INDIAN INSTITUTE OF TECHNOLOGY KANPUR
INSTITUTE WORKS DEPARTMENT

Name of Work: **C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**

VOLUME - I

SECTION A	**TECHNICAL BID SECTION B**
	FINANCIAL BID
Part - A	**CONDITION**
Part -B	**GENERAL CONDITIONS AND MATERIAL AND QUALITY ASSURANCE (CIVIL WORK)**

VOLUME-II

Part - C	**ELECTRICAL & LIFT COMPONENT**
Part - D	**FINANCIAL SCHEDULE**
VOLUME-III	**LIST Of DRAWINGS (Architectural, Structural, Plumbing, Fire-fighting, Electrical, & External Development)**

NIT amounting to Rs. 57,22,76,030/- (Rs. Fifty Seven Crores Twenty Two Lacs Seventy Six Thousand thirty Only)

Executive Engineer (C) **Executive Engineer (E)**

Superintending Engineer

Name of work:- **C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**

INDIAN INSTITUTE OF TECHNOLOGY, KANPUR
INSTITUTE WOPRKS DEPARTMENT
CENTRAL OFFICE
Notice Inviting e-Tender - 05/C/D1/2020-21/01

The Superintending Engineer, IWD, IIT Kanpur invites on behalf of Board of Governors of IIT Kanpur invites online percentage rate open bids on Engineering, Procurement and Construction (EPC) Contract basis from eligible/ contractors of repute in two bid system (Eligibility cum Technical bid & Financial Bid) for the following work:-

Sl No.	Name of Work	Estimated Cost	Earnest money	Period of completion
1	**C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**	Rs. 57,22,76,030/- i/c Civil works : 46,23,12,903/- Electrical & Lift works: 10,99,63,127/-	Rs.67,22,760/-	20 Months

Last date & time of submission of bid on 21.07.2020 up to 5.00 PM. All details are available on website, http://eprocure.gov.in/eprocure/app ,www.tenderhome.com &www.iitk.ac.in/iwd/tenderhall.htm. The bids can only be submitted online at https://eprocure.gov.in/eprocure/app. Any corrigendum regarding this tender will be published only on above mentioned websites.

No. 1112 IWD/CO/2020-21/ Dated: 23.06.2020

Superintending Engineer
Phone No. 0512-259-7725

For publication in the news paper:
Indian Express-All India Editions

Section-A

Technical BID
(Eligibility Bid)

Name of work: **C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**

Note:-The intending bidder must read the terms and conditions carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents as required.

INDIAN INSTITUTE OF TECHNOLOGY,
KANPUR INSTITUTE WORKS DEPARTMENT
Notice Inviting e-Tender

The Superintending Engineer, IWD, IIT Kanpur invites on behalf of Board of Governors of IIT Kanpur invites online percentage rate open bids on Engineering, Procurement and Construction (EPC) Contract basis from eligible/ contractors of repute in two bid system (Eligibility cum Technical bid & Financial Bid) for the following work:-

Sl. No.	NIT No.	Name of work & Location	Estimated cost put to bid	Earnest Money	Period of completion	Last date & time of technical & financial bid for online submission	Last date & time for submitting hardcopy of EMD and other documents as specified in the bid documents	Time and date of opening of Technical bid
01	**05/C/D1/2020-21/01**	**C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**	Rs. 57,22,76,030/- i/c Civil works : 46,23,12,903/- Electrical & Lift works: 10,99,63,127/-	Rs. 67,22,760/-	20 Months	Upto 5:00 P.M. on 21/07/2020	Upto 3:00 P.M. on 23/07/2020	At 03:00 P.M. on 24/07/2020

1. **The bidder should carefully read the milestones and conditions.**
2. Contractors who fulfill the following requirements shall be eligible to apply.

Joint ventures and Special Purpose Vehicles are not accepted.

Should have satisfactorily completed the works as mentioned below during the last Seven years ending **previous day of last date of submission of tenders.**

i. Three similar works each costing not less than Rs. **2289.10 Lacs**

OR

ii. Two similar works each costing not less than Rs. **3433.66 Lacs**

OR

iii. One similar work costing not less than Rs. **4578.21 Lacs.**

Similar work shall mean Construction of building in RCC framed structure having minimum one building of five storied (G + 4) or completing balance construction work of

one building (including structural work) minimum up to five storey including Internal water supply, Sanitary installation, Internal Electrical installations all executed under one agreement. The five storied building should have firefighting system or lift or Fire alarm system or HVAC executed under the said agreement.

Note:

I. Mumty and machine room will not be counted as storey for this purpose.
II. For this purpose, stilt constructed in the building shall be considered as a storey.
III. One building of the specified storeys, as mentioned in the definition of similar work constructed in each work of the financial magnitude as specified above.

a) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to the previous day of last date of submission of tenders.
b) Should have had average annual financial turnover of Rs.**2861.38 Lacs** on construction works during the last three years ending 31st March, 2019.
c) Should not have incurred any loss (profit after tax should be positive) in more than two years during the last five years ending 31st March, 2019
d) Should have a solvency of Rs. **2289.10 lacs.**
e) The bidder should not have been barred /black listed by the central/state government, or any entity controlled by it, from participating in any tender, and the bar subsists as on the bid due date, would not be eligible to submit the bid.
f) Should have networth certificate of minimum **Rs.858.41 Lacs** issued by certified Chartered Accountant.

3. The intending bidder must read the terms and conditions carefully. He should submit his bid only if he considers himself eligible and he is in possession of all the documents required.
4. Information and Instructions for bidders posted on website shall form part of bid document.
5. The bid document consisting of Technical (eligibility) & the Financial bid i/c plans, specifications of the items to be executed and the set of terms and conditions of the contract to be complied with contractor whose bid may be accepted and other necessary documents can be seen in the office of the Engineer-in- Charge between hours of 11:00 AM and 4:00 PM **from date of publicity of tender to last date of submission of tender every day** except on Saturday & Sunday and public holidays or can be seen on the above websites.

6. Applicant has to deposit earnest money of **Rs.67,22,760.00** in the form of receipt/ Treasury Challan or Demand Draft or Pay order or Banker's Cheque or Deposit at Call **Receipt or Fixed Deposit Receipt (drawn in favour of Director IIT Kanpur) along with other documents in the office of the Superintending Engineer.**

7. **Earnest Money in the form of Treasury Challan or Demand Draft or Pay order or Banker's Cheque or Deposit at Call Receipt or Fixed Deposit Receipt (drawn in favour of "Director IIT Kanpur") shall be scanned and uploaded to the e-Tendering website within the period of bid submission. The original EMD should be deposited in the office of Superintending Engineer along with PQ documents in separate envelop mentioning "EMD for the work" on 23.07.2020 up to 3.00 PM.**

   A part of earnest money (EM) 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 of any scheduled bank **having validity for six months or more from the last date of receipt of bids** which also is to be scanned and uploaded by the intending bidders.

   Copy of certificate of work experience and other documents as specified in the technical bid/eligibility bid document shall be scanned and uploaded to the e-Tendering website within the period of bid submission. **However, copy (original/self-certified) of all the scanned and uploaded documents as specified in bid document shall have to be submitted by the all bidders on 23.07.2020 up to 3.00, physically in the office of tender opening authority.**

   Online technical bid documents submitted by intending bidders shall be opened only of those bidders whose original EMD deposited and other documents scanned and uploaded are found in order.
   Online financial bid document submitted by the bidders shall be opened only of those bidders who on the basis of pre-qualification documents uploaded by them within the period of bid submission, qualify in accordance with the provision of technical bid. The financial bid shall be opened at the notified time, date & place in presence of qualified bidders or their representative.

8. The intending bidder must have valid class-III **digital signature** to submit the bid.

9. On opening date, the contractor can login and see the bid opening process. After opening of bids he will receive the competitor bid sheets.

10. Contractor can upload documents in the form of **PDF** format.

11. **Certificate of Financial Turn Over:** At the time of submission of bid, contractor has to upload Affidavit/Certificate from **CA** mentioning Financial Turnover on construction work of last 5 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.

12. Contractor must ensure to quote rate for each item. The column meant for quoting rate in figures appears in pink colour and the moment rate is entered, it turns sky blue.
13. **If a tenderer does not quote any rate in any section/sub head in rate tender,the tender shall be treated as invalid and will not be considered as lowest tenderer.**
14. The Technical bid shall be opened first on due date and time as mentioned above. The time and date of opening of financial bid of contractors qualifying the technical bid shall be communicated to them at a later date.

15. Pre bid meeting shall held either in office of superintending Engineer IWD, IIT Kanpur or through vidio conferencing (the V.C details shall be shared on website) at **11.00 AM on 03-07-2020** to clear the doubt of intending bidders/associates, if any. For physical attendance in pre bid meeting only one representative of firm shall be allowed to maintain the physical distance. Bidders are advised to sand their quarries doubts by Email to the Executive Engineer on Email id rakeshkv@iitk.ac.in at least one day prior to the pre-bid meeting. A Bidder can send multiple mails with different quarries/ doubts in each mail. The bidder may also raise query on the date of pre-bid meeting. If found necessary, an issued and same shall be uploaded on the website and on further queries after pre-bid meeting shall be entrained. Such addendum/ corrigendum shall become part of tender document.

