1.17	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.00%		<b>17.18%</b>
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

### **Sl. No. 6 - RESIDENTIAL BUNGALOW (RD BUNGALOW)**

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Residential Bungalow (RD Bungalow)	Rs. 2,29,85,407.00	Rs. 31,51,267.00	Rs. 2,61,36,674.00
Percentage Cost of Civil Component	87.94%		
Percentage Cost of Electrical Component	12.06%		

#### **Sub head 1. (Cost of Civil Component 87.94% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Completion of foundation up to plinth level i/c pile cap/raft , plinth level slab		27.00%	27.00%
1.1	Piling	7.50%		
1.2	Excavation & PCC	5.00%		
1.3	Pile cap/raft	6.00%		
1.4	On completion of Foundation & plinth beams, grade slab	8.50%		
2	Completion of super structure works (RCC/ structural works) of the building, from Ground Floor to terrace floor i/c terrace work like RCC water tank, lift machine room mumty room etc.		34.00%	61.00%

3	On completion of filler/masonry walls from lower ground floor to mumty, lift machine room including parapet walls		5.00%	66.00%
4	On completion of all water proofing works		2.00%	68.00%
5	Completion of flooring, internal and external plaster work including cladding/dado.		5.00%	73.00%
6	Completion of Door & Window work		5.00%	78.00%
7	On completion of all sanitary & water supply Plumbing work		1.50%	79.50%
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		4.00%	83.50%
9	On completion of internal and external painting, putty, polishing (except final coat of painting )		2.00%	85.50%
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting, building complete in all respect including cleaning of building and adjoining site.		2.00%	87.50%
11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and equipment's.		0.19%	87.69%
12.	Deep cleaning of the complete building to the satisfaction of the Engineer-in-charge and handing over of all buildings.		0.25%	87.94%
<b>Sub head 2: (Cost of Electrical Component 12.06% of the quoted rates)</b>				
S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Installation of system of various E & M services		12.06%	
1.1	On supply of conduits, junction boxes, DBs etc.	0.90%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil       $\mathcal{A}E(C)$        $\mathcal{A}E(E)$        $\mathcal{E}E(C)$

1.2	On Completion of conduiting work.	0.90%		
1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans etc.	5.00%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	1.40%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, terrace pump, and other accessories as required.	0.30%		
1.6	On completion of above installation, testing and commissioning as per scope of work	0.15%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.30%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.10%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.50%		
1.10	On completion of above installation, testing and commissioning as per scope of work	0.12%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.03%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		

1.13	On supply of photovoltaic panels, inverter, solar water heating panels and its structure and accessories complete as required.	1.30%			
1.14	On installation, testing and commissioning of solar photovoltaic plant and solar water heating system for both towers.	0.30%			
1.15	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	0.75%			<b>12.06%</b>
<b>Total Civil + Electrical of % quoted rates</b>					<b>100.00%</b>

### Sl. No. 7 - RESIDENTIAL TOWERS (CLASS III QUARTERS)

Sub Head of work	Civil	Electrical	Total
Cost of Residential Towers (Class III Quarters)	Rs. 54,68,91,898.00	Rs. 11,25,01,289.00	Rs. 65,93,93,187.00
Percentage Cost of Civil Component	82.94%		
Percentage Cost of Electrical Component	17.06%		

#### Sub head 1. (Cost of Civil Component 82.94% of the quoted rates)

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Completion of foundation up to plinth level i/c pile cap/raft , plinth level slab		13.00%	13.00%
1.1	Piling	3.50%		
1.2	Excavation & PCC	2.00%		
1.3	Pile cap/raft	3.00%		
1.4	On completion of Foundation & plinth beams, grade slab	4.50%		
2	Completion of super structure works (RCC/ structural works) of the building, from Ground Floor to 10th floor i/c terrace work like RCC water tank, machine		36.00%	49.00%

	room mumty room etc.			
2.1	Ground floor to 2 <sup>nd</sup> floor ceiling slab,	5.50%		
2.2	2 <sup>nd</sup> floor slab to 4 <sup>th</sup> floor ceiling slab	5.50%		
2.3	4 <sup>th</sup> floor slab to 6th floor ceiling slab	5.50%		
2.4	6th floor slab to 8th floor ceiling slab	5.50%		
2.5	8 <sup>th</sup> floor slab to 10 <sup>th</sup> floor ceiling slab	5.50%		
2.6	11 <sup>th</sup> floor slab to terrace floor ceiling slab, and on completion of Terrace tanks, Mumty etc. complete	8.50%		
3	On completion of filler/masonry walls from lower ground floor to mumty, lift machine room including parapet walls		2.50%	51.50%
4	On completion of all water proofing works		2.00%	53.50%
5	Completion of flooring, internal and external plaster work including cladding/dado.		5.50%	59%
5.1	Ground floor including security rooms upto 5 <sup>TH</sup> floor	1.80%		
5.2	6 <sup>th</sup> floor upto 10 <sup>th</sup> floor	1.80%		
5.3	11 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty.	1.90%		
6	Completion of Door & Window work		5.50%	64.50%
6.1	Ground floor including security rooms and upto 5 <sup>TH</sup> floor	1.80%		
6.2	6 <sup>th</sup> floor upto 10 <sup>TH</sup> floor	1.80%		
6.3	11 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty.	1.90%		

Correction...Nil Deletion... Nil Insertion...Nil

Overwriting... Nil

 $\Delta E(C)$  $\Delta E(E)$  $E E(C)$

7	On completion of all sanitary & water supply Plumbing work		6.00%	70.50%
7.1	Ground to 5 <sup>TH</sup> floor	2.00%		
7.2	5 <sup>th</sup> floor to 10 <sup>th</sup> floor	2.50%		
7.3	11 <sup>th</sup> floor slab to terrace floor, Mumty, machine room	1.50%		
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		4.00%	74.50%
8.1	Up to 5 <sup>TH</sup> floor level	1.30%		
8.2	6 <sup>th</sup> floor to 10 <sup>TH</sup> floor level	1.30%		
8.3	Terrace floor, mumty room, lift machine room.	1.40%		
9	On completion of internal and external painting, putty, polishing (except final coat of painting )		3.06%	77.56%
9.1	Up to 5 <sup>TH</sup> floor roof slab level	0.90%		
9.2	5 <sup>th</sup> floor ceiling slab level to 10 <sup>th</sup> floor roof slab level	1.00%		
9.3	11 <sup>th</sup> floor slab to terrace floor including mumty, machine room.	1.16%		
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting , building complete in all respect including cleaning of building and adjoining site.		3.00%	80.56%
11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining		1.88%	82.44%

Correction...Nil Deletion... Nil

Insertion...Nil Overwriting... Nil

 $\mathcal{AE}(C)$  $\mathcal{AE}(E)$  $\mathcal{EE}(C)$

	Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and equipment's.				
12.	Deep cleaning of the complete building to the satisfaction of the Engineer-in-charge and handing over of all buildings.		0.50%	82.94%	

**Sub head 2: (Cost of Electrical Component 17.06% of the quoted rates)**

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Installation of system of various E & M services		17.06%	
1.1	On supply of conduits, junction boxes, DBs etc.	1.03%		
1.2	On Completion of conduiting work.	1.03%		
1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans etc.	5.67%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	1.54%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, Main pump, other pumps and other accessories as required.	1.46%		
1.6	On completion of above installation, testing and	0.56%		

Correction...Nil Deletion... Nil Insertion...Nil

Overwriting... Nil

 $\Delta E(C)$  $\Delta E(E)$  $E(E)$

	commissioning as per scope of work			
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.46%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.17%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.64%		
1.10	On completion of above installation, testing and commissioning as per scope of work	0.18%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.03%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		
1.13	On Supply of all the lifts for the above Towers	1.75%		
1.14	On installation, testing and commissioning of Lifts.	0.43%		
1.15	On supply of photovoltaic panels, inverter, solar water heating panels and its structure and accessories complete as required.	0.34%		
1.16	On installation, testing and commissioning of solar photovoltaic plant and solar water heating system for both towers.	0.08%		

Correction...Nil Deletion... Nil

Insertion...Nil

Overwriting... Nil

 $\mathcal{AE}(C)$  $\mathcal{AE}(E)$  $\mathcal{EE}(C)$

1.17	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.68%		<b>17.06%</b>
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

### **Sl. No. 8 - RESIDENTIAL TOWERS (CLASS IV QUARTERS)**

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Residential Towers (Class IV Quarters)	Rs. 45,29,24,606.00	Rs.9,58,52,541.00	Rs. 54,87,77,147.00
Percentage Cost of Civil Component	82.53%		
Percentage Cost of Electrical Component	17.47%		

#### **Sub head 1. (Cost of Civil Component 82.53% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Completion of foundation up to plinth level i/c pile cap/raft, plinth level slab, UG Sump and Pump room, STP.		13.00%	13.00%
1.1	Piling	3.50%		
1.2	Excavation & PCC	2.00%		
1.3	Pile cap/raft	3.00%		
1.4	On completion of Foundation & plinth beams, grade slab	4.50%		
2	Completion of super structure works (RCC/ structural works) of the building, from Ground Floor to 12th floor i/c terrace work like RCC water tank, machine room, mummy room etc.		36.00%	49.00%
2.1	Ground floor to 2 <sup>nd</sup> floor ceiling slab,	5.50%		
2.2	2 <sup>nd</sup> floor slab to 4 <sup>th</sup> floor	5.50%		

Correction...Nil Deletion... Nil

Insertion...Nil Overwriting... Nil

*AE (C)**AE(E)**EE(C)*

	ceiling slab			
2.3	4 <sup>th</sup> floor slab to 6th floor ceiling slab	5.50%		
2.4	6th floor slab to 8th floor ceiling slab	5.50%		
2.5	8 <sup>th</sup> floor slab to 10 <sup>th</sup> floor ceiling slab	5.50%		
2.6	11 <sup>th</sup> floor slab to terrace floor ceiling slab, and on completion of Terrace tanks, Mumty etc. complete	8.50%		
3	On completion of filler/masonry walls from lower ground floor to mumty, lift machine room including parapet walls		2.50%	51.50%
4	On completion of all water proofing works		2.00%	53.50%
5	Completion of flooring, internal and external plaster work including cladding/dado.		5.50%	59%
5.1	Ground floor to upto 5 <sup>TH</sup> floor	1.80%		
5.2	6 <sup>th</sup> floor upto 10 <sup>th</sup> floor	1.80%		
5.3	11 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty.	1.90%		
6	Completion of Door & Window work		5.63%	64.63%
6.1	Ground floor including security rooms and upto 5 <sup>TH</sup> floor	1.86%		
6.2	6 <sup>th</sup> floor upto 10 <sup>TH</sup> floor	1.87%		
6.3	11 <sup>th</sup> floor slab to terrace floor, Lift machine rooms, mumty.	1.90%		
7	On completion of all sanitary & water supply Plumbing work		6.00%	70.63%
7.1	Ground to 5 <sup>TH</sup> floor	2.00%		

7.2	5 <sup>th</sup> floor to 10 <sup>th</sup> floor	2.50%			
7.3	11 <sup>th</sup> floor slab to terrace floor, Mumty, machine room	1.50%			
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		4.10%	74.73%	
8.1	Up to 5 <sup>TH</sup> floor level	1.30%			
8.2	6 <sup>th</sup> floor to 10 <sup>TH</sup> floor level	1.30%			
8.3	Terrace floor, mumty room, lift machine room.	1.50%			
9	On completion of internal and external painting, putty, polishing (except final coat of painting )		3.00%	77.73%	
9.1	Up to 5 <sup>TH</sup> floor roof slab level	0.90%			
9.2	5 <sup>th</sup> floor ceiling slab level to 10 <sup>th</sup> floor roof slab level	1.00%			
9.3	11 <sup>th</sup> floor slab to terrace floor including mumty, machine room.	1.10%			
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting , building complete in all respect including cleaning of building and adjoining site.		2.80%	80.53%	
11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and		1.50%	82.03%	

Correction...Nil Deletion... Nil Insertion...Nil

Overwriting... Nil

 $\Delta E(C)$  $\Delta E(E)$  $\Delta E(C)$

	equipment's.				
12.	Deep cleaning of the complete building to the satisfaction of the Engineer-in-charge and handing over of all buildings.		0.50%	82.53%	
<b>Sub head 2: (Cost of Electrical Component 17.47% of the quoted rates)</b>					
S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %	
1	Installation of system of various E & M services		17.47%		
1.1	On supply of conduits, junction boxes, DBs etc.	1.02%			
1.2	On Completion of conduiting work.	1.02%			
1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans etc.	5.64%			
1.4	On completion of above installation, testing and commissioning as per scope of work.	1.64%			
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, Main pump, other pumps and other accessories as required.	1.45%			
1.6	On completion of above installation, testing and commissioning as per	0.43%			

Correction...Nil Deletion... Nil Insertion...Nil

Overwriting... Nil

AE (C)

AE(E)

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	scope of work			
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.46%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.20%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.63%		
1.1	On completion of above installation, testing and commissioning as per scope of work	0.20%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.03%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		
1.13	On Supply of all the lifts for the above Towers	2.25%		
1.14	On installation, testing and commissioning of Lifts.	0.55%		
1.15	On supply of photovoltaic panels, inverter, solar water heating panels and its structure and accessories complete as required.	0.42%		
1.16	On installation, testing and commissioning of solar photovoltaic plant and solar water heating system for both towers.	0.02%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil

 $\mathcal{A}E(C)$  $\mathcal{A}E(E)$  $\mathcal{E}E(C)$

1.17	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.50%		<b>17.47%</b>
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

**Sl. No. 9 - C/O AMENITIES FOR OFFICERS (CLUB BLDG., CREACHE & CHANGING ROOMS)**

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Amenities for Officers (Club Bldg., Creache & Changing Rooms)	Rs. 10,14,72,719.00	Rs. 2,31,03,605.00	Rs. 12,45,76,324.00
Percentage Cost of Civil Component	81.45%		
Percentage Cost of Electrical Component	18.55%		

**Sub head 1. (Cost of Civil Component 81.46% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Completion of foundation up to plinth level i/c pile cap/raft, plinth level slab		24.00%	24.00%
1.1	Piling	8.00%		
1.2	Excavation & PCC	3.00%		
1.3	Pile cap/raft	5.00%		
1.4	On completion of Foundation & plinth beams, grade slab	8.00%		
2	Completion of super structure works (RCC/ structural works) of the building, from Ground Floor to terrace floor i/c terrace work like RCC water tank, lift machine room mumty room etc.		25.00%	49.00%
3	On completion of filler/masonry walls from lower ground floor to mumty, lift machine room including parapet walls		3.00%	52.00%

4	On completion of all water proofing works		3.50%	55.50%
5	Completion of flooring, internal and external plaster work including cladding/dado.		4.50%	60.00%
6	Completion of Door & Window work		3.00%	63.00%
7	On completion of all sanitary & water supply Plumbing work		4.00%	67.00%
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		4.00%	71.00%
9	On completion of internal and external painting, putty, polishing (except final coat of painting )		4.00%	75.00%
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting, building complete in all respect including cleaning of building and adjoining site.		4.00%	79.00%
11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and equipment's, deep cleaning of the building and handing over of all buildings		2.45%	81.45%

### Sub head 2: (Cost of Electrical Component 18.54% of the quoted rates)

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Installation of system of various E & M services		18.55%	
1.1	On supply of conduits, junction boxes, DBs etc.	0.50%		
1.2	On Completion of conduiting work.	0.50%		
1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans etc.	3.00%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	0.80%		