16. 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.
17. After submission of the bid the contractor can re-submit revised bid any number of times but before last time and date of submission of bid as notified.
18. **The rates for all items of work, shall unless clearly specified otherwise, include cost of all operations and all inputs of labour, material, T&P, scaffolding, wastages, watch and ward, other inputs, all incidental charges, all taxes, cess, duties, levies, etc. required for execution of the work. The rates quoted shall be without GST. The GST shall be paid extra along with the bills at the prevailing rates.**
19. The bid submitted shall become invalid if:
    i. The bidder is found ineligible.
    ii. **The bidder does not deposit original EMD along with other bid documents in the office Superintending Engineer, IWD IIT Kanpur.**
    iii. The bidder does not uploaded all the documents (including GST registration) as stipulated in the bid document.
    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. If a bidder 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.

20. The contractor have to ensure the all provisions during execution of work for 3 Star GRIHA rating. Nothing extra shall be payable on this account.

21. Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub- soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A bidder shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The bidders shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidders 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.

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

23. The contractor shall not be permitted to bid for works in the IWD in which his near relative is posted as a 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 officer in the Institute Works Department IIT Kanpur.

24. 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.

25. List of Documents to be filled in by the bidders in various forms as indicated in Section III and other documents, to be scanned & uploaded within the period of bid submission and deposited in hard copy:

1.	Treasury challan /Demand draft/Pay order or Banker's Cheque/ Deposit at Call Receipt/Fixed Deposit Receipt of a Scheduled Bank/ Bank Guarantee of any Scheduled Bank against EMD
2.	Letter of transmittal
3.	Certificate of Financial Turnover for the last five years from Charted Accountant **(Form 'A')**.
4.	Bank Solvency Certificate from a Scheduled Bank **(Form 'B')**.
5.	Networth certificate of minimum **Rs. 858.41 Lacs** issued by the a certified Chartered Accountant **(Form 'B1')**
6.	Details of eligible similar nature of works completed during the last seven years ending previous day of last date of submission of tenders **(Form 'C')**
7.	Details of eligible similar nature of ongoing works. **(Form 'C-1')** .
8.	Performance report of works referred to in Form 'C' **(Form 'D')** .
9.	Structure & Organisation **(Form 'E')**.
10.	Details of works in progress or works awarded as on the last date of submission of tenders **(Form 'F')**.
11.	Affidavit **(form 'G')**
12.	Affidavit as per provision of CPWD-6 **(Form 'H')**
13.	Certificate of Registration for GST Or If the agency is not registered with the GST authorities in the state of U.P, then he shall submit and upload a undertaking that If the work is awarded to me, I/we shall obtain GST registration certificate of the state of U.P within one month from the date of receipt of award letter or before release of any payment to me by IWD IIT Kanpur. **Form-'I'**
14.	Copy of Registration of the concern department.
15.	Permanent Account Number (PAN) as issued by the Income Tax Department.
16.	Copy of EPF & ESIC registration.

Superintending Engineer

SECTION- I

BRIEF PARTICULARS OF THE WORK

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

Sl. No.	Name of work	Estimated Cost		Period of completion
1	**C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**	Civil works : Rs. 46,23,12,903/- Electrical & lift Works : Rs. 10,99,63,127/-		20 Months
		Total	Rs. **57,22,76,030/-**	

The work is situated at IIT Kanpur campus of IIT Kanpur (UP).

The scope of the work will be as per section-1, part-B and part-C. In case of any conflict between these components, higher scope of work shall prevail. The decision of the engineer-in-charge shall be final and binding on the contractor.

- **General features and scope of the work:**

(1) The minimum requirement for the work is attached, such as drawings, special conditions, specifications, tender detail finishing schedule & soil investigation report etc. The work is to be executed on Engineering Procurement and construction (EPC) basis. The scope of work includes further development of architectural design structural design, masonry design, plumbing & water supply design, drainage design, IEI design, , lift pressurisation, Fire Fighting System design, Lift, Fire Alarm System design, , LT panels design. For complete detail, the respective sub- heads may be referred.

(2) The execution will be done on the basis of working drawings and further details if required may further developed by the sub consultant (s) appointed by the contractor and such drawings shall be got approved from the Engineer-in-charge. In case the design prepared by the sub consultant based on the various codes and Engineering practices, indicates that the tender drawing/design/detail is extra-safe, on reduction in the detailed parameters of the tender drawing/design/detail shell be permitted. However, in case the design and working drawing developed by the sub- consultant indicates that the existing tender drawing/design/detail is unsafe/inadequate/insufficient and needs to be modified, the same shall have to be done by the contractor within the scope of this work and at extra cost to the Engineer-in charge. All the working drawings and schemes shall be got approved from the Engineer-in-charge based on the CPWD Specifications, relevant IS code, National Building Code 2016 and other standard specifications suitable for Residential building. The latest technology will be followed in general except otherwise mentioned in bidding document.

(3) The design and working drawings shall comply with all the relevant BIS Codes, the NBC, MoRTH specifications, CPWD Specifications, specification for differently abled persons, etc to make the services safe and functional. In case in codes, the NBC MoRTH specifications, CPWD specification etc is not available, the international codes, good Engineering practices and the direction of the Engineering – In- charge shall be followed. The working drawings shall also include the working architectural drawings for the provision of differently abled toilets, double railing differently abled persons, even if such detail has not been shown in the architectural drawing. Necessary design shell be done by the contractor and got approved from the Engineering –in-charge. Any other detail not shown in the drawing but is functionally required as per various BIS,NBC/ GRIHA, differently abled norms etc shall also be provided by the contractor without any extra cost.

(4) The working drawings shall be approved by the Engineer-in-charge or his authorised representative after satisfying himself that the various code have been followed and also that the working drawing comply to sound engineering practices. It shall be ensured by the contractor that the tender drawing which Indicate the minimum requirement of the work has definitely been followed and the design has not been lowered.

(5) The contractor shall be submit the shop drawings of various components for approval of the Engineering in-charge.

(6) The contractor has to design the various components i.e keeping in view the complete requirement of the building as per the attached architectural drawing and the details mentioned in the tender documents.

(7) Building information modeling (BIM) for integration and coordination of all services like plumbing, sanitary, internal Electrical Installations, fire fighting and fire alarm, low side of HVAC, LV services shall be done by the agency.

(8) Construction of the building, in compliance and as per the approved working drawings, tender conditions, CPWD specifications, NBC 2016, MoRTH, GRIHA, differently abled norms, sound Engineering practice, safety norms, etc, All complete to make the building operational. The operational shall also include w.r.t functionality, safety, comfort aesthetics, all complete.

(9) Tactile up to 25 sqm area, wherever required by the Engineering-in charge shall be provided by the contractor and the same shall be within the scope of this work.

(10) The site shall be handed over to the agency on "As & Where It is" basis. It is contractor's responsibility for demolition or disposal of existing structure falling on the footprint of the proposed building , and removal of any existing underground services consisting of water supply and sewer passing through the site etc. if any, at no extra cost and in on extra time period.
If any power supply line / or telephone line is encountered during excavation, the same shall be removed/ shifted by the contractor within one month with the approval Engineer-in charge. No extra time shall be admissible to the contractor for such shifting of the services by the Engineer-in-charge.

(11) The work shall be executed in accordance with the layout plan, architectural, structural, landscape drawings and services drawings on Turnkey basis to completion and handing over in fit condition ready for occupation.

(12) The land is free from encroachment and there is no hindrance to start the work. The agency shall first barricade the site from the adjacent buildings. Demolishing of the existing structures, if any shall have to be done in accordance with CPWD and Environmental norms. Agency shall fix a permanent benchmark at the site of work. Plinth level (where stilt is provided) shall be fixed above the General finished ground level as per drawings and decided by Engineer-in-charge. The data provided in this document are for general guidelines. Changes, if any, would not affect the agreed rates and no claim on this account shall be entertained.

(13) To carry out survey of the site for execution of the project and shall verify the site dimensions as per the site plan provided with bid document/ or made available by Engineer-in-Charge. In case of any discrepancy the same shall be immediately reported to the Engineer-in-charge.

(14) Providing and Erecting 3.00-meter-high temporary barricading of brand-new profile sheet(PPGI sheets) with MS tubular members of appropriate sizes as approved by Engineer-in-charge on the construction site. The contractor shall also cover the site with green hessian cloth (90/10) up to height of 4m from ground level. After completion of work, the contractor will take away all the barricading material.

(15) The Shifting of external services, if any i.e. electrical, water supply, drainage, telephonic line etc shall be shifted by the contractor at no extra cost.

16) The structural drawings shall be issued by Engineer-in-Charge at various stages in advance. After issuance of the structural drawings by Engineer-in-Charge, if any modification in design/drawing is needed, as per site conditions, or otherwise the agency shall do/re-do without any extra cost. The decision of the Engineer-in-charge shall be final and binding. No claim whatsoever will be entertained on this account.

17) Planning, designing wherever required and execution of all internal services like internal sanitary, water supply, drainage system etc. complete for the buildings planned to include all its fittings, fixtures, testing etc. complete is in scope.

18) Execution of all external services like water supply, sewerage, drainage system, roads, paths and all connected sub-structures and superstructures within the premises, as per bye-laws and norms of the local bodies including making connections with the peripheral services after getting the services approved from Engineer-in-charge are the part of the scope.

19) The scope also includes Planning, designing and construction/installation of underground reservoirs, pump houses for water supply, for firefighting tank including installing of pumps, standby pumps as per approved drawings/specifications or as directed by Engineer-in- charge.

20) The Specifications mentioned in the tender will be minimum requirement that the contractor is expected to execute, however, the contractor will submit shop drawings based on his engineering and may be required to go on higher side. Nothing shall be paid extra on this side.

21) 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 10,000 per day for violation of such measures shall be levied. Nothing extra shall be paid for providing and maintaining this facility.

22) The huts for labour are not to be erected at the site of work by the contractors. He is required to make his own arrangements for labour accommodation out of campus with proper sanitation water supply facility for keeping chowkidar, small site office, lab, samples room, toilets for labour etc., working yard and other essential requirements such as cement store for day to day requirement, some space shall be made available inside the site. Before tendering, he shall visit the site and assess the manner in which he is able to arrange the above facilities. The Engineer-in-Charge shall in no way be responsible for any delay on these accounts and no claim, whatsoever, on these accounts shall be entertained.

23) The agency shall have to make its own arrangement for water .The location of bore shall be provided by the IIT Kanpur after approval from Engineer -in –charge.

24) Landscaping plan including parks, planters and other details etc. as per concept/ landscape layout prepared by consultant, including parks, planters, plantation, street formation and other details for the horticulture works and execution of same therein. Development of parks, construction of its toe wall, providing railings, wicket gates, etc. Shall be completed as per the specification and drawing approved by the Engineer-in-charge.

25) Complete leveling/dressing including filling of earth, its supply, disposal of surplus earth is to be completed as directed by the Engineer-in-charge.

26) Taking all precautionary measures to safeguard safety measures against any accidents for the agency's employees, labour, public, and institute Engineers by providing all necessary safety equipment, helmets etc. at work site.

27) Defect Liability Period would be 03 years from the date of completion i.e. declaring building fit for occupation by Engineer-in-charge.

The Agency shall construct/provide one site office (semi-permanent structure) with modern outlook and having Air Conditioning, for use by Engineer-in- charge and his staff consisting of 1 room with toilet (not less than 40 sqm) and one conference Room with toilet having area not less than 50 Sqm for IWD officers & staff. The location and plan shall be got approved from Engineer-in-Charge. Specification for the site office shall be suitable and matching for running an office which shall be got approved from Engineer-in- charge. The Agency shall provide a typical plan of site office & conference room (having light fixtures, wiring &, AC etc.) with specification within 15 days of award of work and shall construct after approval of Engineer-in- Charge. All running cost & charges (i/c one office

attendant, one data entry operator and AMC etc.) for office including Electricity bill, water supply bills, RO/drinking water bills etc. shall be provided and cost shall be borne by the agency.

28) The agency shall provide the following furniture (new) for use of IWD staff at site office and will take them away these items after completion of work.

	Articles	Quantity
	Office Tables	3 Nos.
	Office Chairs	3 Nos.
	Steel Almirah (Big)	3 Nos.
	Visitor chairs	6 Nos.

29) The scope as described above is only indicative and not exhaustive. In additions to the above the agency shall be responsible for executing all the items required for completing the building in all respect to make the building habitable and ready for occupation with Electrical, future provisioning for HVAC and horticultural works complete as per direction of Engineer-in-charge.

30) The above scope of work includes cost of all materials, manpower, equipment's, T&P fixtures, accessories, royalties, all taxes **(EXCLUDING GST)** watch & ward till handing over the complete premises to the department and all other essential elements for completion Any change, modification, revision etc. required to be done by INSTITUTE , CFO, local bodies, proof consultants etc. in accordance with applicable standards and bye- laws will have to be done at agency's cost and nothing extra shall be payable.

31) External Bulk Services with detailed planning and execution upto completion for Water supply, 2. Sewerage system, 3. Storm water drains, 4. Boundary wall and gates, 5. Underground water tanks, 6. Roads, 7. Paths, 8. Horticulture, 9. Street furniture, differently able person friendly corridors, Landscape as per green area norms are in the scope of work.

32) Detailed planning and execution to complete for Hall of residence #15 including internal & external works , Plumbing , Fire Fighting , Fire Alarm System , HVAC(only required works for future provisioning) ,Internal and External Electrification work including providing and fixing of CC TV wiring ,Lifts ,Water tanks , sump well , internal C.I. water pipe lines, sewer lines, storm water lines, Landscape , Internal Roads and Path , Boundary Wall ,Main Gate and any other essential services as per requirement of the Engineer-in-charge and also required for satisfactory completion of project etc. are within the scope of work.

- **Local Body Approvals Including Fire NOC**

- The contractor shall be solely responsible for obtaining fire clearance from competent authority before beginning of construction and then getting final

NOC to operate the building from the same authority after construction. Since the building and staircases are open, there are no fire doors provided in the design, but if during the process of approval, fire officer insists for fire doors, the cost of providing these shall be deemed to have been included in the bid amount.

- Approvals/NOC/permissions etc if any other than mentioned above shall be obtained by the contractor at his own level.

	Details	Remarks
	Department of Fire services (DFS)	Case is being submitted to DFS. Contractor has to pursue and obtain provisional and final approval from the fire department.

Misc activities to be performed by the contractor

- Erecting one site office of 40 Sqm with inbuilt "folded drawing"/file storage space, drawing display provision and writing desk. The space should also be capable of being used for meeting and mini conference at site for use of the Engineer-in-charge for 15 persons meeting /conference.

- One licensed latest version of Software -- "PRIMAVERA", to be provide by the contractor to the Engineer- in- charge, along with organizing training regarding use of above of mentioned Software for Site Engineers & CPWD Engineers.

The proposed building is RCC framed structure.

There are seven blocks in the building. Out of which three blocks are Stilt + 5 storied and four blocks are stilt + 6 storied with RCC framed structure having Column footings, Columns/ Shear Walls, Beams, Slabs construction using M25/M30/M35 Grade of Concrete. It has Brickwork/AAC block on the external, and in the internal walls of the building. The external faces of the complete building i.e all the elevations shall be completed/finished (i.e. texture paint, terra-cotta Jaali cladding, in staircase one side exposed finish reinforced concrete wall railing and on other M.S. railing upto terrace level (i.e in all blocks of the building) as per the drawing and as per the tender condition. The internal plaster and the external plaster on walls and ceiling including necessary finishing works shall be completed for the complete building upto the terrace level. The terrace shall be completed with Brick bat coba water proofing treatment as per drawings. The landscape, internal roads & pathways etc. shall be completed**.**

Floor wise areas are as under:

S. No.	Floor	Plinth Area (sq.m.)	Facilities
1	Level 1	2401.32	Entrance Lobby, Warden Room, Visitors Rooms, Clock Room , Meeting Room ,2nos. Laundry Area, Bicycle parking Areas , Shops ,Electrical Room , pump Room and Security Room 6 nos. of Lift , 8 no's Staircase, Service Shaft.
2	Level 2	2731.25	71 Single Seater Rooms, 31 Double Seater Rooms, 4 no's Differently Abled Toilet. 8 nos. Staircase, Common Toilets. 3 passenger lifts and 3 nos. Service lift , Service Shaft.
3	Level 3	2731.25	71 Single Seater Rooms, 31 Double Seater Rooms, 8 nos. Staircase, Common Toilets. 3 passenger lifts, Breakout Space and 3 nos. Service lift, Shaft Shaft.
4	Level 4	2752.70	71 Single Seater Rooms, 31 Double Seater Rooms, Connecting Corridors, 8 nos. Staircase, Common Toilets, Breakout Space, 3 passenger lifts and 3 nos. Service lift, Connecting Corridors, Service shaft .
5	Level 5	2752.70	71 Single Seater Rooms, 31Double Seater Rooms, Corridors ,8 nos. Staircase, Common Toilets, Breakout Space, 3 passenger lifts and 3 nos. Service lift, Connecting Corridors, Service shaft.
6	Level 6	2752.70	71Single Seater Rooms, 31 Double Seater Rooms, 8 nos. Staircase, Common Toilets. 3 passenger lifts and 3 nos. Service lift, Connecting Corridors
7	Level 7	1531.48	40Single Seater Rooms, 19 Double Seater Rooms, 8 nos. Staircase, Common Toilets, Breakout Space, 3 passenger lifts and 3 nos. Service lift, Connecting Corridors and Terrace, 3 nos. Domestic Water Tank , 3 nos. Treated Water tank, Mummty Shaft
8	Terrace	-	4 nos. Domestic Water tank, passenger lifts and service lift roof and 3 nos. Fire Fighting Tank ,4 nos. Treated water tank Mummty , service shaft .
	Total	17653.35	

The mumty, Lift machine room& RCC overhead water tank will not be counted as story. It shall not be considered for plinth area calculation.

a) Only 50% of the area of the verandahs & porch has been considered in plinth area calculation irrespective of top being protected or not protected above.

b) Plinth area does not include shafts open to sky above 2 sq.m. area. However, the shafts/ lift wells covered at top shall be counted at one floor level only.