1.5	On Supply of pipes for Wet riser/ Down comer/ sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, Main pump, other pumps and other accessories as required.	0.35%		
1.6	On completion of above installation, testing and commissioning as per scope of work	0.20%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.25%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.08%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.65%		
1.10	On completion of above installation, testing and commissioning as per scope of work	0.19%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.01%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		
1.13	On Supply of ducts,Indoor units,AHU's,outdoor unit,cabling,refrigerant piping,control cable,LT & control Panel etc. for HVAC	3.83%		
1.14	On completion of installation, Testing and commissioning of above.	1.44%		
1.15	On Supply of Fitting,controller,wire,cable,mounting arrangements etc. for façade lighting.	0.26%		
1.16	On installation, testing and commissioning of Lifts.	0.10%		
1.17	On supply of Filteration plant,pumps,motor,electrical panel,cable,control panel etc. for swimming pool and accessories complete as required.	4.15%		
1.18	On installation, testing and commissioning of above swimming	1.41%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

	pool plant complete as required.			
1.19	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	0.82%		<b>18.55%</b>
<b>Total Civil + Electrical of % quoted rates</b>				<b>100.00%</b>

**Sl. No. 10 - C/O AMENITIES FOR STAFF AND SERVICE AREAS  
(CRECHE, WATCHMAN CABINS, PUMP ROOM, LT PANEL ROOM  
AND METER ROOM)**

Sub Head of work	Civil	Electrical	Total
Cost of Amenities for Staff and Service Areas (Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room)	Rs. 8,96,53,226.00	Rs. 2,21,47,731.00	Rs. 11,18,00,957.00
Percentage Cost of Civil Component	80.19%		
Percentage Cost of Electrical Component	19.81%		

**Sub head 1. (Cost of Civil Component 80.19% of the quoted rates)**

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Completion of foundation up to plinth level i/c pile cap/raft , plinth level slab		23.30%	23.30%
1.1	Piling	7.50%		
1.2	Excavation & PCC	3.80%		
1.3	Pile cap/raft	6.50%		
1.4	On completion of Foundation & plinth beams, grade slab	5.50%		

2	Completion of super structure works (RCC/ structural works) of the building, from Ground Floor to terrace floor i/c terrace work like RCC water tank, lift machine room mumty room etc.		30.00%	53.30%
3	On completion of filler/masonry walls from lower ground floor to mumty, lift machine room including parapet walls		5.00%	58.30%
4	On completion of all water proofing works		2.00%	60.30%
5	Completion of flooring, internal and external plaster work including cladding/dado.		5.50%	65.80%
6	Completion of Door & Window work		5.50%	71.30%
7	On completion of all sanitary & water supply Plumbing work		1.00%	72.30%
8	On completion of miscellaneous works such as false ceiling, railing, plinth protection, ramps, steps, window grills etc.		3.00%	75.30%
9	On completion of internal and external painting, putty, polishing (except final coat of painting )		1.50%	76.80%
10	Fixing of sanitary & water supply fixtures, final coat of internal and external painting, building complete in all respect including cleaning of building and adjoining site.		1.50%	78.30%
11	Issue of completion certificate of all buildings, all statutory post-construction clearances, Obtaining Occupation Certificate from Local body, all licenses and as-built drawings, testing of all services and equipment's, Deep cleaning of the building and handing over of all buildings		1.89%	80.19%

### Sub head 2: (Cost of Electrical Component 19.81% of the quoted rates)

S. No.	Milestone/Activity	Breakup % of value	% of Item value	Cumulative %
1	Installation of system of various E & M services		19.81%	
1.1	On supply of conduits, junction boxes, DBs etc.	0.76%		
1.2	On Completion of conduiting work.	0.76%		

1.3	On Supply of wiring, DBs, Cables i/c switch board, switch, sockets and luminaries, i/c sensors, chimney, Geyser, Exhaust fans Purifier etc.	4.30%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	2.54%		
1.5	On Supply of pipes for Wet riser/ Down comer/sprinkler system, sprinklers, sprinkler nozzles, Valves, Hydrants, hose reel, landing valves, branch pipes, Fire extinguishers, Main pump, other pumps and other accessories as required.	0.60%		
1.6	On completion of above installation, testing and commissioning as per scope of work	0.25%		
1.7	On Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm & PA system	0.30%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.16%		
1.9	On Supply of CCTV camera, wiring, conduit and other accessories required for CCTV, intercom, EPBAX, Telephone equipments, LAN wiring and accessories at suitable locations	0.91%		
1.10	On completion of above installation, testing and commissioning as per scope of work	0.26%		
1.11	On supply of illuminated signages and other signage, floor marking etc.	0.02%		
1.12	On completion of above installation, testing and commissioning as per scope of work.	0.01%		
1.13	On Supply of ducts, Indoor units, AHU's, outdoor unit, cabling, refrigerant piping, control cable, LT & control Panel etc. for HVAC	5.46%		
1.14	On completion of installation, Testing and commissioning of above.	1.80%		
1.15	On Supply of Fitting, controller, wire, cable, mounting arrangements etc. for façade lighting.	0.33%		
1.16	On installation, testing and commissioning of the above.	0.11%		

1.17	On completion of testing, commissioning of all services and equipments i/c all NOC and handing over the installation.	1.24%	<b>19.81%</b>
<b>Total Civil + Electrical of % quoted rates</b>			<b>100.00%</b>

### Sl. No. 11 – DEVELOPMENT OF SITE (ELECTRICAL)

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Development of Site (Electrical)	Rs. 0.00	Rs. 7,88,32,449.00	Rs. 7,88,32,449.00
Percentage Cost of Civil Component	0.00%		
Percentage Cost of Electrical Component	100.00%		

#### Sub head 1: (Cost of Electrical Component 100% of the quoted rates)

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Installation of system of various E & M services		100.00%	
1.1	On supply of DG sets, AMF Panel, Diesel tank, Control Panel, Exhaust Piping and its structure etc. complete as required.	5.00%		
1.2	On Completion of installation of DG set i/c testing and commissioning as required.	3.00%		
1.3	On Supply of HT Panel, Transformers, LT Panel, HT & LT cables, LT Panel, Essential Panel, APFC Panel, Meter panel in each block i/c its cable complete as required for installing substation.	35.00%		
1.4	On completion of above installation, testing and commissioning as per scope of work.	17.00%		
1.5	On Supply of STP including membrane, other chamber, tanks, electrical cable, pumps, control panel, etc. complete as required for installation of STP in the campus.	8.00%		
1.6	On completion of above installation, testing and commissioning as per scope of work	4.20%		
1.7	On Supply of Boom barrier, card reader, control panel, cable etc. complete as required.	0.30%		
1.8	On completion of above installation, testing and commissioning as per scope of work	0.22%		
1.9	On supply of street lights, poles, Decorative lights, cable, feeder pillar, bollard etc. complete as required.	7.00%		
1.10	On completion of above installation, testing and commissioning as per scope of work.	2.00%		
1.11	On completion of Supply of MCP, Detectors, Hooters, wire etc.as per Fire alarm	0.02%		
1.12	On completion of above installation, testing and commissioning as per scope of work	0.01%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE (C) AE(E) EE(C)

1.13	On completion of Supply of all type Fire extinguisher etc.as per scope of work	3.00%		
1.14	On completion of above installation, testing and commissioning as per scope of work	1.50%		
1.15	On supply of Hydroneumatic system, control panel, cable etc. complete as required.	2.50%		
1.16	On installation, testing and commissioning of above plants complete as required.	1.25%		
1.17	On supply of water treatment plant for drinking water system, water filtration plant for swimming pool, control panel, cable etc. complete as required.	3.00%		
1.18	On installation, testing and commissioning of above complete as required.	1.00%		
1.19	On completion of testing, commissioning of all services and equipments i/c all NOC, Deep cleaning of the site and handing over the installation.	6.00%		100.00%

**SI. NO. 12 – DEVELOPMENT OF SITE (CIVIL)**

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Development of Site (Civil)	Rs. 17,90,13,425.00	Rs. 0.00	Rs. 17,90,13,425.00
Percentage Cost of Civil Component	100.00%		
Percentage of Cost Electrical Component	0.00%		

**Sub head 1: (Cost of Civil Component 100% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1	Development of Site (Civil Work)		100.00%	
1.1	Underground sump including Pumphouse as per tender drawings	4.00%		
1.2	Levelling of site as per tender drawings	8.00%		
1.3	Completion of Cement concrete pavement with vacuum dewatered concrete, cutting & filling joints, road marking and signages etc. complete	4.50%		
1.4	Completion of all footpaths, parking, ramps, kerb stones, PCC, pavers etc. all complete	5.50%		
1.5	External Sewer work including pipes, bed concrete, concrete upto haunch/concrete allround, manholes etc. complete	9.00%		
1.6	External Filtered, unfiltered & treated water supply - All distribution lines, peripheral lines. submains including valves, fittings, pumps chambers etc. complete	17.50%		
1.7	Storm water drain, drainage lines including pipes, bed concrete, concrete upto haunch/concrete allround, open drains, road gully chambers, NP3 Pipe Drain along Boundary Wall etc. complete	18.50%		
1.8	Rain Water Harvesting i/c bypass arrangement as specified in the tender i/c any other items as specified in the tender drawing and	4.60%		

Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil AE(C) AE(E) EE(C)

	as per local authority.			
1.9	Trenches for services all complete as per tender drawings	8.70%		
1.10	Boundary wall in all respect as per tender drawing	7.00%		
1.11	Horticulture operations, plantation, leveling, landscaping etc. including 300 mm earth filling, grassing, tree plantation/shrubs and potted plants etc.	2.30%		
1.12	Electromechanical boom barrier with all accessories upto 6 m length	0.30%		
1.13	Motorized steel gates upto 6.00 m width as per tender drawings	1.20%		
1.14	Waste compactor and dry bins (Grade A, Grade B & C, Grade D & above, RD Bungalow, Class III and Class IV Residential Buildings	1.18%		
1.15	Installation of Deep Tube Well as per specification in tender	3.50%		
1.16	Installation of Filtration Plant as per specification in tender	2.60%		
1.17	Completion of external development as shown in development drawings and Deep cleaning of the site.	1.62%		<b>100.00%</b>

**SI. NO. 13 – DEMOLITION CHARGES OF EXISTING STRUCTURES AFTER  
ADJUSTING SALVAGE VALUES**

<b>Sub Head of work</b>	<b>Civil</b>	<b>Electrical</b>	<b>Total</b>
Cost of Demolition charges of existing structures	Rs. 13,96,917.00	Rs. 0.00	Rs. 13,96,917.00
Percentage Cost of Civil Component	100.00%		
Percentage Cost of Electrical Component	0.00%		

**Sub head 1: (Cost of Civil Component 100% of the quoted rates)**

<b>S. No.</b>	<b>Milestone/Activity</b>	<b>Breakup % of value</b>	<b>% of Item value</b>	<b>Cumulative %</b>
1.	Demolition of Existing Structures		100.00%	
1.1	Dismantling of Qtrs.	50.00%		
1.2	Dismantling of Ancillary structure & other Misc. structure	30.00%		
1.3	Dismantling of existing Compound wall	15.00%		
1.4	Dismantling all remaining structure	5.00%		100.00%

## BILL OF QUANTITIES (BOQ)

*Correction...Nil* *Deletion... Nil*    *Insertion...Nil*    *Overwriting... Nil*               $\mathcal{AE}(C)$                $\mathcal{AE}(E)$                $\mathcal{EE}(C)$

## BILL OF QUANTITIES (BOQ) (PART-A)

### For Civil, Electrical & Horticulture enabling Works

**Name of work:** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parkings including all development works for Civil, E&M, Horticulture and services as per GFC drawings on EPC (Mode-III) basis].

**NIT No. :** 25 / NIT / CE / GHY / 2025-26

Item No.	Description	Quantity	Unit	Rate	Amount
1	<p>Construction of multi-storeyed RCC framed building (Watchman Cabin 1&amp;2, creche, Club house for officials, swimming pool, Grade -F (Regional Director) (G+1) quarter, Grade D quarters (S+P+5) (12 Nos.), Grade B &amp; C quarters (S+P+9) (60 Nos.), Grade A quarters (S+P+6), (S+P+7) (60 Nos.), landscaped area for officials, Class III quarters (2S+P+9) (80 Nos.), Club house for class III &amp; IV residents, Class IV quarters (2S+P+9) (80 Nos.), caretaker block for staff, caretaker block for officers i/c parking at stilt and podium for officers and staff quarters, water tank &amp; pump room, substation, STP all civil and electrical works with monolithic technology using aluminum shuttering, all earth works for foundation i/c earth filling for raising the level, CC works, RCC works, Masonry, floorings, stone works, roofing works, all finishing, painting, door-window-ventilators including their fittings and fixtures, steel works, railings, all services like water supply, sanitary, sewer, drainage, rain water harvesting, road work including foot paths, all round Compound wall etc., interior works like false ceilings, cladding/dado, all toilets including fittings and fixtures, water proofing, underground water tank, overhead water tanks for domestic and firefighting water supply, STP, podiums finishing's at all levels, plinth protection work all around the building, Supplying, Installation, Testing and Commissioning of internal electrical installations and luminaires, Fire Fighting , Fire Alarm System, PA System , Lifts , DG sets, UPS, Intercom &amp; CCTV system, street lighting with LED, water supply pumps, Hydropneumatic system, Solar PV power generation system, solar water heating system, STP, Water Treatment Plant i/c Water Filtration Plant for Swimming Pool, boom barrier, VRV/VRF system, Organic waste composter, Emergency light illumination signages, Lightning conductor, Horticulture / landscape enabling work (except soil &amp; plantation) i/c all internal &amp; external service connections of Civil, E&amp;M works as per GFC drawings by incorporating stipulated specifications and integrating all internal and external services etc. including all incidental works complete as per terms and conditions of bid document on EPC MODE-III basis and as per directions of Engineer-in-Charge. It also includes all the works specified and their specifications mentioned in the various sections / sub-sections / chapter of the tender.</p> <p>The rate of this item includes all Civil, E&amp;M and Horticulture enabling work, works of all building and development works complete, and all taxes/charges/royalties, nothing extra shall be payable.</p>	1.00	job	Rs. 3,63,66,33,289.00	Rs. 3,63,66,33,289.00
	<b>Total (A)</b>				<b>Rs. 3,63,66,33,289.00</b>

**BILL OF QUANTITIES (BOQ) (PART-B)**  
**PRICE SCHEDULE FOR COMPREHENSIVE ANNUAL MAINTENANCE**

**Name of work:** Demolition and Re-development of RBI Quarters at Zoo-Narengi Road Colony, Guwahati, Assam. [SH: Construction of 293 Nos. Residential units (60 Nos. Grade A Quarters, 60 Nos. Grade B&C Quarters, 12 Nos. Grade D & Above Quarters, 01 No. RD Bungalow, 80 Nos. Class III Quarters, 80 Class IV Quarters), Amenities for Officers Club Bldg.-I, Crèche & Changing Rooms, Swimming Pool, Amenities for Staff and Service Areas (Club Bldg.-II, Creche, Watchman Cabins, Pump Room, LT Panel Room and Meter Room) including Stilts & Podium Parkings including all development works for Civil, E&M, Horticulture and services as per GFC drawings on EPC (Mode-III) basis].