The work should be executed as per drawing, schedule of finishes, schedule of hardware, latest CPWD Specifications, relevant IS codes of latest edition and other standard specifications except otherwise mentioned in bidding document.

This document is to be read in conjunction with other documents issued by the Institute along with tender. In case of any discrepancy between design drawings and CPWD conditions, the decision of Engineer-in- Charge shall be followed. The Contractor shall refer the drawings while bidding and will read them in conjunction with specifications/ schedules, etc.

The work shall be strictly carried out in accordance with the specifications. The equipment & material supplied at site will also be selected out of the list of approved makes. The contractor shall submit technical documentation for the shortlisted make of material/ equipment, as well as prepare shop drawings for various items/ works, as required for

proper execution, whether the same have been indicated in drawings or not. Actual execution shall be based on shop drawings & documents approved from Institute representative. Nothing extra shall be payable on account of items required to be executed as per approved shop drawing.

The contractor shall be required to demonstrate satisfactory operation of entire system (including equipments supplied by Client and installed by contractor) and furnish required labour, material & tools to install & commission the system/s.

Contractor shall also be required to undertake the following, for which nothing extra shall be payable:

- Liasioning and obtaining approval from Local Authorities prior & post installation for operation of equipments (lifts, panels, fire systems, etc.)
- Commissioning of the plant including test reports to demonstrate satisfactory working prior to handing over.
- Provide as-built drawings and handing over document comprising of list of recommended spares, catalogues and service schedule for each equipment/material
- Training of Client's staff
- The executed work shall strictly confirm to applicable laws, regulations and Indian Standards which become applicable. In case the specifications and drawings contained in this document call for higher standard than those required by prevailing regulations, then these specifications & drawings shall become applicable. However, in case of any conflict or violation between the document/drawings and prevailing laws, then the applicable laws & regulations shall be governing & binding

Following shall be the procedure followed by contractor while preparation of shop drawings:

- The contractor shall refer the design drawings for understanding the scope and proposed routes to be followed during execution.
- collect latest architectural backgrounds from the Client representative.
- Examine all related works/ services drawings but not limited to structural, finishes, plumbing, electrical, HVAC and others including as-built works before starting the work. Any discrepancy must be reported to the Client's site representative in writing and obtain approval for go-ahead.
- Within one week of award of work, the Contractor shall prepare a list of shop drawing along with submission schedule for approval of Institute representative. The list of drawings must include layouts for all steel work, aluminium work, structural glazing, glass railing, space frame, electrical panel rooms, lighting, power, cable, cable tray layouts, earthing, lightning protection, SLD, lifts, typical drawings showing exact location of supports, bends, tee connections, reducers, detailed drawings showing exact location and type of supports, fittings etc; electrical panels inside/outside views, power and control wiring schematics, cable trays, supports and terminations.

Maximum headroom shall be maintained at all points and in case the same is inadequate, then written approval from Institute representative must be obtained prior to execution at site.

Ceramic/ Vitrified, stone/ tile dado and panelling, shall be executed at site by the Contractor in symmetrical pattern as far as possible.

These shop drawings shall depict information required to complete the Project as per specifications and as required by the Institute representative. These shop drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all items of equipment/materials/works.

- The contractor shall thereafter furnish six sets of detailed shop drawings to Institute representative for obtaining comments/approval. The Contractor will make unlimited number of re-submissions of shop drawings unless Institute representative approval is obtained.
- The Contractor will thereafter submit six sets of final shop drawings to the Institute representative for their exclusive use and all other agencies.

- No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/ equipment/ installation.
- In case installation is carried out without following above process or obtaining a waiver to follow the procedure from Institute representative, the work shall be rejected, and contractor shall rectify the same at their own cost.
  Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the
  contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract. The contractor prior to supplying material at site will submit the following documentation to Consultant/ Client representative for approval:

- Manufacturers' drawings, catalogues, pamphlets and other documents in triplicate. Each item shall
  be properly labeled, indicating the specific services/ works for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted
- Samples of all materials shall be submitted to the Institute representative prior to procurement.
  These will be submitted in two sets for approval and retention by Client's representative and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed, a mock-up or sample installation shall be carried out for approval before proceeding for further installation.

The contractor to ensure that all materials and equipment supplied shall be new and of best available quality conforming to the relevant Indian Standard Specifications and to these specifications. Makes shall be strictly in conformity with list of approved manufacturers/ vendors as provided herein. The Institute reserves the right to reject any item which in their assessment is second hand or of inferior quality/ make.

Electrical works:

The Scope of various Electrical services works covering the complete building is described briefly hereunder. The scope of work shall include the systems as described below and in the respective subheads, in complete respect with full functionality, compliances to the tender, local body requirements, drawings etc as required:

Internal Electrical Installations:

Planning, designing, supply, installation, testing and commissioning of complete Internal and External Electrical Works which includes copper wiring in steel conduit, LED luminaires, fans, modular switches, sockets, DBs, MCBs, RCCBs, UPS, raceways, earthing, lightening arrestor, cable TV wiring in steel conduit, steel conduit for Lan/Wifi, street light, compound light and landscape lights etc. complete as required.

Description of Points	Single seater	Double seater	Corridor
6 Amp. 3Pin Moduler Outlet for Fan Coil Unit	1	1	
6 Amp. 3Pin Moduler Outlet for Reading Lamp	1	2	
6 Amp. 3Pin Moduler Outlet for Computer Point	2	4	
6/16 Amp. 6Pin Modular Power Outlet	1	1	1
DATA/LAN Outlets	1	2	
Fans	1	1	
LED Lights	1	2	
Wi-Fi			As per requirement.

LT Distribution:

Planning, designing, supply, installation, testing and commissioning of complete Works which includes Main LT Panel, Distribution Panels, Fire Emergency Panels, other related works like cabling, earthing etc. complete as required. Statutory clearances wherever required will have to taken by the contractor.

LT Distribution also include cabling work from Exiting campus substation to main LT panel room.LT Panel having two nos. incomer of 800A 4P ACB(1W+1S) with 800A Bus coupler,1600A Al.Bus Bar

The Main LT Panel (Normal Supply)& Main DG Panel are located within LT Panel room at ground near entry gate.

- Each block shall have 2 Nos. Sub-Distribution Panels (1 No. Normal Supply Panel + 1 No. DG Supply Panel.
- Each floor shall have separate TPN DBs and Provision of Meter panel in Future.
- Each room shall have8 way SPN DB With Separate circuit fed from Floor TPN DBs. Separate circuit is provided for FCU power outlet to avoid any disturbance in other circuits.
- Emergency supply only provided to staircase and lifts.
- Fire escape staircases provided with uninterrupted power supply system.

Fire Alarm System:

Supplying, installation, testing & commissioning of Automatic Intelligent Addressable Fire alarm system. It shall be as per NBC 2016, CPWD specifications and Local bylaws and as per approval of Local Fire Service authorities. The work shall also include planning, designing, preparing drawings and getting the drawings approved from the Engineer-in-Charge and its subsequent execution. Scope of work also includes integration of Automatic Intelligent Addressable Fire alarm system provided in the building as per NBC 2016 requirements to the main control room located inside the building in Block B1. Statutory clearances wherever required will have to taken by the contractor.

Lifts:

The scope of work for Lifts includes planning, designing, supplying, installation, testing & commissioning of

- 3 Nos. 16 Passenger Lifts serving all the floors (G+6)
- 1 Nos. 16 Passenger Lifts serving all the floors (G+5)
- 3 Nos. 8 Passenger Lifts serving all the floors (G+6)
- 1 Nos. 8 Passenger Lifts serving all the floors (G+5)

Statutory clearances wherever required will have to taken by the contractor.

UPS:

Supply, installation, testing and commissioning of 3kVA, 1 Phase input and 1Phase output UPS along with lead acid batteries giving a back up of min. 15-20min provided in each block for staircase emergency lighting.

Emergency supply:

Provision of emergency supply is to be provided only for staircase and Lifts

CCTV and Security System:

Scope of work includes only supply and fixing of CCTV conduit.

LAN/Wi-Fi:

Supply & Fixing of conduit & Cat-6 outlet for LAN / Wifi. Points provided per room shall be as under:

- 1 Nos.LAN point in single seater room

- 2 Nos. LAN points in Double seater room
- Wi-Fi Point in Corridors.

Lightning Protection:
Supply, Installation and Commissioning of External LPS- Lightning Protection System shall comply with IEC 62305/IS 2309/IS 3043. Drilling or welding is not permitted as explained in IEC 62305.

HVAC Works:
The required provisions for making this Hall of Residence No - 15 as air cooled Hall in future such as fixing of sleeves of required diameter for passing Air-Conditioning supply and drain out pipes through RCC/ Brick work in corridors and rooms of the blocks shall have to be fixed by the contractor during the progress work. The shop drawing for fixing of sleeves, if required shall be provided during the execution of work by the Architect.

SECTION- II
INFORMATION & INSTRUCTIONS FOR BIDDERS

General:

1.1 The Indian Institute of Technology, Kanpur, is an institution of national importance has decided to construct "**: C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.).**

1.2 This is a very prestigious and a time bound project shall be monitored by the MHRD.

Important Note: The construction conditions and milestones of this NIT have been specifically drafted to complete the project in time.

1.3 Letter of transmittal and forms for deciding eligibility are given in Section III.

1.4 All information called for in the enclosed forms should be furnished 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. Even if no information is to be provided in a column, **a "nil" or "no such case"** entry should be made in that 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 by telegram or telex and those received late will not be entertained.

1.5 The bid should be type- written. The bidder should sign each page of the application.

1.6 Overwriting should be avoided. Correction, if any, should be made by neatly crossing out, initialing, dating and rewriting. Pages of the eligibility criteria document are numbered. Additional sheets, if any added by the contractor, should also be numbered by him. They should be submitted as a package with signed letter of transmittal.

1.7 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 or equivalent

1.8 The bidder may furnish any relevant 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.

2 Definitions:

2.1 In this document the following words and expressions have the meaning hereby assigned to them.

2.2 **Employer:** Means the Board of Governors, IIT Kanpur, through the **Superintending Engineer, IWD IIT Kanpur**.

2.3 **Bidder:** Means the individual, proprietary firm, firm in partnership, limited company private or public or corporation.

2.4 **"Year"** means "Financial Year" unless stated otherwise.

3 Method of application:

3.1 If the bidder is an individual, the application shall be signed by him above his full type written 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 later 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 duly attested by a Public Notary.

4. **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. **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. **Site visit**
The bidder is advised to visit the site of work, at his own cost, and examine it and its surroundings to himself collect all information that he considers necessary for proper assessment of the prospective assignment.
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 these employees stating clearly how these would be involved in this work within **15 days of award of work**.

7. **Initial criteria for eligibility**

7.1 Bidder should have satisfactory completed works during the last seven years ending previous day of last date of submission of tenders. For this purpose cost of work shall mean gross value of the completed work. This should be certified by an officer not below the rank of Executive Engineer / Project Manager or equivalent.

(i) Three similar works each costing not less than Rs. 2289.10 lacs

OR

(ii) Two similar works each costing not less than Rs. 3433.66 lacs

OR

(iii) One similar work costing not less than Rs. 4578.21 lacs.

Similar work shall mean the work of Construction of building in RCC framed structure having minimum one building of five storied (G + 4)or completing balance construction work of one building (including structural work) minimum up to five storey including Internal water supply, Sanitary installation, Internal Electrical installations all executed under one agreement. The five storied building should have firefighting system or lift or Fire alarm system or HVAC executed under the said agreement.

Note:

I. Mumty and machine room will not be counted as storey for this purpose.
II. For this purpose, stilt constructed in the building shall be considered as a storey.
III. One building of the specified storeys, as mentioned in the definition of similar work constructed in each work of the financial magnitude as specified above.

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

The bidder should have had average annual financial turn over (gross) of **2861.38 lacs** on Civil/Electrical construction work during the last three consecutive years **balance sheets duly audited by Charted Accountant.** Year in which no turnover is shown would also be considered for working out the average.

7.2 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,** duly certified **and audited** by the Chartered Accountant.

7.3 The bidder should have a solvency of Rs. **2289.10 lacs** certified by his Bankers

7.4 The bidder should have incurred any loss (profit after tax should be positive) in more than two years during available last five consecutive balance sheets, duly certified and audited by the Charted Accountant. The balance sheet in case of Private/Public limited company shall include its standalone finance statement and consolidated financial statement both.

7.5 Should have the calculated bidding capacity equal to or more than the estimated cost of the work. The bidding capacity shall be = (2*N*A-B), where

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

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

B= Value of the existing commitments and ongoing works.

8. **Evaluation criteria**

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

8.2 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.

8.3 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 and on the basis of inspection of ongoing and completed work carried out by the scrutiny committee duly constituted the Director, IIT Kanpur.

(a) Financial strength **(Form 'A' 'B' & B1)**	Maximum 20 marks
(b) Details of eligible similar nature of works completed during the last seven years ending previous day of last date of submission of tenders **(Form'C' & 'C1')**	Maximum 20 marks
(c) Performance on works **(Form 'D') – Time over run**	Maximum 20 marks
(d) Performance on works **(Form 'D' & 'D-1') – Quality**	Maximum 40 marks
	Total 100 marks

To become eligible for short listing the bidder must **secure at least fifty percent marks in each (section a, b, c & d) and sixty 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 on the basis of inspection of ongoing and completed work carried out by the scrutiny committee duly constituted by the Director, IIT Kanpur of the eligible similar works given in FORM -C.

Note:- 2 Performance of works for ongoing works shall be done by selecting not more than any two ongoing works from the list given in FORM-C1.

9. **Evaluation of performance**
Evaluation of the performance of contractors for the eligibility shall be done by the scrutiny committee. All the eligible Similar Works executed and submitted by the bidders may be got inspected by the committee. The marks for the quality shall be given based on this inspection, if inspection is carried out. Scoring method of evaluation: The scoring for evaluation mentioned in these columns shall be done as given in **Annexure-1.**

10. **Financial information**

Bidder should furnish the following financial information:
Annual financial statement for the last five year in (**Form "A")** and solvency certificate in (**Form "B") and net worth certificate in Form 'B1'**

11. **Experience in works highlighting experience in similar work** Bidder should furnish the following:

a.) List of eligible similar nature of work successfully completed during the last seven years in (**Form "C**") and ongoing works as well in (**Form-C-1**).

b.) Performance report of works referred in form "C" (In **Form "D**") signed by officer not below the rank of Executive Engineer /Project Manager or equivalent. The performance report should explicitly mentioned that "Construction of building in RCC framed structure having minimum one building of five storied (G + 4)or completing balance construction work of one building (including structural work) minimum up to five storey including Internal water supply, Sanitary installation, Internal Electrical installations all executed under one agreement. The five storied building should have firefighting system or

lift or Fire alarm system executed under the said agreement." **It should also mentioned that the stories mentioned are a excluding the machine room and mummty.** The detail shall also specify, whether or not the work contains fire fighting system or lift or fire alarm system in the said agreement and shall mentioned the services executed and included in the agreement.

12. **Organization information**

Bidder is required to submit the information in respect of his organization in Form "E".

13. **Letter of transmittal**

The bidder should submit the letter of transmittal attached with the document.

14. **Opening of Price bid**

After evaluation of Pre-Qualification Documents, a list of short listed agencies will be prepared. Thereafter 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 **90 days from the date of opening of technical bid.**

15. **Award criteria**

15.1 The employer reserves the right, without being liable for any damages or obligation to inform the bidder, to:

a. Amend the scope and value of contract to the bidder.
b. Reject any or all the applications without assigning any reason.

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.

SECTION- III

INFORMATION REGARDING ELIGIBILITY LETTER OF TRANSMITTAL

From

To,

The Superintending Engineer
IWD IIT Kanpur
Kanpur.

Subject: **C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**

Sir,

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

1. I/ we hereby certify that all the statement made and information supplied in **the enclosed forms A to I** 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 solvency certificate and authorize the **Superintending Engineer, IWD IIT Kanpur** to approach the bank issuing the solvency certificate to confirm the correctness there of. I/ we also authorize **Superintending Engineer, IWD IIT Kanpur** to approach individuals, employer, firms and corporation to verify our competence and general reputation. I/we submit the following certificates in support of our suitability technical knowledge and capability for having successfully completed the following eligible similar work:

SI.NO	Name of work	Certificate from
1.		
2.		
3.		

Certificate:

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

Seal of bidder

Enclosures:

Signature (s) of Bidder (s).

Date of submission:

FORM 'A'

FINANCIAL INFORMATION

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

Years

Year	2014-15	2015-16	2016-17	2017-18	2018-19
Gross Annual turnover on construction works(in lacs)					
Profit / Loss.(in lacs)					

Note –: 1 The bidder should give information strictly in above format.

Note -:2 The balance sheet in case of private/public limited company shall include its standalone finance statement and consolidated financial statement both.

Signature of Chartered Accountant (with Seal) **Signature of Bidder(s).**

Membership No. ICAI

FORM "B"

FORM OF BANKERS' CERTIFICATE FROM A SCHEDULED BANK

This is to certify that to the best of our knowledge and information that M/s./Sh ……having marginally noted address, ……

……..a customer of our bank are/is respectable and can be treated as good for any engagement upto a limit of Rs……(Rupees……

……..). This certificate is issued without any

guarantee or responsibility on the bank or any of the officers.

(Signature)

For the Bank

NOTE:

(1) Bankers certificates should be on letter head of the Bank, addressed to tendering authority.
(2) In case of partnership firm, certificate should include names of all partners as recorded with the Bank.
(3) Solvency certificate should not be more than 6 months old.

FORM "B1"

FORM FOR CERTIFICTE OF NET WORTH FROM CHARTERED ACCOUNTANT

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 01.04.2019 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 01.04.2019."

Signature of Chartered Accountant

.....
Name of Chartered Accountant
.....
Membership No. ICAI

Date and Seal

FORM 'C'

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

S. No	Name of work/project and location	Owner of sponsoring organization	Cost of work	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	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.

Signature of Bidder(s)

Note: The agency should give list of only those eligible works which are of **'SIMILAR NATURE'**.