**NIT No. :** 25 / NIT / CE / GHY / 2025-26

S.No.	Activity	First Year (after defect liability period of three year)
1	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above Passenger and goods lifts etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	Rs. 29,95,531.00
2	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above UPS systems etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	Rs. 39,798.00
3	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above Security systems ( CCTV ) etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	Rs. 3,61,226.00
4	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above Fire alarm system including detectors, panels	Rs. 3,77,245.00

	etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	
5	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above Solar plant system etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	<b>Rs. 7,75,048.00</b>
6	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above VRF AC system and Ventilation & pressurization system etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	<b>Rs. 7,09,968.00</b>
7	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above STP system etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	<b>Rs. 6,44,956.00</b>
8	Comprehensive AMC contract to be prepared by the contractor between RBI and OEM/Vendor/Service provider for the comprehensive maintenance of above Intercom System etc. including replacement of spare parts after the finishing of defect liability period of 3 year. So the rates to be quoted accordingly and OEM/Vendors/Service Provider should be aware of this AMC condition.	<b>Rs. 7,88,403.00</b>
<b>TOTAL (B)</b>		<b>Rs. 66,92,175.00</b>
<b>GRAND TOTAL (A+B)</b>		<b>Rs. 3,64,33,25,464.00</b>

Note: On completion of the main contract and defect liability period, the service provider (s) should enter bipartite agreement (Supplementary Agreement) for CAMC with the RBI authority based on the above quoted rate only.

## PART - F

### CHAPTER-A PROJECT MANAGEMENT

## Project Monitoring, Reporting and Reviewing of Progress

### 1. Tools of Project Monitoring:

The agency shall make adequate arrangements through technology and specialist of the field to monitor the project. In this regard the following points / actions/measures shall be taken by the agency, these are:

- 1.1 The Agency shall prepare and submit the phase wise (monthly) resource chart / report (materials, manpower and machinery) based on the project execution schedule as per clause 5 of **GCC 2024 EPC Projects** modified upto the last date of submission of the bid.
- 1.2 The agency shall use the latest version of Project Monitoring tool such as Primavera or any other equivalent software. The agency shall submit in soft copy the projected demand/allocation of Men & Material required at site and actually deployed as per schedule.
- 1.3 The agency shall use project monitoring tool so that the “SMS” alert are generated for deviation in start/finish of critical activities including supplying and ordering of material, equipment etc.
- 1.4 CCTV Cameras (IP based) to cover the project shall be installed in all work locations covering all areas of activities. These cameras will be integrated with an application through which the site could be observed by authorized CPWD Engineers from any location in real time. Location of cameras shall be changed based on physical progress of work in residential towers.

### 2. Reporting and Reviewing of progress:

- 2.1 The Agency shall submit the photographs & videos of progress of work on monthly basis with the help of drone to real time monitoring and to create a short film of the entire execution of the work to be kept in archive.
- 2.2 Agency shall submit a detailed monthly progress report with respect to program submitted to the Engineer-in-Charge by 5th of every month. The format of monthly progress report shall be as approved by Engineer-in-Charge.
- 2.3 The Agency will make it possible to be represented by a senior level executive who have sufficient financial powers to take decisions required. He should be available during review meetings and inspection of sites whenever engineer in charge will direct to him.
- 2.4 The agency shall stick to the construction schedule, if there is any hindrance or delay due to any reason the same shall be mitigated through engaging extra manpower, material and machinery.
- 2.5 The Agency shall submit every month the details of “Funds-Requirements” for the next six months.
- 2.6 Coordination meeting with the Master Consultant/Architect shall be called fortnightly for better coordination at site.
- 2.7 The Agency shall install and maintain **video-conferencing** system with remote connectivity of approved specifications and quality at site to the concerned as decided by Engineer-in-Charge till the completion of the project at his own cost as per the directions of the Engineer-in-Charge.

## **CHAPTER-B**

### **SAFTEY, HEALTH & ENVIRONMENT ASPECTS**

## **1.0 Safety, Health and Environment (SHE)**

- 1.1 The Contractor shall comply of the provisions contained in Safety, Health and Environment handbook 2019 and management System as amended from time to time available on CPWD web site [www.cpwd.gov.in](http://www.cpwd.gov.in) failing which he / they will be liable for the penalties on each violation subject to compounding of the same to maximum of such default as mentioned in the various unsafe act / unsafe conditions in this manual. This apart from the other fines/ levies / penalties are mentioned in the documents elsewhere. It is incumbent upon the EPC contractor to ensure in undertaking all health and safety compliance for safety of all concern to generate safety conscious and safety regulatory as his primary statutory duties or responsibilities in the contract.
- 1.2 The Agency shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or other resulting from pollution, noise or other causes arising as a consequence of his methods of operation. The Agency shall be required to follow all the rules/norms of National Green Tribunal, APCB (Assam pollution control board) applicable to this work as amended from time to time. The Agency shall display prominently dust mitigation measures being taken at construction site for easy public viewing.
- 1.3 During continuance of the contract, the Agency and his sub-agencies shall at all times, abide by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, by-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. However, Salient features of some of the major laws that are applicable are given below:
- 1.4 Water Pollution is to be prevented as per The Water (prevention and Control of Pollution) Act, 1974 which provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. ‘Pollution’ means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health or animals or plants or of aquatic organisms. The contractor has to manage waste water/surplus water properly by channelizing through drain at site to help the site clean and tidy and also ensure this water goes to the city drain after necessary precaution to avoid pollution in city drain.

- 1.5 Air Pollution is to be prevented as per The Air (prevention and Control of Pollution) Act, 1981 which provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. The Agency should install and maintain PM 1.0, PM 2.5 & PM 10.0 sensors along with display screen of approved quality and specifications at site till the completion of the project at his own cost as per the directions of the Engineer-in-Charge. The agency should have to install antismog gun to mitigate the air pollution.
- 1.6 Environment is to be protected as per The Environment (Protection) Act, 1986 which provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human being, other living creatures, plants, micro-organism, and property.
- 1.7 The public Liability Insurance Act, 1991: This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986 and exceeding such quantity as may be specified by notification by the Central Government.
- 1.8 **Dust Pollution Control Assessment**

The Agency has to assist Engineer-in-Charge in submitting the dust pollution control self-assessment along with required documents in the prescribed manner by APCB (Assam pollution control board) with upto date control measures being modified from time to time at his own cost as and when required. To mitigate dust pollution, no stone cutting shall be permitted at site. Further, the green net cloth shall be used to cover the material to avoid air pollution.

**Appendix-I**

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR  
WATERPROOFING TREATMENT FOR TERRACE / TOILETS/  
BALCONY/FIRE REFUGE FLOOR/ PODIUM & EXPANSION JOINT, ETC.**

The agreement made this..... day of year two thousand  
And .....

.....between.....  
(Hereinafter called the Guarantor of the one part) and the PRESIDENT OF INDIA  
(Hereinafter called the Government of the other part).

WHEREAS this agreement is supplementary to a contract (Hereinafter called the contract) dated..and made between the GUARANTOR of the one part and the Government of the other part, whereby the agency inter-alia, undertook to render the building and structures in the said contract recited completely water and leakproof.

And whereas the GUARANTOR agreed to give guarantee to the affect that the said work will remain water and leakproof for **ten years** from the date of giving of water proofing treatment.

Now the GUARANTOR hereby guarantees that water proofing treatment given by him will render the structures completely leakproof and the minimum life of such water proofing treatment shall be **ten years** to be reckoned from the completion of actual date of original construction work of this contract.

Provided that the guarantor will not be responsible for leakage caused by earthquake or structural defects or misuse or alteration 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 cause damage to the proof.
- b) Alteration shall mean construction of an additional storey or a part of the roof or construction adjoining to existing roof whereby proofing treatment is removed in parts.
- c) The decision of the Engineer-in-Charge with regard to nature and cause of defects shall be final.

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

That if Guarantor fails to execute the waterproofing or commits breach thereunder; then the guarantor will indemnify the principal and his successors against all loss, damage, cost any default on the part of the GUARANTOR in performance and

observance of this supplementary agreement. As to the amount of loss and/ or damage and/or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on the parties.

In witness whereof these presents have been executed by the obligator .....  
..... and .....By For and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

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

1. .... 2. .... SIGNED FOR AND

ON BEHALF OF THE PRESIDENT OF INDIA

By .....in the presence of :

1. .... 2. ....

\*Note:- The format shall be slightly changed in accordance with respective item.

## FORM OF SUPPLEMENTARY AGREEMENT

This Agreement made this day the ..... 20..... between ..... hereinafter called the First Party which expression shall include his heirs, executors and administrators/their successors and assigns and the President of India, hereinafter called the Second Party, which expression shall include his successors and assigns, shown as under:

1. That this Agreement shall be called as Supplementary Agreement to the Agreement No ..... relating to the Name of work entered into by the parties to this Agreement.
2. That WHEREAS the First Party has completed the execution of the work described in and covered by the Agreement No..... except the items mentioned in the Schedule annexed to this Agreement and whereas the items of the work mentioned in the Schedule annexed to this agreement cannot now be completed on account of being operation & maintenance nature of this work; and whereas both the parties are desirous that the items mentioned in the Schedule annexed to this Agreement should be executed by the First Party as per Terms & Conditions of original Agreement No after the completion of the construction works (Structure & Development Works), it is hereby further agreed as under :
  - (a) That First Party shall and will execute the work covered by the items mentioned in the Schedule annexed to this Agreement at the rates and as per the terms and conditions of the original Agreement No..... whatsoever called upon to do so by the Engineer-in-Charge, for the period of five years from the date hereof.
  - (b) That the First Party shall have absolutely no claim of whatsoever nature against the Second Party for doing the work mentioned in the Schedule annexed to this Agreement as required under clause (a) above, except that which he would be entitled to under the original Agreement No. ....
  - (c) That the First Party shall have to execute all the items which the Engineer-in-charge consider necessary.
  - (d) That the First Party shall start with the work of the comprehensive maintenance, operation of services, watch & ward and mechanized housekeeping for Five( 05 ) years mentioned in the Schedule annexed to this Agreement for ..... days from on the receipt of a letter to the effect from the Engineer-in-Charge or from any date fixed in the said letter and shall complete the said work five-year time by the Engineer-in-Charge or as extended by him from time to time.
  - (e) That on the due execution and completion of this Agreement by the parties, the bill of the First Party in relation to the work already done by him under the Original Agreement No shall be provisionally finalized by the Second Party and payment on account, if any amount due, shall be made to the First Party provided that the Second Party shall have a right to retain such amount as is considered reasonable by him as a security for the execution of the work mentioned in the Schedule annexed to this Agreement and the Second Party shall have right to deal with the said amount of

security as he thinks proper under the terms and conditions of the Original Agreement. Further, on the due execution and original completion of this Agreement, the First Party shall be entitled to claim back his security deposit relating to the work in question, subject to the right of the Second Party to retain such amount as he thinks reasonable as mentioned above soon after the maintenance period of three months or six months, as the case may be mentioned in clause of the Original Agreement, is over.

(f) That the final bill relating to the entire work under the two agreements shall be prepared after the completion of the entire work covered by Agreement No. ....and this Agreement.

(3) Except as modified by this Agreement the said Agreement No. ..... shall remain in full force and effect.

IN WITNESS WHEREOF THE ABOVE MENTIONED PARTIES HAVE PUT THEIR SIGNATUREON THIS DAY THE.....

**Appendix- III**

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR  
REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF uPVC  
doors/windows, Fire DOOR, Polycarbonate sheets etc.**

The agreement made this \_\_\_\_\_ day of \_\_\_\_\_ Two Thousand and between \_\_\_\_\_ Son \_\_\_\_\_ of \_\_\_\_\_ (hereinafter called the GUARANTOR on the one part) and the PRESIDENT OF INDIA (hereinafter called the Government on the other part.)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated \_\_\_\_\_ and made between the GUARANTOR OF THE ONE PART AND the Government of the other part, whereby the contractor inter alia, undertook to render the work in the said contract recited structurally stable, leak proof and sound material, workmanship, colouring, sealing.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said work will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective colouring, sealing and finishing for 10 (Ten) years to be reckoned from the actual date of completion of the work.

NOW THE GUARANTOR hereby guarantee that work executed by him will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective colouring, sealing and finishing for ten years to be reckoned from the actual date of completion of the work. The decision of the Engineer-in-charge with regard to nature and cause of defects shall be final.

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 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 Guarantor's risk and cost. The decision of the Engineer-in-Charge as to the cost, payable by the Guarantor shall be final and binding.

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

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

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

1. \_\_\_\_\_

2. \_\_\_\_\_

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

1. \_\_\_\_\_

2. \_\_\_\_\_

**The Contractor gives an authority letter addressed to the Engineer-in-charge on a non-judicial stamp paper of Rs. 100 in the format given below:-**

**Authority Letter for Payment to Third Party**

**To,**

**Executive Engineer  
Guwahati Central Division  
CPWD, Bamunimaidan,  
Guwahati - 781021**

**Sub: - Authority for payment to third party.**

I/We authorize the Executive Engineer & Senior Manager(C)-I, Project Division-I, CPWD, Room No. C-301, Government of India Press, Minto Road, New Delhi-110002 to pay directly on my/ our behalf to..... (name of third party) an amount of Rs.....(Rupees..... .....in words) for the work done or supplies made by (name of third party). I/We shall be responsible for the quality and quantity of the same under the provisions of agreement No.....

**Signature of Contractor**

---

**Note: -**

1. The total payment to third party (or parties) shall not exceed 10% of the agreement cost of the work.
2. Full reasons for proposing such third party payment shall be recorded and prior written approval of the next higher authority shall be obtained before making such payment.

**CHECK LIST FOR POUR CARD**

<b>1.0 GENERAL</b>			<b>DATED</b>
	1.1	Name of work	
	1.2	Name of agency	
	1.3	Location	
	1.4	Architectural drawing No.	
	1.5	Structural Drawing No.	
	1.6	Approximate quantity and grade of concrete.	
	1.7	Expected start time	
	1.8	Expected finish time	
	1.9	Name of Contractor's Engineer	
<b>2.0 ALUMINUM FORM WORK</b>			<b>TYPE</b>
	2.1	Cleaned	Y/N
	2.2	Oiled	Y/N
	2.3	Levelled	Y/N
	2.4	Verticality checked for external as well as internal walls	Y/N
	2.5	Check all pin & wedges	Y/N
	2.6	Slab soffit form work level	Y/N
	2.7	Check outer tie for external beam and sunk portion	Y/N
	2.8	Door spacer installed as per drawing	Y/N
	2.9	All kicker level have been lined and adjusted accordingly	Y/N
	2.10	All kicker level bolts installed correctly	Y/N
	2.11	All excessive spaces between rocker and floor level have been sealed	Y/N
	2.12	O.K.	Y/N
<b>3.0 CENTRING</b>			<b>TYPE</b>
	3.1	Adequate vertical supports	Y/N
	3.2	Adequate lateral supports	Y/N
	3.3	O.K.	Y/N
<b>4.0 REINFORCEMENT</b>			<b>TYPE</b>
	4.1	Cover blocks.	Y/N
	4.2	Conforms to drawings	Y/N
	4.3	Tied Properly	Y/N
	4.4	Space Bars/Chairs	Y/N
	4.5	O.K.	Y/N
<b>5.0 CONCRETE</b>			<b>TYPE</b>
	5.1	Plant informed about mix and type	Y/N
	5.2	Transit mixer ready	Y/N

	5.3	Tower crane ready		Y/N
	5.4	Concrete pump ready		Y/N
	5.5	Vibrators (Electrical & Diesel Ready)		Y/N
	5.6	Predetermined Holes Left wherever required.		Y/N
	5.7	All Conduits placed in position		Y/N
	5.8	Fan clamps placed in position		Y/N
	5.9	Steel templates		Y/N
	5.10	Cement slurry		Y/N
	5.11	Slump test		Y/N
	5.12	O.K		Y/N
<b>6.0</b>	<b>POST CONCRETE</b>		<b>TYPE</b>	
	6.1	Deviation report for survey record		Y/N
	6.2	Dimension of rooms checked as per drawing		Y/N
	6.3	Diagonal Check		Y/N
	6.4	All conduits, electrical points, plumbing points etc. Check		Y/N
	6.5	O.K		Y/N

The above information filled by me after proper verification.

(SITE ENGINEER OF FIRM)

The above information checked by me and allowed.

(ASSISTANT ENGINEER)

CONCRETING MAY BE ALLOWED

(EXECUTIVE ENGINEER)

### **Eligibility Criteria for List Works (Revision-3)**

1. The lift manufacture shall comply with BIS standards, duly certified by the manufacture itself.
2. The manufacturer shall be compliant to the Public Procurement (Preference to Make In India), Order 2017 (as amended from time to time) issued by the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry.
3. The experience of successful completion of similar works shall be as per CPWD Works Manual / SoP.
4. The manufacturer shall furnish an undertaking regarding availability of spares for the entire expected life of the lift i.e. 15 to 20 years.
5. The complete lift installation including its components, safety devices, various types of controls etc. testing, inspection, operation & maintenance shall conform to relevant Codes, Standards, code of practices, guidelines, safety rules, inspection manual(s), rules issued by Bureau of Indian Standards, as amended upto the last date of receipt of tenders.
6. Quality standards shall conform to latest IS/ISO-9001:2015.
7. The down time of installed lifts being maintained by the manufacturer shall not be more than 8 hours (average) in case of minor faults and 7 days (average) in case of major faults during the last one financial year.

## PART - G

### List of Architectural, Civil & E&M Drawings

**Demolition and Re-development of RBI Zoo-Narengi Road Colony Quarters,  
Guwahati.**  
**List of Tender Drawings**

**ARCHITECTURE DRAWINGS**

<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
<b>Layout Plan/Floor Plans</b>		
1	SITE - SURVEY PLAN	RBI-GWH-AR-SW-001
2	SITE - DEMOLITION PLAN	RBI-GWH-AR-SW-002
3	SITE PLAN - LAYOUT PLAN	RBI-GWH-AR-SW-101
4	SITE PLAN - STILT LEVEL PLAN	KBI-GWH-AR-SW-102
5	BOUNDARY WALL LAYOUT	RBI-GWH-AR.SW 103
6	GUARD ROOM	RBI-GWH-AR-SW-104
7	BOUNDARY WALL DETAIL	RBI-GWH-AR-SW-105
8	MAIN GATE DETAIL - ELEVATION & SECTION	RBI-GWH-AR-SW-106
9	LT PANEL ROOM . ELEVATION & SECTION	RBI-GWH-AR-SW-107
10	STE PLAN - DEVELOPMENT PLAN	RBI-GWH-AR-SW-108
11	EXTERNAL DEVELOPMENT . ROAD SECTIONS	RBI-GWH-AR-SW-109
12	EXTERNAL DEVELOPMENT - PATHWAY DETAILS	RBI-GWH-AR-SW-110
13	FTERNAL DEVELOPMENT - TYPICAL FINISHING DETAIL	RBI-GWH-AR-SW-111
14	EXTERNAL DEVELOPMENT - GATE & FENSING	RBI-GWH-AR-SW-112
<b>TOWER 1&amp;2 (CLASS-III)</b>		
15	STILF-1 FLOOR PLAN TOWER 1&2 (CLASS III)	RM-GWH-AR-T1&T2-101
16	STILT-2 FLOOR PLAN TOWER 1&2 (CLASS III)	RM-GWH-AR-T1&T2-102
17	PODIUM/ FIRST FLOOA. PLAN TOWER 1&2 (CLASS III)	RM-GWH-AR-T1&T2-103
18	SECOND-10 FLOOR PLAN) TOWER 1&2 (CLASS III)	RM-GWH-AR-T1&T2-104
19	TERRACE PLAN TOWER 1&2 (CLASS III)	RM-GWH-AR-T1&T2-105
20	MACHINE ROOM & ROOF PLAN TOWER 1&2 (CLASS III)]	RM-GWH-AR-T1&T2-106
<b>TOWER 3&amp;4 (CLASS-IV)</b>		
21	STILT-1 FLOOR PLAN TOWER 3&4	RBI-GWH-AR-T3&T4-101

	(CLASS IV)	
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
22	STILT-2 FLOOR PLAN TOWER 3&4 (CLASS IV)	RBI-GWH-AR-T3&T4-102
23	PODIUM FIRST FLOOR PLAN TOWER 3&4 (CLASS IV)	RBI-GWH-AR-T3&T4-103
24	TYPICAL-1 (SECOND -10TH FLOOR PLAN) TOWER 3&4 (CLASS IV)	RBI-GWH-AR-T3&T4-104
25	TERRACE PLAN (ICLASS IV) TOWER 3&4 (CLASS IV)	RBI-GWH-AR-T3&T4-105
26	MACHINE ROOM & ROOF PLAN TOWER 3&4 (CLASS IV)	RBI-GWH-AR-T3&T4-106
	<b>CLUB-02</b>	
27	STILT-1 FLOOR PLAN CLUB-02	RBI-GWH-AR-C-02-101
28	STILT-2 FLOOR PLAN CLUB-02	RBI-GWH-AR-C-02-102
29	PODIUM/FIRST FLOOR PLAN CLUB-02	RBI-GWH-AR-C-02-103
30	SECOND & TERRACE PLAN CLUB- 02	RBI-GWH-AR-C-02-104
31	ROOF PLAN CLUB-02	RBI-GWH-AR-C-02-105
	<b>ELEVATION</b>	
32	TOWER1,2,3,4 & CLUB-2- ELEVATION 1&4	RBI-GWH-AR-201
33	TOWER1,2,3,4 & CLUB-2- ELEVATION 2&3	RBI-GWH-AR-202
	<b>SECTIONS</b>	
34	SECTION Y1-Y1'	RBI-GWH-AR-T1,2,3,4-301
35	SECTION Y2-Y2'	RBI-GWH-AR-T1,2,3,4-302
36	SECTION Y3-Y3'	RBI-GWH-AR-T1,2,3,4-303
37	SECTION X1-X1', Y4 Y4' (CLUB-2)	RBI-GWH-AR-T1,2,3,4-304
38	SECTION Y6-Y6'	RBI-GWH-AR-T1,2,3,4-305
39	SECTION Y7-Y7'	RBI-GWH-AR-T1,2,3,4-306
40	SECTION Y8-Y8'	RBI-GWH-AR-T1,2,3,4-307
41	SECTION X1-X1'- 1 (TOWER 1& 2)	RBI-GWH-AR-T1,2,3,4-308
42	SECTION X1-X1'- 2 (TOWER 1& 2)	RBI-GWH-AR-T1,2,3,4-309
43	SECTION Y2-Y2' (T1 & T2)	RBI-GWH-AR-T1,2,3,4-310
	<b>STAIRCASE DETAILS</b>	

44	TOWER 1,2,3,4 STAIRCASE-01	RBI-GWH-AR-401
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
45	TOWER 1,2,3,4 STAIRCASE-02	RBI-GWH-AR-402
46	TOWER 1,2,3,4 STAIRCASE-03	RBI-GWH-AR-403
47	RAMP DETAIL - 1	RBI-GWH-AR-404
48	CLUB-02-STAIRCASE DETAIL-04	RBI-GWH-AR-C-02-401
	<b>TOILET DETAILS</b>	
	<b>CLASS-III - TOWER 1&amp;2</b>	
49	TOWER 1&2 (CLASS-III) TOILET- 1 DETAIL	RBI-GWH-AR-T1&T2-501
50	TOWER 1&2 (CLASS iii) TOILET-2 DETAIL	RBI-GWH-AR-T1&T2-502
51	TOWER 1&2 (CLASS-III) TOILET- 1 (PWD AT PODIUM LVL)	RBI-GWH-AR-T1&T2-503
	<b>CLASS IV TOWER 3&amp;4</b>	
52	TOILET - 1 (TOWER 3&4 )	RBI-GWH-AR-T3&T4-501
53	TOILET-2 ( TOWER 3&4)	RBI-GWH-AR-T3&T4-502
54	TOWER 3&4 (CLASS-IV) TOILET-1 (PWD AT PODIUM LVL))	RBI-GWH-AR-T3&T4-503
	<b>CARETAKER - 1</b>	
55	TOILET - 1	RBI-GWH-AR-CK-01-501
56	TOILET - 2	RBI-GWH-AR-CK-01-502
57	TOILET - 3	RBI-GWH-AR-CK-01-503
58	TOILET - 4	RBI-GWH-AR-CK-01-504
	<b>CLUB 02</b>	
59	TOILET - 1	RBI-GWH-AR-C-02-501
60	TOILET - 2	RBI-GWH-AR-C-02-502
	<b>KITCHEN DETAILS</b>	
61	KITCHEN DETAIL( TOWER 1& 2)	RBI-GWH-AR-T1&T2-601
62	KITCHEN DETAIL( TOWER 3&4)	RBI-GWH-AR-T3&T4-601
	<b>CUPBOARD DETAIL</b>	
63	CUPBOARD DETAIL CLASS-IV ( TOWER 1&2)	RBI-GWH-AR-T1&T2-701
64	CUPBOARD DETAIL CLASS-IV ( TOWER 3&4)	RBI-GWH-AR-T3&T4-702
	<b>DOOR AND WINDOW DETAILS</b>	

65	DOOR WINDOW DETAIL	RBI-GWH-AR-801A
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
66	DOOR WINDOW DETAIL	RBI-GWH-AR-801B
67	DOOR WINDOW DETAIL	RBI-GWH-AR-801C
68	DOOR WINDOW DETAIL	RBI-GWH-AR-801D
69	DOOR WINDOW DETAIL	RBI-GWH-AR-801E
70	CLUB-02 DOOR WINDOW DETAIL	RBI-GWH-AR-C-02-801
71	CLUB-02 DOOR WINDOW DETAIL	RBI-GWH-AR-C-02-802
72	CLUB-02 DOOR WINDOW DETAIL	RBI-GWH-AR-C-02-803
	<b>RAILING DETAIL</b>	
73	BALCONY RAILING DETAIL - 1	RBI-GWH-AR-T1&T2-901
74	BALCONY RAILING DETAIL - 2	RBI-GWH-AR-T3&T4-901
75	CLASS III ( TOWER 1&2) UTILITY BALCONY DETAIL	RBI-GWH-AR-T1&T2-902
76	CLASS IV ( TOWER 3&4) UTILITY BALCONY DETAIL	RBI-GWH-AR-T3&T4-902
77	CLUB-2 RAILING DETAIL	RBI-GWH-AR-C-02-901
78	TYPICAL RAILING DETAIL TOWER 1,2,3,4,5,6, 7,8,9	RBI-GWH-AR-901
	<b>OHT</b>	
79	OHT ( CLASS III)	RBI-GWH-AR-T1&T2-1001
80	OHT ( CLASS IV)	RBI-GWH-AR-T3&T4-1001
	<b>ARCHITECTURE</b>	
81	STILT FLOOR PLAN -TOWER 5 (GRADE A )	RBI-GWH-AR-T5-101
82	STILT FLOOR PLAN -TOWER 6 (GRADE A )	RBI-GWH-AR-T6-101
83	STILT FLOOR PLAN -TOWER 7(GRADE B&C)	RBI-GWH-AR-T7-101
84	STILT FLOOR PLAN -TOWER 8(GRADE D)	RBI-GWH-AR-T8-101
85	STILT FLOOR PLAN -TOWER 9(GRADE B&C)	RBI-GWH-AR-T9-101
86	FLOOR PLANS -TOWER 5(GRADE A)	RBI-GWH-AR-T5-102
87	FLOOR PLANS -TOWER 5(GRADE A)	RBI-GWH-AR-T5-103

88	FLOOR PLANS -TOWER 6(GRADE A)	RBI-GWH-AR-T6-102
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
89	FLOOR PLANS -TOWER 6(GRADE A)	RBI-GWH-AR-T6-103
<b>ELEVATIONS</b>		
90	TOWER-5 (GRADE A) ELEVATION 1,2,3,4	RBI-GWH-AR-T5-201
91	TOWER-6 (GRADE A) ELEVATION 1,2,3,4	RBI-GWH-AR-T6-201
<b>SECTIONS</b>		
92	SECTION Y1-Y1' (TOWER-5)	RBI-GWH-AR-T5-301
93	SECTION Y1-Y1' ( TOWER-6)	RBI-GWH-AR-T6-301
<b>STAIRCASE DETAILS</b>		
94	STAIRCASE ST-04(GRADE A ) Tower 5 -ST-1	RBI-GWH-AR-406
95	STAIRCASE ST-05(GRADE A ) Tower5 -fire staircase	RBI-GWH-AR-407
96	STAIRCASE ST-06(GRADE A ) Tower 6-ST-1	RBI-GWH-AR-408
97	STAIRCASE ST-07(GRADE A ) Tower 6-fire staircase	RBI-GWH-AR-409
<b>TOILET DETAILS</b>		
98	TOWER 5&6 (GRADE-A) TOILET - 1	RBI-GWH-AR-T5&T6-501
99	TOWER 5&6 (GRADE-A) TOILET - 2	RBI-GWH-AR-T5&T6-502
100	TOWER 5&6 (GRADE-A) TOILET- 1(PWD)	RBI-GWH-AR-T5&T6-503
<b>KITCHEN DETAILS</b>		
101	KITCHEN DETAIL( TOWER 5&6 )(GRADE A )	RBI-GWH-AR-T5&T6-601
<b>CUPBOARD DETAIL</b>		
102	CUPBOARD DETAIL TOWER 5&6 )	RBI-GWH-AR-T5&T6-701
<b>RAILING DETAIL</b>		
103	RAILING DETAIL (TOWER 5&6 ) ( GRADE A)	RBI-GWH-AR-T5&T6-901

104	UTILITY BALCONY DETAIL- 1 (TOWER 5&6) (GRADE A )	RBI-GWH-AR-T5&T6-902
105	OHT ( CLASS III)	RBI-GWH-AR-T5&T6-1001
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
<b>A</b>		<b>Layout Plan/Floor Plans</b>
	<b>ARCHITECTURE</b>	
106	FLOOR PLANS -TOWER 7&9(GRADE B&C)	RBI-GWH-AR-T7&9-102
107	FLOOR PLANS -TOWER 7&9(GRADE B&C)	RBI-GWH-AR-T7&9-103
108	FLOOR PLANS -TOWER 7&9(GRADE B&C)	RBI-GWH-AR-T7&9-104
	<b>ELEVATIONS</b>	
109	TOWER-7 & 9(GRADE B&C) ELEVATION 1,2,3,4	RBI-GWH-AR-T-7&9-201
	<b>SECTIONS</b>	
110	SECTION X2-X2' ( TOWER B & C)	RBI-GWH-AR-T7&9-301
111	SECTION Y2-Y2' ( TOWER-B&C)	RBI-GWH-AR-T7&9-302
	<b>STAIRCASE DETAILS</b>	
112	STAIRCASE ST-09(GRADE B&C) TOWER 7&9-FIRE TOWER	RBI-GWH-AR-410
113	STAIRCASE ST-10(GRADEB&C) TOWER 7&9-fire staircase	RBI-GWH-AR-411
	<b>TOILET DETAILS</b>	
114	TOWER 7&9 (GRADE-B&C) TOILET - 1 DETAIL	RBI-GWH-AR-T 7&9-501
115	TOWER 7&9 (GRADE-B&C) TOILET - 2 DETAIL	RBI-GWH-AR-T 7&9-502
116	TOWER 7&9 (GRADE-B&C) TOILET - 3 DETAIL	RBI-GWH-AR-T 7&9-503
117	TOWER 7&9 (GRADE-B&C) TOILET - 1 DETAIL (PWD TOILET)	RBI-GWH-AR-T 7&9-504
	<b>CARETAKER-2</b>	
118	TOILET - 1 (CHANGING ROOM)	RBI-GWH-AR-CK-02-501
119	TOILET - 2 (DOCTOR CONSULTATION ROOM)	RBI-GWH-AR-CK-02-502
120	TOILET - 3 (BANK ENGINEER'S OFFICE )	RBI-GWH-AR-CK-02-503