FORM 'C-1'

PROJECTS UNDER EXECUTION

(Works with estimated cost put to tender more than Rs. 20.00 Crore)

Sl No.	Name of work/project and location	Owner of sponsoring organization	Cost of work in Lacs of Rupe e s	Date of commencement as per contract	Stipulated date of completion	Upto date percentage progress of work	Slow progress if any and reasons thereof	Name and address /telephone number of officer to whom reference to 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 correct to my/ our knowledge and belief.

Signature of Bidder(s)

WITH STAMP & SEAL

FORM 'D'

PERFORMANCE REPORT OF WORKS REFERRED TO IN FORMS "C"

1. Name of work/project & location
2. Agreement no.
3. Estimated cost
4. i Tendered cost

ii Value of work done

5. Date of start
6. Date of completion
7.

i. Stipulated date of completion

ii. Actual date of completion

8. Whether case of levy of compensation for delay has been decided or not Yes/No

If decided, amount of compensation levied for delayed completion, 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 Behaviour	Outstanding/Very Good/Good/Poor

Dated: **Executive Engineer or Equivalent**

Note: If Name of Work is not clearly defining scope of work as specified in the definition of similar work, bidders are advised to upload copy of Agreement/ final bill or any other relevant document in support of their proposed completed work conforming to the definition of similar work.

FORM 'D-1'

Assessment of Quality for Completed as well as Ongoing Works

Name of work :
Date of Inspection :
Date of submission of report:

A. General observations & Operational Aspects	Yes/No
2. Availability of approval from local bodies in case of Construction of Private Buildings.	
3. Availability of approved structural drawings.	
4. Observation on seepage/leakage in the building.	
5. Whether Line & level maintained.	
6. In case of basement, observation on seepage, if any.	
7. Any Structural defects/ distress observed, if yes give details.	
8. Whether safety measures adopted at site as per CPWD safety code of Govt. guidelines are adequate or not.	
9. Whether the welfare facilities provided to labour as per Clause- 19H of GCC for CPWD works / and or Govt. guidelines are adequate or not	
1). Whether AHU getting automaticly switched off and fire damps closed in case of fire signal	
11. Whether thimbles used for termination of wires in DBs, EBDs and panels	
B. Quality of work	**Marks Assessed**
1. Quality of plaster / finishing	
2. Quality of RCC / CC work	
3. Quality of Flooring	
4. Quality of Wood Work	
5. Quality of Steel work / Aluminium Work	
6. Qualityof Plumbing and Sanitary Installation	
7. Quality of Workmanship	
8. Quality of Water Proofing	
9. If cladding done, observation on efficiency / quality of cladding / brick work	
10. Quality of internal electrification work	
11. Quality of DBs, EBDs & Panels	
12. Quality of E&M equipments, panels & feeder pillar	
13. Quality of Fire alarm system / fire fighting system	
14. Quality of Air Conditioning work	
15. Quality of Substation based on complete live diagram, capacitor panel, power factor, insulating mat, cleanliness, cable termination, earthing pits, earthing of transformer / DG sets	
16. Any other aspect (To be elaborated)	

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

Note:-

1. All the above parameters may be considered for assessing the overall quality of work executed by the contractor.
2. In case, any attribute is not applicable, the same may not be included in assessment and mentioned are not applicable (N/A)
3. The works as assessed above shall be converted on a scale of 25/15 marks for completed/ ongoing works respectively.
4. In case of eligible completed works as well as ongoing works being more than one the maximum marks assigned for completed works and ongoing works will be equally distributed among the work

FORM "E"

STRUCTURE & ORGANISATION

1. Name & address of the bidder
2. Telephone no./Telex no./Fax no.
3. Legal status of the bidder (attach 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 (attach attested photocopy)

Organisation/Place of registration	**Registration No.**
(a).	
(b).	
(c).	

5 Names and titles of Directors & 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 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 of Bidder(s)

FORM "F"

List of the Projects under execution or awarded

Sl. No.	Name of work / project and location	Owner or sponsoring organization	Cost of work in Lacs of rupees	Date of commencement as per contract	Stipulated date of completion	Upto date percentage progress of work	Slow progress if any and reasons there of	Name and address / telephone , no. of officer to whom difference may be made	Remarks
1	2	3	4	5	6	7	8	9	10
1.									
2.									

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

Signature of bidder/s

FORM "G"
AFFIDAVIT

I / We undertake and confirm that our firm / partnership firma gas not been blacklisted and or debarred 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 IWD, in future forever. Also if such information comes to the notice of the department on any day before date of start of the work, the Engineer-in Charge shall be free to cancel the agreement and to forfeit the entire amount of earnest money deposit / performance guarantee.
I/We under take and confirm that I / We have not abandoned any of the work entrusted to me / us nor any of the work entrusted to me / us have been rescinded by any of the central / state government department, undertaking auto nomous institutions, agencies, societies, enterprises, and companies during the last 7 years ending previous day of last date of submission of bid. Further that, if such information comes to the notice of the department then I / We shal be debarred for bidding in the IWD in future forever. Also, if such information comes to the notice of the department. Also if such information comes to the notice of the department on any day before date of start of the work, the Engineer-in Charge shall be free to cancel the agreement and to forfeit the entire amount of earnest money deposit / performance guarantee.

Note: Affidavit to be furnished on a non judicial stamp paper worth Rs.10/-
(Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid)

Signature of bidder's
or authorized officer of the firm with stamp

FORM "H"

Affidavit as per provision of CPWD-6

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 IWD, IIT Kanpur 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 Bidder(s) or an authorized Officer of the firm with stamp

Signature of Notary with seal

FORM "I"

Undertaking regarding obtaining GST registration Certificate of The State, in which work is to be taken up

lf work is awarded to me, I/we shall obtain GST registration Certificate of the State, in which work is to be taken up within one month from the date of receipt of award letter or before release of any payment by IWD, IIT Kanpur whichever is earlier, failing which I/We shall be responsible for any delay in payments which will be due towards me/us on a/c of the work executed and/or for any action taken by Institute or GST department in this regard.

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

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

Signature of Notary with seal

ANNEXURE- 1

CRITERIA FOR EVALUATION OF THE PERFORMANCE OF CONTRACTORS FOR PRE-ELIGIBILITY

	Attributes	Evaluation	
(a)	Financial strength **(20 marks)**		
	(i) Average annual Turnover **16 marks** **(ii)** Solvency Certificate **2 marks** (iii) Net Worth certificate **2 marks**	(i) 60% marks for minimum eligibility criteria (ii) 100% marks for twice the minimum eligibility criteria or more In between (i) & (ii) – on pro-rata basis	
(b)	Experience in similar class of works **(20 marks)**	(i) 60% marks for minimum eligibility criteria (ii) 100% marks for twice the minimum eligibility criteria or more In between (i) & (ii) – on pro-rata basis	
(c)	Performance on works (time over run) **(20 marks)**		
	Parameter Calculation For points	Score	Maximum Marks
	If TOR = 1.00 2.00 3.00 >3.50 (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		20

TOR = AT/ST, where AT=Actual Time; ST=Stipulated Time in the agreement plus (+) justified period of extension of time

Note: Marks for value in between the stages indicated above is to be determined by straight line variation basis.

(d)	**Performance of works (Quality) as per assessment in Form- 'D-1' (40 Marks)**		
	Completed Works (Maximum 25 Marks)	**Ongoing works (Maximum 15 Marks)**	**Total Marks Assessed**

SECTION-B

PART-A

FINANCIAL BID

INFORMATION AND INSTRUCTIONS FOR BIDDERS FOR e-TENDERING FORMING PART OF BID DOCUMENT AND TO BE POSTED ON WEBSITE

The Superintending Engineer, IWD, IIT Kanpur invites on behalf of Board of Governors of IIT Kanpur invites online percentage rate open bids on Engineering, Procurement and Construction (EPC) Contract basis from eligible/ contractors of repute in two bid system (Eligibility cum Technical bid & Financial Bid) for the following work:-

Sl. No.	NIT No.	Name of work & Location	Estimated cost put to	Earnest Money	Period of completion	Last date & time of technical & financial bid for online	Last date & time for submitting hardcopy of EMD and other documents as specified in the bid	Time and date of opening of Technical bid
1	**05/C/D1/2020-21/01**	**C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**	Rs.57,22,76,030/- i/c Civil works : 46,23,12,903/- Electrical & lift works: 10,99,63,127/-	Rs.67,22,760/-	20 Months	Upto 5:00 P.M. on 21/07/2020	Up to 3:00 P.M. on 23/07/2020	At 3:00 P.M. on 24/07/2020

1. The intending bidder must read the terms and conditions of CPWD-6 carefully. He should only submit his bid if he consider himself eligible and he is in possession of all the documents required.
2. Information and Instructions for bidders posted on website shall form part of bid document.
3. The bid document consisting of plans, specifications 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 www.iitk.ac.in/iwd/tenderhall.htm, https://eprocure.gov.in/eprocure/app & www.tenderhome.com. But the bids can only be submitted online on https://eprocure.gov.in/eprocure/app.