121	TOILET - 4 (CARETAKER'S OFFICE)	RBI-GWH-AR-CK-02-504
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
	<b>KITCHEN DETAILS</b>	
122	KITCHEN DETAIL( TOWER 7&9 )(GRADE B&C)	RBI-GWH-AR-T7&T9-601
	<b>CUPBOARD DETAIL</b>	
123	CUPBOARD DETAIL( TOWER 7&9 )	RBI-GWH-AR-T7&T9-701
	<b>RAILING DETAIL</b>	
124	RAILING DETAIL (TOWER 7&9)( GRADE B&C )	RBI-GWH-AR-T7&9-901
125	UTILITY BALCONY DETAIL-1(TOWER 7&9) (GRADE B&C)	RBI-GWH-AR-T7&9-902
126	OHT (GRADE B&C)	RBI-GWH-AR-T7&9-1001
<b>A</b>	<b>GRADE D ( TOWER - 8 )</b>	<b>Layout Plan/Floor Plans</b>
127	TOWER 8(GRADE D)-FLOOR PLANS	RBI-GWH-AR-T8-102
128	TOWER 8(GRADE D)-FLOOR PLANS	RBI-GWH-AR-T8-103
129	TOWER 8(GRADE D)-FLOOR PLANS	RBI-GWH-AR-T8-104
	<b>ELEVATIONS</b>	
130	TOWER-8 (GRADE-D) ELEVATION 1,2,3&4	RBI-GWH-AR-T-8-201
	<b>SECTIONS</b>	
131	SECTION Y3-Y3' ( PART B )	RBI-GWH-AR-T8-301
	<b>STAIRCASE DETAILS</b>	
132	TOWER 8(GRADE D) -STAIRCASE - 11	RBI-GWH-AR-412
133	TOWER 8(GRADE D ) -STAIRCASE - 12	RBI-GWH-AR-413
	<b>TOILET DETAILS</b>	
134	TOWER 8 (GRADE-D) TOILET - 1	RBI-GWH-AR-T8-501
135	TOWER 8 (GRADE-D) TOILET - 2	RBI-GWH-AR-T8-502

136	TOWER 8 (GRADE-D) TOILET - 3	RBI-GWH-AR-T8-503
137	TOWER 8 (GRADE-D) TOILET - 4	RBI-GWH-AR-T8-504
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
138	TOWER 8 (GRADE-D) TOILET -2 (PWD)	RBI-GWH-AR-T8-505
<b>KITCHEN DETAILS</b>		
139	TOWER 8 ( GRADE D) KITCHEN DETAIL	RBI-GWH-AR-T8-601
<b>CUPBOARD DETAIL</b>		
140	GRADE D (TOWER 8)-CUPBOARD DETAIL	RBI-GWH-AR-T8-701
<b>RAILING DETAIL</b>		
141	BALCONY RAILING DETAIL (TOWER 8) (GRADE-D)	RBI-GWH-AR-T8-901
142	UTILITY BALCONY DETAIL (TOWER 8) (GRADES)	RBI-GWH-AR-T8-902
143	OHT (GRADE D)	RBI-GWH-AR-T8-1001
<b>B</b>	<b>BUILDING- RD BUNGALOW</b>	<b>Layout Plan/Floor Plans</b>
144	RD BUNGALOW - FLOOR PLANS	RBI-GWH-AR-DB-101
<b>ELEVATIONS</b>		
145	RD BUNGALOW - ELEVATIONS	RBI-GWH-AR-DB-201
<b>SECTIONS</b>		
146	RD BUNGALOW - SECTIONS	RBI-GWH-AR-DB-301
<b>STAIRCASE DETAILS</b>		
147	RD BUNGALOW-STAIRCASE DETAIL	RBI-GWH-AR-DB-401
<b>TOILET DETAILS</b>		
148	TOILET DETAIL - 1	RBI-GWH-AR-DB-501
149	TOILET DETAIL - 2	RBI-GWH-AR-DB-502
150	TOILET DETAIL - 3	RBI-GWH-AR-DB-503
151	TOILET DETAIL - 4	RBI-GWH-AR-DB-504
152	TOILET DETAIL - 5	RBI-GWH-AR-DB-505
153	TOILET DETAIL - 06 (PWD TOILET)	RBI-GWH-AR-DB-506

<b>KITCHEN DETAILS</b>		
154	RD BUNGALOW - KITCHEN DETAIL	RBI-GWH-AR-DB-601
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
<b>CUPBOARD DETAIL</b>		
155	RD BUNGALOW - CUPBOARD DETAIL	RBI-GWH-AR-DB-701
<b>DOOR WINDOW DETAIL</b>		
156	RD BUNGALOW - DOOR WINDOW DETAIL	RBI-GWH-AR-DB-801
157	RD BUNGALOW - DOOR WINDOW TYPICAL DETAIL	RBI-GWH-AR-DB-802
<b>RAILING DETAIL</b>		
158	RD BUNGALOW-RAILING DETAIL	RBI-GWH-AR-DB-901
159	OHT ( RD BUNGALOW )	RBI-GWH-AR-DB-1001
<b>ARCHITECTURE</b>		
<b>A</b>	<b>BUILDING- CLUB - 01</b>	<b>Layout Plan/Floor Plans</b>
160	CLUB-01-GROUND AND FIRST FLOOR PLAN	RBI-GWH-AR-C-01-101
161	CLUB-01-TERRACE AND ROOF PLAN	RBI-GWH-AR-C-01-102
<b>ELEVATIONS</b>		
162	CLUB-01-ELEVATIONS	RBI-GWH-AR-C-01-201
<b>SECTIONS</b>		
163	CLUB-01-SECTIONS	RBI-GWH-AR-C-01-301
<b>STAIRCASE DETAIL</b>		
164	CLUB-01-STAIRCASE DETAIL - 01	RBI-GWH-AR-C-01-401
<b>TOILET DETAIL</b>		
165	CLUB-01-TOILET DETAIL - 01 (GREEN ROOM)	RBI-GWH-AR-C-01-501
166	CLUB-01-TOILET - 2 ( MALE TOILET )	RBI-GWH-AR-C-01-502
167	CLUB-01-TOILET - 2 ( FEMALE TOILET )	RBI-GWH-AR-C-01-503

168	CLUB-01-TOILET DETAIL - 3 (COMMON TOILET)	RBI-GWH-AR-C-01-504
169	CLUB-01-TOILET DETAIL - 4&5	RBI-GWH-AR-C-01-505
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
	<b>DOOR WINDOW DETAIL</b>	
170	CLUB-01 - DOOR WINDOW DETAIL	RBI-GWH-AR-C-01-801
171	CLUB-01 - DOOR WINDOW DETAIL	RBI-GWH-AR-C-01-802
172	CLUB-01 - DOOR WINDOW DETAIL	RBI-GWH-AR-C-01-803
173	CLUB-01 - DOOR WINDOW TYPICAL DETAIL	RBI-GWH-AR-C-01-804
	<b>RAILING DETAIL</b>	
174	CLUB-01 RAILING DETAIL	RBI-GWH-AR-C-01-901
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
	<b>ARCHITECTURE</b>	
<b>A</b>	<b>UG TANK</b>	<b>Layout Plan/Floor Plans</b>
175	UG TANK ( PLAN & SECTION )	RBI-GWH-AR-UG-101
176	UG TANK ( STAIRCASE )	RBI-GWH-AR-UG-102
	<b>STP TANK</b>	
177	STP PLAN & SECTION	RBI-GWH-AR-STP-101
	<b>SWIMMING POOL</b>	
178	SWIMMING POOL LAYOUT SECTION & PLAN	RBI-GWH-AR-SM-101
179	BALANCING TANK	RBI-GWH-AR-SM-102
180	SWIMMING POOL LAYOUT ( MEP )	RBI-GWH-AR-SM-103
180A	SWIMMING POOL LAYOUT PLAN & SECTION ( ELECTRICAL )	RBI-GWH-MEP-SM-104
	<b>3D View Drawing</b>	
1	3D VIEWS RBI HOUSING, GUWAHATI	RBI-GWH-3D-01
2	3D VIEWS RBI HOUSING, GUWAHATI	RBI-GWH-3D-02
3	3D VIEWS RBI HOUSING, GUWAHATI	RBI-GWH-3D-03

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### INTERIORS DRAWINGS

<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
1	TOWER 1& 2 (CLASS-III) TYPICAL UNIT PLAN FLOORING	RBI-GWH-ID-T1&T2-101
2	TOWER 1& 2 (CLASS-III) TYPICAL CORRIDOR INTERIOR	RBI-GWH-ID-T1&T2-102
3	TOWER 1& 2 (CLASS-III) ENTRANCE LOBBY INTERIOR	RBI-GWH-ID-T1&T2-103
4	TOWER 3 & 4 (CLASS-IV) TYPICAL UNIT PLAN FLOORING	RBI-GWH-ID-T3&T4-101
5	TOWER 3&4 ( CLASS-IV) TYPICAL CORRIDOR INTERIOR	RBI-GWH-ID-T3&T4-102
6	TOWER 3&4 ( CLASS-IV) ENTRANCE LOBBY INTERIOR	RBI-GWH-ID-T3&T4-103
7	TOWER 5 & 6 (GRADE A) TYPICAL UNIT PLAN FLOORING	RBI-GWH-ID-T5&T6-101
8	TOWER 5&6( GRADE-A) TYPICAL CORRIDOR INTERIOR	RBI-GWH-ID-T5&T6-102
9	TOWER5&6 ( GRADE-A) ENTRANCE LOBBY INTERIOR	RBI-GWH-ID-T5&T6-103
10	TOWER- 7&9 (GRADE B&C) TYPICAL UNIT PLAN FLOORING	RBI-GWH-ID-T7&T9-101
11	TOWER 7&9 (GRADE B&C) TYPICAL CORRIDOR INTERIOR	RBI-GWH-ID-T7&T9-102
12	TOWER 7&9 (GRADE B&C) ENTRANCE LOBBY INTERIOR	RBI-GWH-ID-T7&T9-103
13	TOWER -8 (GRADE-D) TYPICAL UNIT PLAN FLOORING	RBI-GWH-ID-T8-101
14	TOWER 8 (GRADE-D) TYPICAL CORRIDOR INTERIOR	RBI-GWH-ID-T8-102
15	TOWER 8 ( GRADE-D) ENTRANCE LOBBY INTERIOR	RBI-GWH-ID-T8-103
16	CLUB HOUSE -1 (PART-B) GROUND & FIRST FLOOR FLOORING	RBI-GWH-ID-C1-101
17	CLUB HOUSE -01 (PART-B) GROUND & FIRST FLOOR FALSE CEILING	RBI-GWH-ID-C1-101
18	CLUB HOUSE -2 (PART-B) GROUND & FIRST FLOOR FLOORING	RBI-GWH-ID-C2-101
19	CLUB HOUSE -2 (PART-B) GROUND & FIRST FLOOR FALSE CEILING	RBI-GWH-ID-C2-201

20	DIRECTOR'S BUNGALOW FLOORING PLAN	RBI-GWH-ID-DB-101
21	DIRECTOR'S BUNGALOW FLOORING PLAN	RBI-GWH-ID-DB-102
22	DIRECTOR'S BUNGALOW FLOORING PLAN	RBI-GWH-ID-DB-103
23	DIRECTOR'S BUNGALOW FLASE CEILING PLAN	RBI-GWH-ID-DB-201
24	CARETAKER BLOCK -01 FLOORING LAYOUT	RBI-GWH-ID-CK-01-101
25	CARETAKER BLOCK -02 FLOORING LAYOUT	RBI-GWH-ID-CK-02-101
26	TYPICAL DETAIL CLADDING DETAILS	RBI-GWH-ID-TD-101

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### STRUCTURAL DRAWINGS

<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
<b>A</b>	<b>CLASS III(TOWER 1&amp;2)</b>	
1	FOUNDATION PLAN	CLASS-III-S01
2	FOUNDATION RC DET	CLASS-III-S01A
3	FOUNDATION RC DET	CLASS-III-S01B
4	FOUNDATION PLAN	CLASS-III-S01B1
5	FOUNDATION RC DET	CLASS-III-S01C
6	FOUNDATION EC DET	CLASS-III-S01D
7	FOUNDATION PLAN	CLASS-III-S01T
8	PLINTH BEAM LAYOUT PLAN	CLASS-III-S02
9	PLINTH BEAM RC DET	CLASS-III-S02A
10	PODIUM 1 FLOOR SLAB FRAMING PLAN	CLASS-III-S03
11	PODIUM 1 FLOOR BEAMS & SLAB RC DET	CLASS-III-S03A
12	FIRST FLOOR SLAB FRAMING PLAN	CLASS-III-S04
13	TYPICAL FLOOR ROOF SLAB PLAN	CLASS-III-S05
14	TYPICAL FLOOR BEAMS & SLAB RC DET	CLASS-III-S05A
<b>B</b>	<b>CLASS IV(TOWER 3&amp;4)</b>	
15	FOUNDATION PLAN	CLASS-IV-S01
16	FOUNDATION RC DET	CLASS-IV-S01A
17	FOUNDATION RC DET	CLASS-IV-S01B
18	FOUNDATION PLAN	CLASS-IV-S01B1
19	FOUNDATION RC DET	CLASS-IV-S01C
20	FOUNDATION RC DET	CLASS-IV-S01D
21	FOUNDATION PLAN	CLASS-IV-S01T
22	PLINTH BEAM LAYOUT PLAN	CLASS-IV-S02
23	PLINTH BEAM RC DET	CLASS-IV-S02A
24	PODIUM-1 FLOOR SLAB FRAMING PLAN	CLASS-IV-S03
25	PODIUM-1 FLOOR BEAM & RC DET	CLASS-IV-S03A
26	FIRST FLOOR SLAB FRAMING PLAN	CLASS-IV-S04
27	TYPICAL FLOOR SLAB ROOF PLAN	CLASS-IV-S05