4. Those contractors not registered on the website mentioned above, are required to get registered beforehand. If needed they can be imparted training on online bidding process as per details available on the website.
5. The intending bidder must have valid class-III digital signature to submit the bid.
6. On opening date, the contractor can login and see the bid opening process. After opening of bids he will receive the competitor bid sheets.
7. Contractor can upload documents in the form **PDF** format.
8. **The rates for all items of work, shall unless clearly specified otherwise, include cost of all operations and all inputs of labour, material, T&P, scaffolding, wastages, watch and ward, other inputs, all incidental charges, all taxes, cess, duties, levies, etc. required for execution of the work. GST shall be paid extra along with the bills at the prevailing rates.**
9. Contractor must ensure to quote rate for the work. The column meant for quoting rate in figures appears in pink colour and the moment rate is entered, it turns sky blue.

If a tenderer does not quote any rate in any section/sub head in rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

Superintending Engineer

CPWD-6 FOR e-Tendering

The Superintending Engineer, IWD, IIT Kanpur invites on behalf of Board of Governors of IIT Kanpur invites online percentage rate open bids on Engineering, Procurement and Construction (EPC) Contract basis from eligible/ contractors of repute in two bid system (Eligibility cum Technical bid & Financial Bid) for the following work:-

C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrical Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

1. The work is estimated to cost **Rs. 57,22,76,030.00**. This estimate, however, is given merely as a rough guide.
2. Contractors who fulfill the following requirements shall be eligible to apply. **Joint ventures and Special Purpose Vehicles are not accepted.**
   Should have satisfactorily completed the works as mentioned below during the last seven years ending **previous day of last date of submission of tenders.**

   (i) Three similar works each costing not less than Rs.2289.10 lacs
   OR
   (ii) Two similar works each costing not less than Rs. 3433.66 lacs
   OR
   (iii) One similar work costing not less than Rs. 4578.21 lacs.

3. Agreement shall be drawn with the successful bidders on prescribed Form No.
   CPWD 7 which is available as a Govt. of India Publication and also available onwebsitewww.iitk.ac.in/iwd/tenderhall.htm, https://eprocure.gov.in/eprocure/app & www.tenderhome.com his rates including all applicable taxes but **excluding GST** as per various terms and conditions of the said modified form which will form part of the agreement.
4. The time allowed for carrying out the work will be **20 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.
5. The site for the work is available.
6. The architectural, structural & Electrical drawings are available. Further details/ shop drawings, if any shall be prepared by the contractor. These drawings shall be approved by the Engineer In-charge before execution and nothing extra shall be payable.
7. The bid document consisting of plans, specifications to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents except Standard General Conditions of Contract Form can be seen on website www.iitk.ac.in/iwd/tenderhall.htm, https://eprocure.gov.in/eprocure/app & www.tenderhome.com free of cost.

8. After submission of the bid the contractor can re-submit revised bid any number of times but before last time and date of submission of bid as notified.
9. While submitting the revised bid, contractor can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of bid as notified.
10. This bid is invited in two bid system.
11. **i) Earnest Money in the form of Treasury Challan or Demand Draft or Pay order or Banker's Cheque or Deposit at Call Receipt or Fixed Deposit Receipt (drawn in favour of the Director, IIT Kanpur shall be scanned and uploaded to the e-Tendering website within the period of bid submission.**

    ii) **The original EMD and other relevant documents shall be submitted in the hard copy to the office of the Superintending Engineer upto 3.00 PM on 23.07.2020.**

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

    iv) Copy of certificate of work experience and other documents as specified in the technical bid/eligibility bid document shall be scanned and uploaded to the e-Tendering website within the period of bid submission. **However, copy of all the scanned and uploaded documents as specified in bid document shall have to be submitted by the all bidders in the hard copy to the office of the Superintending Engineer upto 3.00 PM on 23.07.2020.**

    Online technical bid documents submitted by intending bidders shall be opened only of those bidders **whose original EMD and other documents scanned and uploaded are found in order.**

- **Online financial bid document submitted by the bidders shall be opened only of those bidders who on the basis of pre-qualification documents uploaded by them within the period of bid submission, qualify in accordance with the provision of technical bid. The financial bid shall be opened at the notified time, date & place in presence of qualified bidders or their representative.**

The technical (eligibility) bid submitted shall be **opened at 03:00 PM on 24.07.2020.**

12. The bid submitted shall become invalid if:

(i) The bidder is found ineligible.

(ii) **The bidder does not deposit original EMD & other documents in hard copy in the office of Superintending Engineer, IWD, IIT Kanpur.**

(iii) The bidder does not uploaded all the documents (including certificate of registration for GST) as stipulated in the bid document **including original EMD.**

(iv) If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted **physically by the bidder** in the office of bid opening authority.

(v) If a tender 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.

13. The contractor whose bid is accepted will be required to furnish **performance guarantee of 5% (Five Percent)** of the bid amount within the period specified in Schedule F. This guarantee shall be in the form of cash (in case guarantee amount is less than Rs. 10000/-) or Deposit at Call receipt of any scheduled bank/Banker's cheque of any scheduled bank/Demand Draft of any 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.** The contractor whose bid is accepted will be required to furnish copy of applicable licenses/registration with BOCW also ensure the compliance of aforesaid provisions by the sub contractors, if any engaged by the contractor for the said work and Programme Chart (Time and Progress) within the period specified in Schedule F.

14. **Description of the work is as follows:**

C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A bidders shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed.

The bidders shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidders 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.

15. The competent authority on behalf of the Board of Governors, IIT Kanpur does not bind itself to accept the lowest or any other bid and reserves to itself the authority to reject any or all the bids received without the assignment of any reason. All bids in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the bidders shall be summarily rejected.
16. Canvassing whether directly or indirectly, in connection with bidders is strictly prohibited and the bids submitted by the contractors who resort to canvassing will be liable for rejection.
17. The competent authority on behalf of Board of Governors, IIT Kanpur 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.
18. **The bid for the works shall remain open for acceptance for a period of Ninety (90) days from the date of opening of technical bid.** If any bidders withdraws his bid before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the bid which are not acceptable to the department, then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the bidders shall not be allowed to participate in the rebidding process of the work.
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 22 days from the stipulated date of start of the work, sign the contract** consisting of:-

(a) The Notice Inviting Bid, all the documents including additional conditions, specifications and drawings, if any, forming part of the bid as uploaded at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto.

(b) Standard C.P.W.D. Form 7 i/c upto date amendments and duly modified for EPC work or other Standard C.P.W.D. Form as applicable.

20. **For Composite Bids**

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

20.1.2 **The financial bid document will include following components**:

Volume-I

Part A:- CPWD-6, **CPWD-7** including schedule A to F for the major component of the work, Standard General Conditions of Contract for of CPWD- 2020 for EPC mode.

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

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

Part D:- Soil investigation report attached in PDF form

Part E:- Schedule of financial quote

Volume-II – Details of Part C

Volume- III – Drawings for Execution Architectural, Plumbing, Fire fighting drawings, structural drawings, Electrical drawings

20.2 The bidders must associate himself, with agencies of the appropriate class eligible to bid for each of the minor component individually as per details given in respective minor component.

20.3 The eligible bidders shall quote rates for all items of bid documents

20.4 After acceptance of the bid by competent authority, the SE in charge of major component of the work shall issue letter of award on behalf of the Board of Governors, IIT Kanpur. After the work is awarded, the main contractor will have to enter into one agreement with EE in charge of major component and has also to sign two or more copies of agreement depending upon number of EE's of minor components. One such signed set of agreement shall be handed over to EEs of minor component(s). EE of major component will operate **Part A** and **Part B** of the agreement. EEs of minor component(s) shall operate **Part C** along with **Part A** of the agreement.

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

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

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

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

20.9 The main contractor has to enter into agreement with contractor(s) associated by him for execution of minor component(s). Copy of such agreement shall be submitted to EEs of each minor component as well as to EE in charge of major component. In case of change of associate contractor, the main contractor has to enter into agreement with the new contractor associated by him.

20.10 The requirement of technical staff given in various specialized works in Part- C (Electrical) is in addition to the requirement given in clause 32 (i) Schedule - F. The actual deployment of these technical staff will be as per execution of work and direction of Superintending Engineer, IWD, IIT Kanpur.

20.11 Running payment for the major component shall be made by EE of major discipline to the main contractor. Running payment for minor components shall be made by the Engineer-in-charge of the discipline of minor component directly to the main contractor.

20.12 **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 major component after record of completion certificate of all other components**.

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

Superintending Engineer

INTEGRITY PACT **CPWD**

To,

……*……
…..,
……*……
…..,
……*……
…..

Sub: NIT No. 05/C/D1/20-21/01 for the C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

Dear Sir,

It is hereby declared that IWD, IIT Kanpur 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 Tenderer will sign the integrity Agreement, which is an integral part of tender/tender documents, failing which the tenderer will stand disqualified from the tendering process and the tender of the tenderer would be summarily rejected.

This declaration shall form part and parcel of the Integrity Agreement and signing of the same shall be deemed as acceptance and signing of the Integrity Agreement on behalf of the Board of Governor, IIT Kanpur.

Yours faithfully

Superintending
Engineer

INTEGRITY PACT

To,

Superintending Engineer
IWD, IIT Kanpur

Sub: Submission of Tender for the work of : C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

Dear Sir,

I/We acknowledge that IWD, IIT Kanpur is committed to follow the principles thereof as enumerated in the Integrity Agreement enclosed with the tender/tender 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 Agreement, 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 TENDER SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of this condition of the NIT.