28	TYPICAL FLOOR BEAMS & SLAB RC DET	CLASS-IV-S05A
29	DET OF FW MKD RCC WALLS	CLASS-III & IV-S05B
Sl. No.	Drawing Title	Drawing No.
C	<b>CLUB-02</b>	
30	FOUNDATION PLAN	CL-2-S01
31	FOUNDATION RC DET	CL-2-S01A
32	FOUNDATION RC DET	CL-2-S01B
33	PLINTH BEAM LAYOUT PLAN	CL-2-S02
34	PLINTH BEAM RC DET	CL-2-S02A
35	PODIUM-1 FLOOR SLAB FRAMING PLAN	CL-2-S03
36	PODIUM-1 FLOOR BEAM & RC DET	CL-2-S03A
37	FIRST FLOOR SLAB FRAMING PLAN	CL-2-S04
38	FIRST FLOOR BEAMS & SLAB RC DET	CL-2-S04A
39	SECOND FLOOR SLAB FRAMING PLAN	CL-2-S05
40	SECOND FLOOR BEAMS & SLAB RC DET	CL-2-S05A
41	TYPICAL FLOOR ROOF SLAB PLAN	CL-2-S06
42	TERRACE BEAMS & SLAB RC DET	CL-2-S06A
<b>D</b>	<b>NON-TOWER(PART A)</b>	
43	PLINTH BEAM RC DET	NT-S02A
44	PODIUM-1 FLOOR BEAM & RC DET	NT-S03A
45	FIRST FLOOR BEAM & SLAB RC DET	NT-S04A
<b>E</b>	<b>GRADE A (TOWER 5&amp;6)</b>	
46	PLINTH BEAM LAYOUT PLAN	GA-T5-S02
47	POUDIUM FLOOR SLAB FRAMING PLAN	GA -T5-S03
48	FOUNDATION PLAN	G-A-T5&6-501
49	FOUNDATION RC DET	G-A-T5&6-S01A
50	FOUNDATION RC DET	G-A-T5&6-S01B
51	FOUNDATION PLAN	G-A-T5&6-S01B1
52	FOUNDATION RC DET	G-A-T5&6-S01C
53	FOUNDATION RC DET	G-A-T5&6-S01D
54	FOUNDATION PLAN	G-A-T5&6-S01T

55	PLINTH BEAM RC DET	G-A-T5&6-S02A
56	TYPICAL FLOOR ROOF SLAB PLAN	G-A-T5&6-S04
Sl. No.	Drawing Title	Drawing No.
57	TYPICAL FLOOR BEAMS & SLAB RC DET	G-A-T5&6-S04A
58	PLINTH BEAM LAYOUT PLAN	G-A-T6-S02
59	PODIUM LEVEL FRAMING PLAN - SHEET 1	GA -T6-S03
60	PLINTH BEAM LAYOUT PLAN- SHEET 2	G-A-T6-S03
F	<b>GRADE-B&amp;C (TOWER 7&amp;9)</b>	
61	FOUNDATION PLAN	G-B&C-T7-S01
62	FOUNDATION PLAN	G-B&C-T7-S01B1
63	FOUNDATION PLAN	G-B&C-T7-S01T
64	PLINTH BEAM LAYOUT PLAN	G-B&C-T7-S02
65	PODIUM FLOOR SLAB FRAMING PLAN	G-B&C-T7-S03
66	FOUNDATION RC DET	G-B&C-T7&9-S01A
67	FOUNDATION RC DET	G-B&C-T7&9-S01B
68	FOUNDATION RC DET	G-B&C-T7&9-S01C
69	PLINTH BEAM RC DET	G-B&C-T7&9-S02A
70	TYPICAL FLOOR ROOF SLAB PLAN	G-B&C-T7&9-S04
71	TYPICAL FLOOR BEAMS & SLAB RC DET	G-B&C-T7&9-S04A
72	FOUNDATION PLAN	G-B&C-T9-S01
73	FOUNDATION PLAN	G-B&C-T9-S01B1
74	FOUNDATION PLAN	G-B&C-T9-S01T
75	PLINTH BEAM LAYOUT PLAN	G-B&C-T9-S02
76	PODIUM-1 FLOOR SLAB FRAMING PLAN	G-B&C-T9-S03
G	<b>TYPICAL DRAWINGS (GRADE A,B&amp;C,D)</b>	
77	TYP DET FOR FW WALLS	G-A-BC&D-S
H	<b>GRADE D (TOWER 8)</b>	
78	FOUNDATION PLAN	G-D-T8-501
79	FOUNDATION RC DET	G-D-T8-S01A
80	FOUNDATION RC DET	G-D-T8-S01B
81	FOUNDATION PLAN	G-D-T8-S01B1
82	FOUNDATION RC DET	G-D-T8-S01C

83	FOUNDATION PLAN	G-D-T8-S01T
84	PLINTH BEAM LAYOUT PLAN	G-D-T8-S02
85	PLINTH BEAM RC DET	G-D-T8-S02A
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
86	PODIUM-1 FLOOR SLAB FRAMING PLAN	G-D-T8-S03
87	TYPICAL FLOOR ROOF SLAB PLAN	G-D-T8-S04
88	TYPICAL FLOOR BEAMS & SLAB RC DET	G-D-T8-S04A
<b>I</b>	<b>NON TOWER (PART B )</b>	
89	FOUNDATION RC DET	VT-S01A
90	PLINTH BEAM RC DET	NT-S02A
91	PODIUM FLOOR BEAMS & SLAB RC DET, SHEET 1	NT-S03A
92	PODIUM 1 FLOOR BEAMS & SLAB RC DET-SHEET 2	NT-S03A
93	FIRST FLOOR BEAM & SLAB RC DETAIL	NT-S04A
94	FOUNDATION PLAN	NT-S01T5
95	FOUNDATION PLAN	NT-S01T6
96	FOUNDATION PLAN	NT-S01T7
97	FOUNDATION PLAN	NT-S01T8
98	FOUNDATION PLAN	NT-S01-T9
<b>J</b>	<b>CLUB-01</b>	
99	FOUNDATION PLAN	CL-1-S01
100	FOUNDATION RC DET	CL-1-S01A
101	PLINTH BEAM LAYOUT PLAN	CL-1-S01B
102	PLINTH BEAM RC DET	CL-1-S010
103	FIRST FLOOR SLAB PLAN	CL-1-S02
104	FIRST FLOOR BEAM SLAB RC DET	CL-1-S02A
105	TERRACE FLOOR SLAB PLAN	CL-1-S03
106	TERRACE FLOOR BEAM SALB & RC DET	CL-1-S03A
<b>K</b>	<b>RD BUNGLOW</b>	
107	FOUNDATION PLAN	DB-S01
108	FOUNDATION RC DE	DB-S01A
109	PLINTH BEAM LAYOUT PLAN	DB-S01B
110	PLINTH BEAM RC DETAIL	DB-S01C
111	GROUND FLOOR ROOF SALB	DB-S02

	PLAN	
112	TERRACE FLOOR BEAM SALB & RC DET	DB-S03
Sl. No.	Drawing Title	Drawing No.
L	<b>BOUNDARY WALL</b>	
113	BOUNDARY WALL DETAIL	BW-S01
114	BOUNDARY WALL DETAIL	BW-S02
M	<b>SUBSTATION</b>	
115	SUBSTATION -FOUNDATION PLAN	LT-S01
116	FOUNDATION RC DET	LT-S01A
117	PLINTH BEAM LAYOUT PLAN	LT-S02A
118	PLINTH BEAM RC DETAIL	LT-S02
N	<b>STP</b>	
119	STP - LAYOUT PLAN	STP-S01
120	FOUNDATION RC DET	DB-S01A
O	<b>UGT</b>	
121	UG Tank (RC Details)	UGT-S01A
122	UG Tank (Framing Plan)	UGT-S01
P	<b>SWIMMING POOL</b>	
123	Swimming Pool	SWM-S01

**PLUMBING DRAWINGS**

Sl. No.	Drawing Title	Drawing No.
A		<b>Layout Plan/Floor Plans</b>
1	TAKEOFF SHEET FOR PLUMBING	RBI-GWH-PL-001
		<b>SITE</b>
2	SITE LAYOUT PLAN	RBI-GWH-PL-SW-101
		<b>GRADE II, IV &amp; CLUB-02</b>
3	TOWER 1,2,3,4 (CLASS 3&4) STILT & PODIUM PLUMBING LAYOUT	RBI-GWH-PL-T1&T2, T3, T4-101
4	TOWER 1,2,3,4 (CLASS 3&4) FIRST & TYPICAL FLOOR PLUMBING LAYOUT	RBI-GWH-PL-T1&T2, T3, T4-102
5	TOWER 1,2,3,4 (CLASS 3&4) TERRACE & MACHINE ROOM PLUMBING LAYOUT	RBI-GWH-PL-T1&T2, T3, T4-103
6	CLUB-02 FIRST, SECOND & TERRACE FLOOR FIRE FIGHTING LAYOUT	RBI-GWH-PL-C-02-101
7	TOWER 1&2 (CLASS 3) TOILET-1	RBI-GWH-PL-T1&T2-501

In these drawing Rain water pipe mentioned as PVC pipe should be read as Hubless pipe as per IS:15905

	PLUMBING LAYOUT	
8	TOWER 1&2 (CLASS 3) TOILET-2 PLUMBING LAYOUT	RBI-GWH-PL-T1&T2-502
9	TOWER 1&2 (CLASS 3) TOILET-1 PWD PLUMBING LAYOUT	RBI-GWH-PL-T1&T2-503
10	TOWER 3&4 (CLASS 4) TOILET-2 PLUMBING LAYOUT	RBI-GWH-PL-T3&T4-501
11	TOWER 3&4 (CLASS 4) TOILET-2 PLUMBING LAYOUT	RBI-GWH-PL-T3&T4-502
12	TOWER 3&4 (CLASS 4) TOILET-1 PLUMBING LAYOUT	RBI-GWH-PL-T3&T4-503
<b>GRADE B &amp; C</b>		
13	TOWER B&C (PLOT-B) TOILET-1 PLUMBING LAYOUT	RBI-GWH-PL-T7&19-501
14	TOWER B&C (PLOT-B) TOILET-2 PLUMBING LAYOUT	RBI-GWH-PL-T7&19-502
15	TOWER B&C (PLOT-B) TOILET-3 PLUMBING LAYOUT	RBI-GWH-PL-T7&19-503
16	TOWER B&C (PLOT-B) PWD TOILET PLUMBING LAYOUT	RBI-GWH-PL-T7&T9-504
<b>Sl. No.</b>	<b>Drawing Title</b>	<b>Drawing No.</b>
A		Layout Plan/Floor Plans
<b>GRADE D</b>		
17	TOWER D (PART-B) TOILET 01 PLUMBING LAYOUT	RBI-GWH-PL-T8-501
18	TOWER D (PART-B) TOILET 02 PLUMBING LAYOUT	RBI-GWH-PL-T8-502
19	TOWER D (PART-B) TOILET 03 PLUMBING LAYOUT	RBI-GWH-PL-T8-503
20	TOWER D (PART-B) TOILET 04 PLUMBING LAYOUT	RBI-GWH-PL-T8-504
21	TOWER D (PLOT-B) PWD TOILET PLUMBING LAYOUT	RBI-GWH-PL-T8-505
<b>CLUB-01</b>		
22	CLUB-01 GROUND & FIRST FLOOR PLUMBING LAYOUT	RBI-GWH-PL-C-01-101
23	CLUB-01 TERRACE FLOOR PLUMBING LAYOUT	RBI-GWH-PL-C-01-102
<b>RD BUNGALOW</b>		
24	RD BUNGALOW PLUMBING LAYOUT	RBI-GWH-PL-DB-101
<b>SCHEMATICS</b>		
25	TOWER 1&2 CLASS 3 PLUMBING SCHEMATIC LAYOUT	RBI-GWH-PL-T1&12-201
26	TOWER 3&4 CLASS 4 PLUMBING SCHEMATIC LAYOUT	RBI-GWH-PL-T3&T4-201
27	CLUBHOUSE 02 PLUMBING	RBI-GWH-CH-PL-201

	SCHEMATIC LAYOUT	
28	GRADE A TOWER-5 PLUMBING SCHEMATIC LAYOUT	RBI-GWH-TA-PL-201
29	GRADE A TOWER-6 PLUMBING SCHEMATIC LAYOUT	RBI-GWH-TA-PL-201
30	GRADE & TOWER-7 PLUMBING SCHEMATIC	RBI-GWH-TB-PL-201
31	GRADEC TOWER-9 PLUMBING SCHEMATIC LAYOUT	RBI-GWH-TC-PL-201
32	GRADED TOWER-8 PLUMBING SCHEMATIC LAYOUT	RBI-GWH-TD-PL-201
33	CLUBHOUSE 01 PLUMBING SCHEMATIC LAYOUT	RBI-GWH-CH-PL-201
34	RD BUNGALOW PLUMBING SCHEMATIC LAYOUT	RBI-GWH-RDB-PL-201

DEMOLITION AND RE-DEVELOPMENT OF RBI ZOO-NARENGI ROAD COLONY QUARTERS, GUWAHATI.		
List of Tender drawings		
5. No.	Drawing Title	Drawing No.
<b>ELECTRICAL DRAWINGS</b>		
SITE & STILT		
1	Main electrical single line diagram	RBI-GWH-EL-SLD-01
2	Rising main electrical single line diagram	RBI-GWH-EL-SLD-02
3	EV charging panel electrical single line diagram	RBI-GWH-EL-SLD-03
4	Site layout-ground floor external lighting & cctv	RBI-GWH-EL-SW-101
5	Site layout(part-A)ground floor external lighting & cctv	RBI-GWH-EL-SW-101A
6	Site layout(part-B) ground floor external lighting & cctv	RBI-GWH-EL-SW-101B
7	Site layout- podium level electrical layout	RBI-GWH-EL-SW-102
8	Site layout- electrical sub-station layout	RBI-GWH-EL-SW-103
9	Stilt floor plan electrical layout	RBI-GWH-EL-ST-101
10	Stilt floor plan FAS, PA & cctv layout	RBI-GWH-EL-ST-102
11	Stilt floor plan lighting & power DB detail layout	RBI-GWH-EL-ST-103
	Class III, IV&Club-02	
12	Tower 1,2,3&4 (class iii- iv) stilt & podium floor electrical layout	RBI-GWH-EL-T1,2,3,4-101
13	Tower 1,2,3&4 (class iii- iv) stilt & podium floor FAS, PA, cctv layout	RBI-GWH-EL-T1,2,3,4-101A
14	Tower 1,2,3&4 (class iii- lv) stilt & podium floor DB details layout	SBI-GWH-EL-T1,2,3,4-101B
15	Tower 1,2,3&4(class iii- iv) first & typical floor electrical layout	RBI-GWH-EL-T1,2,3,4-102
16	Tower 1,2,3&4(class iii- iv) first & typical floor DB details	RBI-GWH-EL-T1,2,3,4-102A
17	Tower 1,2,3&4 (class iii- iv) terrace & machine room electrical layout	RBI-GWH-EL-T1,2,3,4-103
18	Club-02 first & second floor electrical layout	RBI-GWH-EL-C-02-101
19	Club-02 first & second floor electrical layout	RBI-GWH-EL-C-02-102
20	Club-02 lighting and power distribution	RBI-GWH-EL-C-02-103
21	Tower 1&2 (class iii) toilet- 1 electrical elevation layout	RBI-GWH-EL-TB-EL-101
22	Tower 1&2 (class iii) toilet -2 electrical elevation layout	RBI-GWH-EL-TB-EL-102
23	Tower 1&7 ((class iii) toilet -3 electrical elevation layout	RBI-GWH-EL-TB-EL-103
24	Tower 1&2 (class iii) PWD toilet electrical elevation layout	RBI-GWH-EL-TB-EL-104
25	Grade-a (class iii) electrical elevation layout	RBI-GWH-G-A-EL-901
26	Grade-a (class-iv) electrical elevation layout	RBI-GWH-G-A-EL-902
	Grade	
	A	
27	Tower-5(Grade-A) floor plan electrical layout	RBI-GWH-EL-T5-101
28	Tower-5(Grade-A) terrace plan - solar panel layout	RBI-GWH-EL-T5-102
29	Tower-5(Grade-A) floor plan DB details	RBI-GWH-EL-T5-103
30	Tower-6(Grade-A) floor plan electrical layout	RBI-GWH-EL-T6-101
31	Tower-6(Grade-A) terrace plan- solar panel layout	RBI-GWH-SP-T6-101
32	Tower-6(Grade-A) floor plan DB details	RBI-GWH-SP-T6-103
33	Tower 5&6(Grade-A) toilet-1 electrical elevation layout	RBI-GWH-EL-T5&T6-EL-101

The distance  
between face to face  
two CCTV will be  
50 Mtrs. in case of  
distance more than  
50 mtrs. or turning  
point there will be  
more CCTV  
required  
accordingly.

34	Tower 5&6(Grade-A) toilet- 2 electrical elevation layout	RBI-GWH-EL-T5&T6-EL-102
35	Tower 5&6(Grade-A) toilet-3 electrical elevation layout	RBI-GWH-EL-T5&T6-EL-103
36	Tower 5&6(Grade-A) PWD toilet electrical elevation layout	RBI-GWH-EL-T5&T6- EL-104
	Grade B & C	
37	Grade B&C Typical Floor electrical elevation layout	RBI-GWH- B&C-EL- 101
38	Tower B&C (plot-B)toilet 01 electrical elevation layout	RBI-GWH-EL-T-B&C-101
39	Tower B&C (plot-B)toilet 02 electrical elevation layout	RBI-GWH-EL-T B&C-102
40	Tower B&C (plot-B)toilet 02 electrical elevation layout	RBI-GWH-EL-T-B&C-103
41	Tower B&C (plot-B) Pwd toilet electrical elevation layout	RBI-GWH-EL-T-B&C- 104
42	Grade B&C toilet -01electrical elevation layout	RBI-GWH-EL-T-B&C 201
43	Grade B&C toilet-02 electrical elevation layout	RBI-GWH-EL-T B&C-202
44	Grade B&C toilet-03 electrical elevation layout	RBI-GWH-EL-T-B&C-203
45	Tower 7&9 Grade B&C podium &typical floor electrical layout	RBI-GWH-EL-T7 &9-101
46	Tower 7&9 Grade B&C terrace solar and machine room electrical layout	RBI-GWH-EL-T7 &9- 102
47	Tower 7&9 Grade B&C podium &typical floor- DB Details	RBI-GWH-EL-T7 &9- 103
	Grade D	
48	Grade- D Typical floor electrical elevation layout	RBI-GWH-EL-GD-EL-101
49	Tower 8(Part- B) toilet-01 electrical elevation layout	RBI-GWH-EL-T-D-101
50	Tower 8(Part- B) toilet -02 electrical elevation layout	RBI-GWH-EL-T-D-102
51	Tower 8(Part- B) toilet -03 electrical elevation layout	RBI-GWH-EL-TD -103
52	Tower D(Part- B) toilet-02 electrical elevation layout	RBI-GWH-EL-T-D-104
53	Tower D(Part- B) PWD-Toilet Electrical elevation layout	RBI-GWH-EL-T-D-105
54	Tower-8 (Grade-D)podium & second floor electrical layout	RBI-GWH-EL-T8-101
55	Tower-9 (Grade-D) typical &terrace floor electrical layout	RBI-GWH-EL-T8-102
56	Tower-8 (Grade -D)terrace floor solar panel layout	RBI-GWH-EL-T8- 103
57	Tower-8 (Grade-D) podium& second floor DB detail	RBI-GWH-EL-T8-104
	CLUB - 01	
58	Club house -01 ground and first floor plans- electrical layout	RBI-GWH-EL-C-01-101
59	Club house -01 terrace floor plans- electrical layout	RBI-GWH-EL-C-01- 102
60	Club house -01 terrace floor plans- electrical layout	RBI-GWH-EL-C-01-103
61	Club house -01 ground and first floor plans- ELV layout	RBI-GWH-EL-C-01-104
62	Club house -01 fire alarm system plans	RBI-GWH-CH-FAS- 101
	RD BUNGALOW	
63	RD bungalow floor plans- electrical layout	RBI-GWH-EL-RDB-101
64	RD bungalow DB details	RBI-GWH-EL-RDB-102
65	TV,data & telephone schematic diagram	RBI-GWH-EL-SLD-04
	<b>Fire fighting drawings</b>	
1	Fire Fighting Take Off Sheets	RBI- GWH- FF -001
2	Tower 8 Grade-D Fire Fighting Take Off Sheet	RBI- GWH- FF-002
3	All Blocks Fire Schematic Layout	RBI- GWH-SL-201
	<b>Grade III, IV &amp; Club-02</b>	
4	Tower 1,2,3,4 (class 3&4) stilt & podium fire fighting layout	RBI-GWH-FF-T1&T2,T3,T4-101

Sprinkler provision shall be provided in stilt and podium parking areas only in all towers and club buildings.

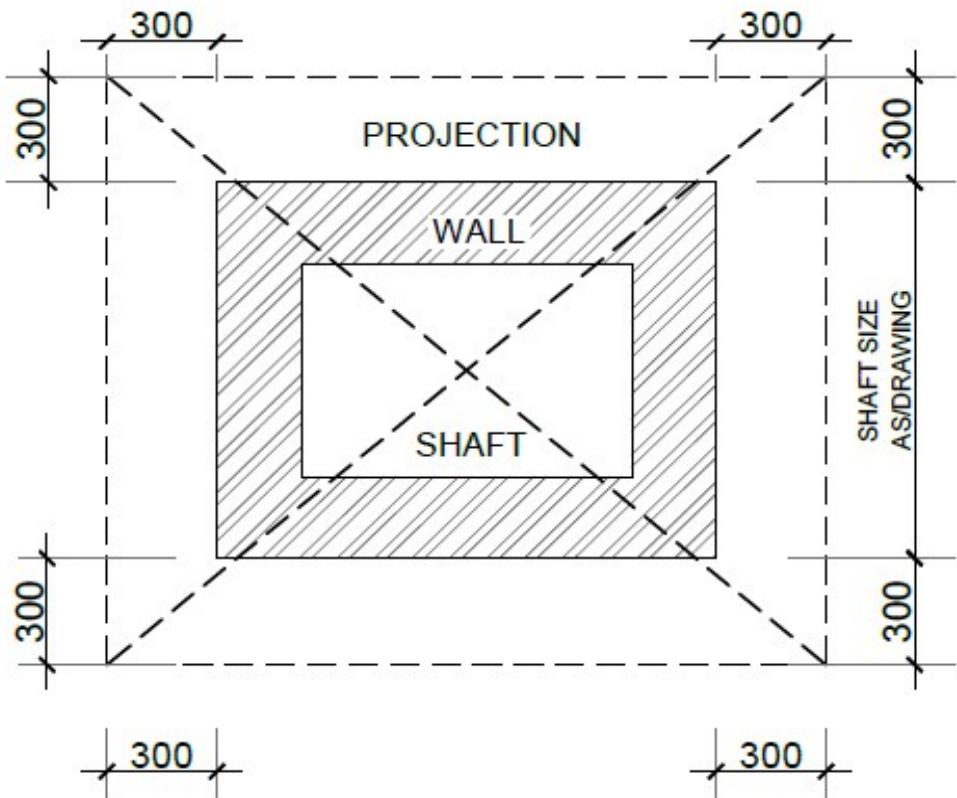
5	Tower 1,2,3,4 (class 3&4) first & typical floor fire lighting layout	RBI-GWH-FF-TJ&T2,T3,T4-102
6	Tower 1,2,3,4 (class 3&4) terrace & machine room fire fighting layout	RBI-GWH-FF-T1&T2,T3,T4-103
7	Club 02 first, second & terrace floor fire fighting layout	RBI-GWH-FF-C-02-101
<b>Grade A</b>		
8	Tower 5 (Grade-A) stilt floor plumbing & fire fighting layout	RBI-GWH-SP-T5-FF/PL-101
9	Tower 5 (Grade-A) Podium/ First Floor Plumbing & Fire Fighting Layout	RBI-GWH-SP-T5-FF/PL-102
10	Tower 5(Grade-A) Typical floor plumbing & fire fighting layout	RBI-GWH-SP T5-FF/PL-103
11	Tower 5(Grade-A) Terrace Floor Plumbing & Fire Fighting Layout	RBI-GWH-SP-T5-FF/PL-104
12	Tower 5 (Grade-A) Mumty Terrace Floor Plumbing & Firefighting Layout	RBI-GWH-SP-T5-FF/PL-105
13	Tower 5 (Grade-A) Roof Plumbing & Firefighting Layout	RBI-GWH-SP-T5-FF/PL-106
14	Tower 6 (Grade-A) Stilt Floor Plumbing & Fire fighting Layout	RBI-GWH-SP-T6-FF/PL-101
15	Tower 6 (Grade-A) Podium/ First Floor Plumbing & Fire Fighting Layout	RBI-GWH-SP-T6-FF/PL-102
16	Tower 6 (Grade A) Typical Floor Plumbing & Firefighting Layout	RBI-GWH-SP-T6-FF/PL-103
17	Tower 6 (Grade-A) Terrace Plumbing & Fire fighting Layout	RBI-GWH-SP-T6-FF/PL-104
18	Tower 6 (Grade-A) Mumty Terrace Plumbing & Fire fighting Layout	RBI-GWH-SP-T6-FF/PL-105
19	Tower 6 (Grade-A) Roof plumbing & firefighting layout	RBI-GWH-SP-T6-FF/PL-106
<b>Grade B &amp; C</b>		
20	Tower 7&9 (Grade- B&C )Terrace& Machine Room Plumbing & Firefighting Layout (Podium & stilt)	RBI-GWH-FF/PL-T7&T9-101
21	Tower 7&9 (Grade-B&C )Terrace& Machine Room Plumbing & Firefighting Layout (Typical floor & terrace plan)	RBI-GWH-FF/PL-T7&T9-102
22	Tower 7&9 (Grade-B&C )Terrace & Machine Room Plumbing & Firefighting Layout (Machine room & terrace plan)	RBI-GWH-FF/PL-T7&T9-102
<b>Grade D</b>		
23	Tower 8 Grade- D plumbing & firefighting layout	RBI-GWH FF/PL- T8-101
<b>HVAC drawings</b>		
1	Stilt floor HVAC layout	AC-01
2	Tower 1,2,3,4 stilt & podium electrical layout	RBI-GWH-AC-T1,T2,T3 T4-101
3	Tower 1,2,3,4 terrace & machine room electrical layout	RBI-GWH-AC-T1,T2,T3 T4-103
4	Club-01 Ground & First Floor Plan -HVAC Layout	RBI-GWH-AC-C-01-101
5	Club - 2 First & Second Floor HVAC layout	RBI-GWH-AC-C-02-101
6	Club - 2 terrace floor	RBI-GWH-AC-C-02-102
7	Tower 5Grade-A HVAC layouts	RBI-GWH-AC-T5-101
8	Tower 6 Grade-A HVAC Layouts	RBI-GWH-AC-T6-101
9	Tower 7&9 Grade B&C Terrace& Machine Room HVAC Layout	RBI-GWH-AC-T7&9-101

10	Tower 8 Grade—D Terrace HVAC Layout	RBI-GWH-AC-T8-101
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Correction...Nil Deletion... Nil Insertion...Nil Overwriting... Nil       $\mathcal{AE}(C)$        $\mathcal{AE}(E)$        $\mathcal{EE}(C)$

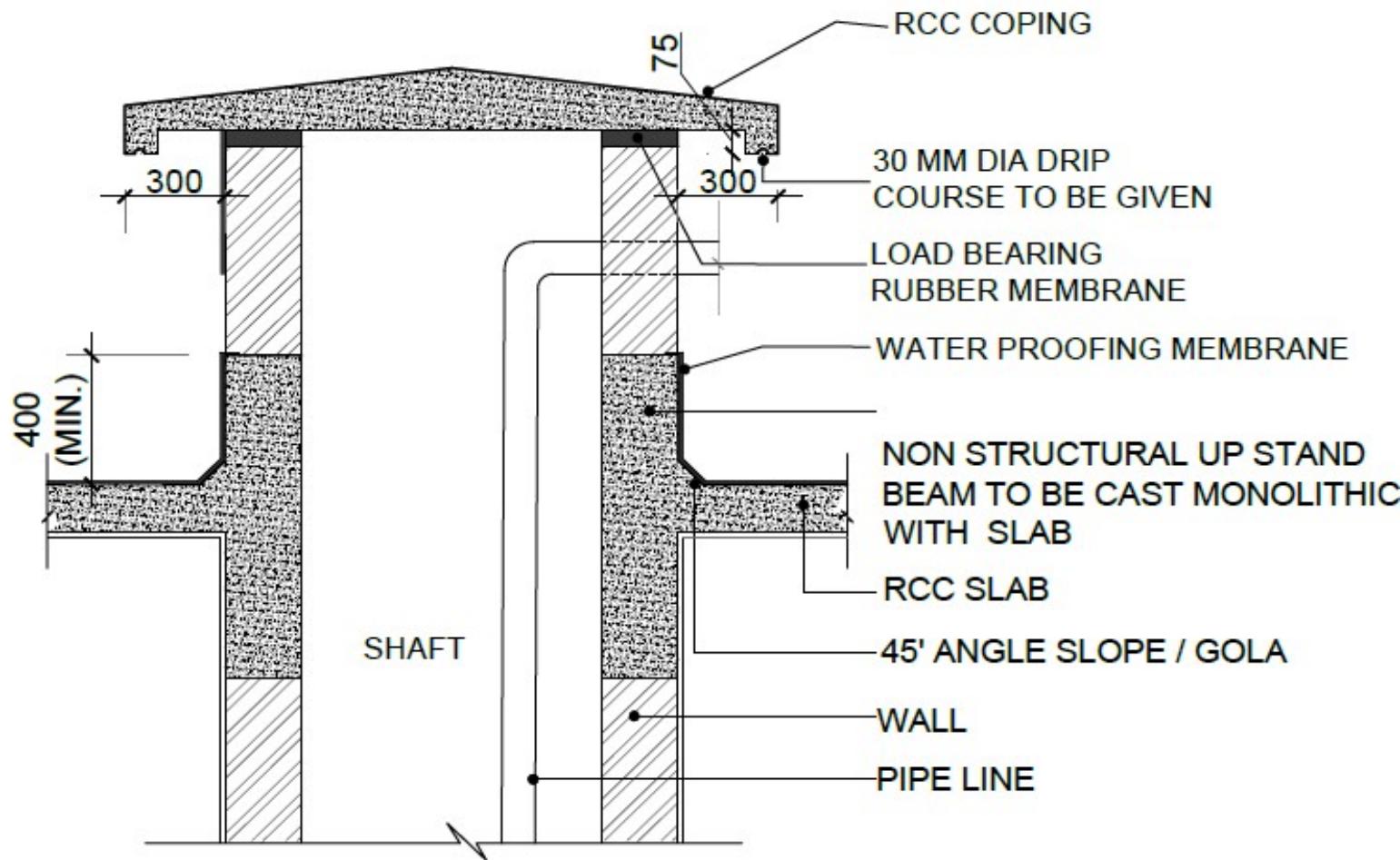
PART – H  
TYPICAL DRAWING

# SHAFT / DUCT



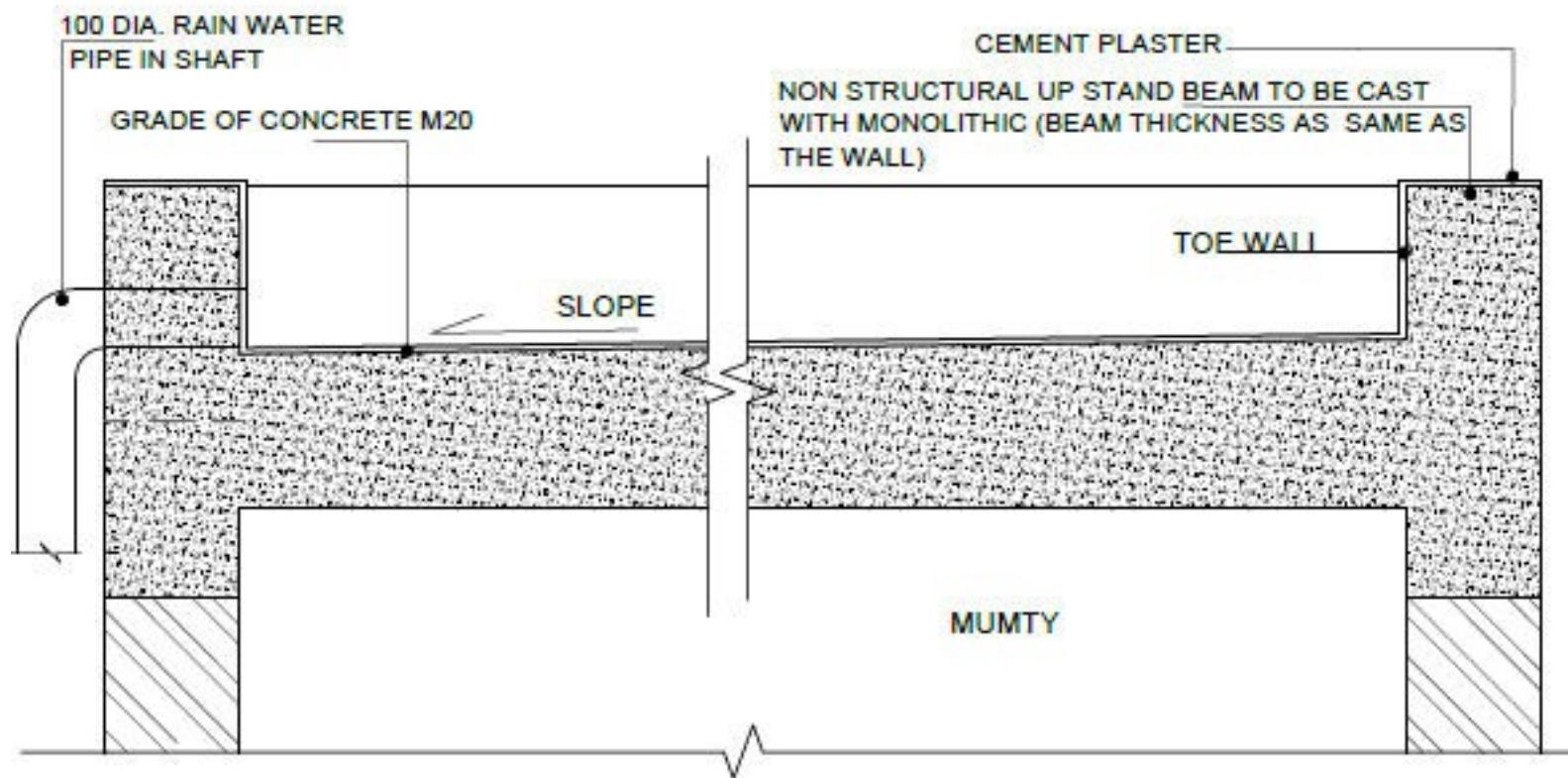
## SECTION

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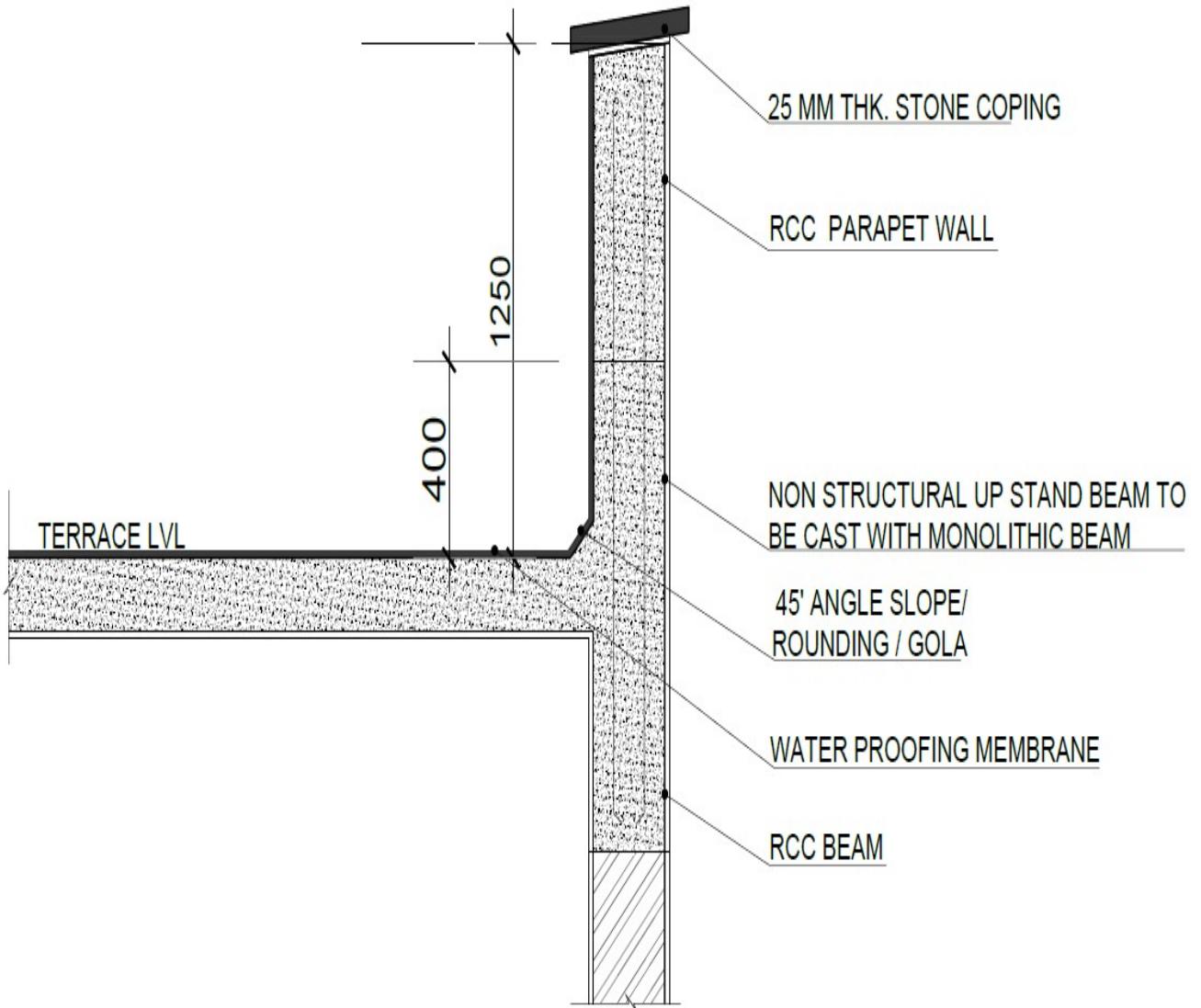
## PLAN

## MUMTY ROOF SLAB WITH TOE WALL

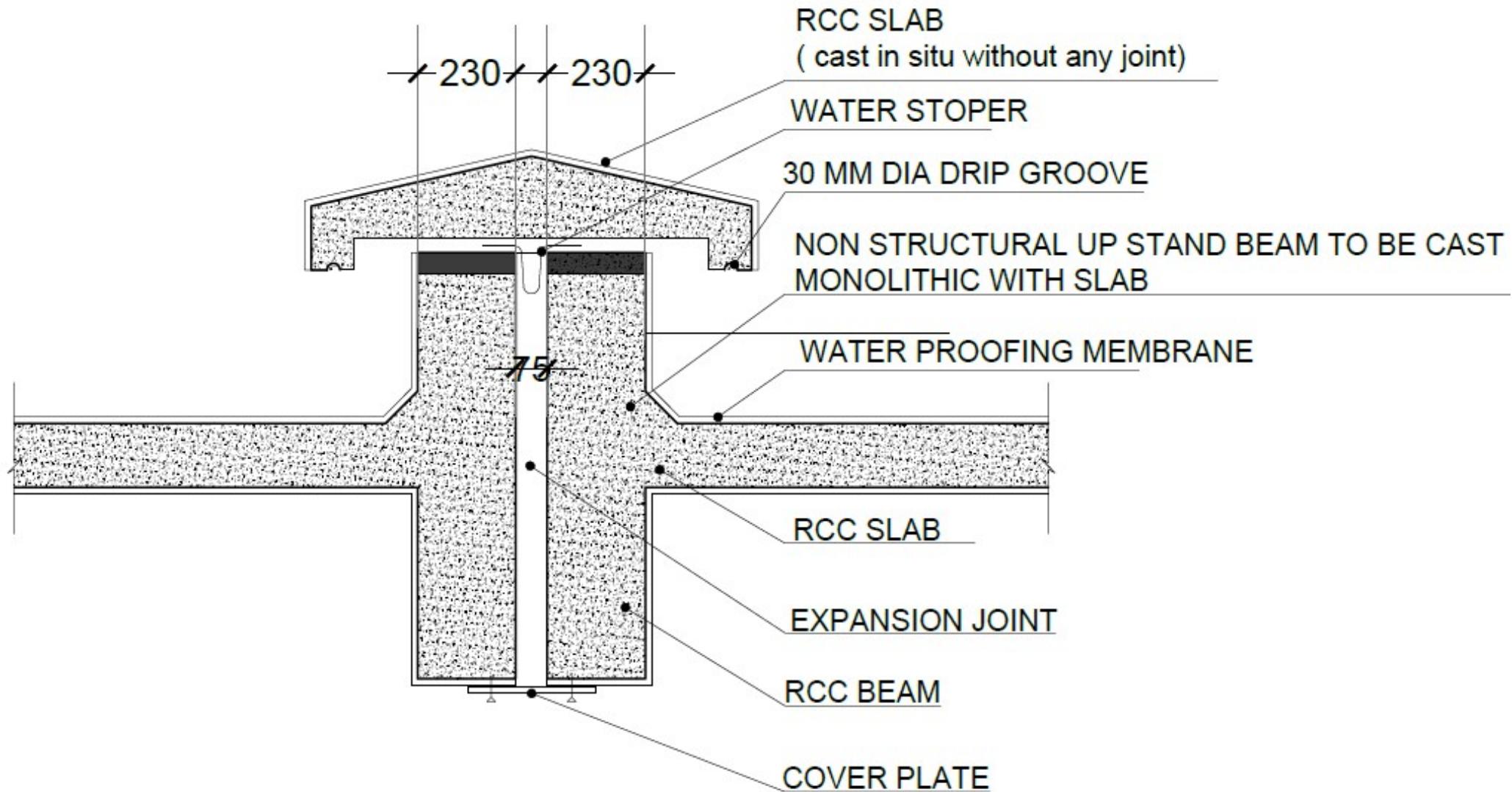


# Typical RCC Parapet Details

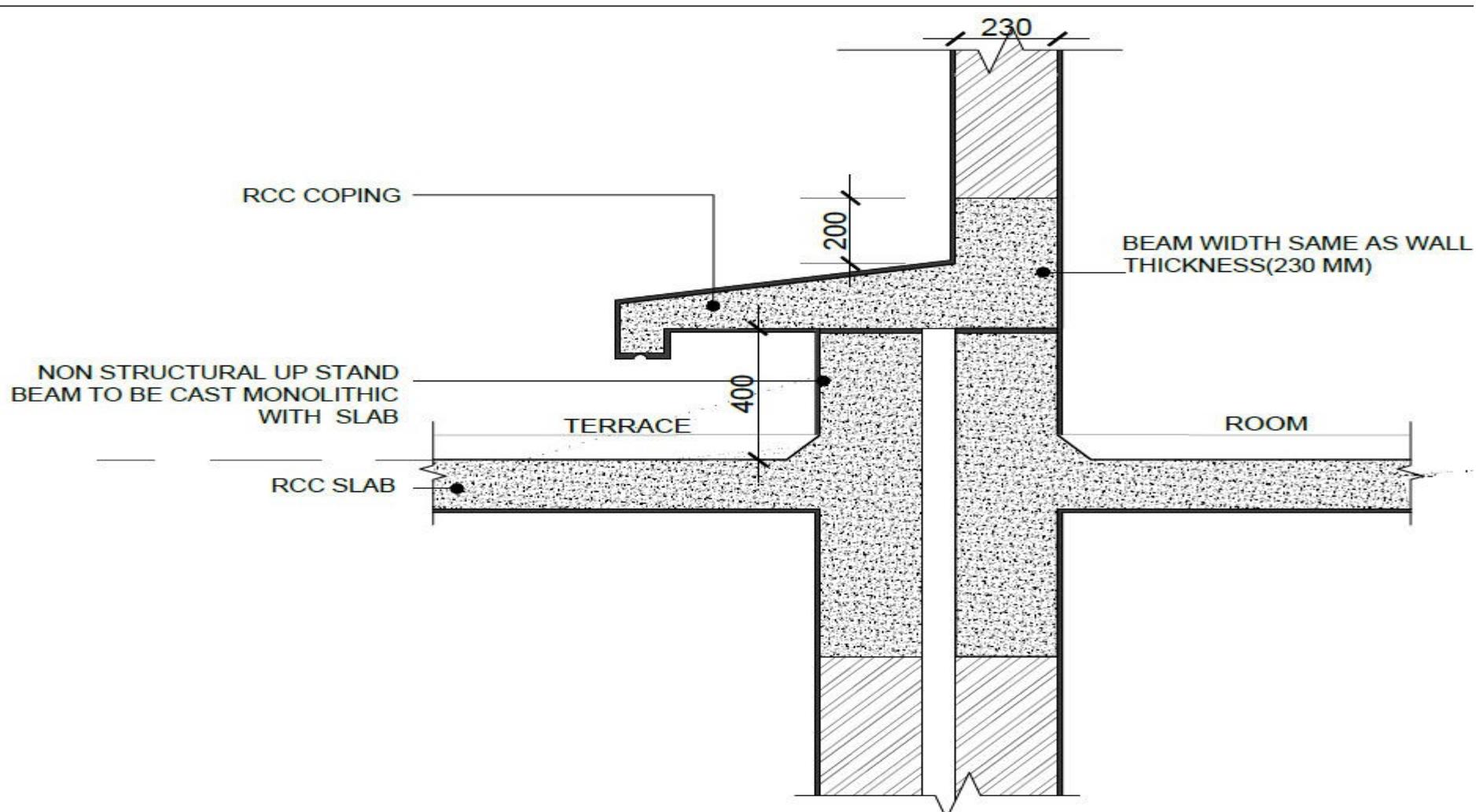
- The entire parapet (including RCC wall) wall to have inverted beams
- Depth of inverted beam be not less than 400 mm depth
- The parapet wall top may have coping with stone with inward slope. Coping stone to be secured properly with mechanical fasteners / stone tile adhesive



## TYPICAL DETAILS OF EXPANSION JOINT (AT TERRACE LEVEL)



## Details of Expansion Joints at the interface of lower terrace.



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**Cover of Khurra (Cover shall be made of SS316 instead of MS shown in the Drawing)**