I/We confirm acceptance and compliance with the Integrity Agreement 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/tender is finally accepted by IWD, IIT Kanpur. I/We acknowledge and accept the duration of the Integrity Agreement, which shall be in the line with Article 1 of the enclosed Integrity Agreement.

I/We acknowledge that in the event of my/our failure to sign and accept the Integrity Agreement, while submitting the tender/tender, IWD, IIT Kanpur shall have unqualified, absolute and unfettered right to disqualify the tenderer and reject the tender is accordance with terms and conditions of the tender.

Yours faithfully

(Duly authorized signatory of the Tenderer)

INTEGRITY PACT

To be signed by the tenderder and same signatory competent / authorised to sign the relevant contract on behalf of IWD, IIT Kanpur.

INTEGRITY AGREEMENT

This Integrity Agreement is made at .....*..... on this .....*..... day of .....* **2020**

BETWEEN

Board of Governors, IIT Kanpur represented through Superintending Engineer, IWD IIT Kanpur, (Name of Division) (Hereinafter referred as the **'Principal/Owner',** which (Address of Division) expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

AND

.....*..... (Name and Address of the Individual/firm/Company) through .....* ..... (Hereinafter referred to as the (Details of duly authorized signatory)

"Tenderer/Contractor" and which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

Preamble

WHEREAS the Principal/Owner has floated the Tender **(NIT No. /C/D1/2020-21/**) (hereinafter referred to as **"Tender/Bid"**) and intends to award, under laid down organizational procedure, contract for **: C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**

AND WHEREAS the Principal/Owner 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 Tenderer(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"** or **"Pact**"), the terms and conditions of which shall also be read as integral part and parcel of the Tender/Tender documents and Contract between the parties.

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

INTEGRITY PACT

Article 1: Commitment of the Principal/Owner

1) The Principal/Owner commits itself to take all measures necessary to prevent corruption and to observe the following principles:

(a) No employee of the Principal/Owner, 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/Owner will, during the Tender process, treat all Tenderer(s) with equity and reason. The Principal/Owner will, in particular, before and during the Tender process, provide to all Tenderer(s) the same information and will not provide to any Tenderer(s) confidential / additional information through which the Tenderer(s) could obtain an advantage in relation to the Tender process or the Contract execution.

(c) The Principal/Owner shall endeavour to exclude from the Tender process any person, whose conduct in the past has been of biased nature.

2) If the Principal/Owner 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/Owner 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 Tenderer(s)/Contractor(s)

1) It is required that each Tenderer / 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 Tenderer(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 Tenderer(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal/Owner's 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 Tenderer(s)/Contractor(s) will not enter with other Tenderer(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 tenders or any other actions to restrict competitiveness or to cartelize in the tendering process.

(c) **INTEGRITY PACT**

(d) The Tenderer(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act. Further the Tenderer(s)/Contract(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.

(e) The Tenderer(s)/Contractor(s) of foreign origin shall disclose the names and addresses of agents/representatives in India, if any. Similarly Tenderer(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 tender in a tender but not both. Further, in cases where an agent participate 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.

(f) The Tenderer(s)/Contractor(s) will, when presenting his tender, 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.

3) The Tenderer(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

4) The Tenderer(s)/Contractor(s) will not, directly or through any other person or firm indulge in fraudulent practice **means a willful 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 Tenderer(s)/Contractor(s) will not, directly or through any other person or firm use Coercive Practices (means 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 Tenderer(s)/Contractor(s) and the Tenderer/ Contractor accepts and undertakes to respect and uphold the Principal/Owner's absolute right:

INTEGRITY PACT

1) If the Tenderer(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 Tenderer(s)/ Contractor(s) from the Tender process or terminate/determine the Contract, if already executed or exclude the Tenderer/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 Tenderer(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 Tenderer/Contractor.
3) **Criminal Liability:** If the Principal/Owner obtains knowledge of conduct of a Tenderer or Contractor, or of an employee or a representative or an associate of a Tenderer 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 Tenderer 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 Tenderer 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 Tenderer/Contractor as deemed fit by the Principal/ Owner.
3) If the Tenderer/Contractor 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.

INTEGRITY PACT

Article 5: Equal Treatment of all Tenderers/Contractors/Subcontractors

1) The Tenderer(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact. The Tenderer/Contractor shall be responsible for any violation(s) of the principles 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 Tenderers and Contractors.
3) The Principal/Owner will disqualify Tenderers, who do not submit, the duly signed Pact between the Principal/Owner and the tenderer, 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 Pact begins when both the parties have legally signed it. It expires for the Contractor/Vendor 12 months after the completion of work under the contract or till the continuation of defect liability period, whichever is more and for all other tenderers, till the Contract has been awarded.

If any claim is made/lodged during the time, the same shall be binding and continue to be valid despite the lapse of this Pacts as specified above, unless it is discharged/determined by the Competent Authority, IWD, IIT Kanpur.

Article 7-Other Provisions

1) This Pact is subject to Indian Law, place of performance and jurisdiction is the **Head quarters of the Division** of the Principal/Owner, who has floated the Tender.
2) Changes and supplements need to be made in writing. Side agreements have not been made.
3) If the Contractor is a partnership or a consortium, this 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 Pact must be signed by a representative duly authorized by board resolution.
4) Should one or several provisions of this 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 intensions
5) t is agreed term and condition that any dispute or difference arising between the parties with regard to the terms of this Integrity Agreement / Pact, any action taken by the Owner/Principal in accordance with this **Integrity Agreement/ Pact or interpretation thereof shall not be subject to arbitration.**

INTEGRITY PACT

Article 8-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/Contract documents with regard 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/Owner)

.....*..... (For and on behalf of Tenderer/Contractor)

WITNESSES:

1. .....*.....
(signature, name and address)

2. .....*.....
(signature, name and address)

Place: Dated
:

* To be filled in by the Executive Engineer & tenderer as the case may be

CPWD-7

INDIAN INSTITUTE OF TECHNOLOGY, KANPUR

INSTITUTE WORKS DEPARTMENT

EPC (TURNKEY) BID

(A) Tender for the work of: **: C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)**

(i) To be submitted by **5:00 P.M. on 21.07.2020** online.

(ii) Technical bid to be opened in presence of tenderers who may be present at **3.00 P.M** on **24.07.2020** in the office of the Superintending Engineer, IWD, IIT, Kanpur.

TENDER

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

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

We agree to keep the tender open for **Ninety (90) days** from the due date of its opening and not to make any modification in its terms and conditions.

A sum of Rs**67,22,760.00** 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. 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 Board of Governor, IIT Kanpur or the successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 of the tender form. Further, I/We agree that in case of forfeiture of Earnest Money & 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 IWD, IIT Kanpur 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 therefrom to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated: Signature of Contractor

Witness:

Postal Address Address:

Occupation:

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for an on behalf of the Board of Governors, IIT Kanpur for a sum of ` ……..……. (Rupees …… ……).

The letters referred to below shall form part of this

contract agreement:

(a)

(b)

(c)

For & on behalf of Board of Governors, IIT Kanpur

Signature …….

Dated: Designation …….

PROFORMA OF SCHEDULES

(Separate Performa for Civil, Elect Works in case of Composite Tenders)
(Operative Schedules to be supplied separately to each intending tenderer)

SCHEDULE 'A'

Schedule of financial quote for quoting for the work.

SCHEDULE 'B'
Schedule of materials to be issued to the contractor.

S. No.	Description of item	Quantity	Rates in figures & words at which the material will be charged to the contractor	Place of issue
1	2	3	4	5
---------NIL----------				

SCHEDULE 'C'

Tools and plants to be hired to the contractor

S. No.	Description	Hire charges per day	Place of Issue
1	2	3	4
---------NIL----------			

SCHEDULE 'D'
Extra schedule for specific requirements/document for the work, if any. **As attached in tender form**

SCHEDULE 'E'
Reference to General Conditions of contract: GCC 2020 for EPC projects as amended / modified upto last date of submission of bid.

Name of Work: : C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)		
Estimated cost of the work:	**Civil Items of Work-**	Rs. 46,23,12,903.00
	Electrical & Lift Items of Work- Tota	Rs. 10,99,63,127.00
	Total	Rs. 57,22,76,030.00
Earnest money	Rs. 67,22,760.00	
Performance Guarantee	5% of the tendered value of the work	
Security Deposit	2.5% of the tendered value of the work	

SCHEDULE 'F'
GENERAL RULES & DIRECTIONS

Officer inviting tender	**Superintending Engineer, IWD, IIT Kanpur**
Definitions:	
Engineer-in-Charge	
For Civil items of work	**Executive Engineer (Civil), IWD, IIT Kanpur**
For Electrical items & Lift items of work	**Executive Engineer (Elect.)IWD, IIT Kanpur**
Accepting Authority	Superintending Engineer
Percentage on cost of material and labour to cover all overheads and profits	15%
Standard Schedule of Rates:	
Civil Items of Work:	Plinth area rates 2012 + cost index @28% & Market Rates
Electrical & Lift Items of Work:	DSR 2018 & Market Rates
Department:	Institute Works Department, IIT Kanpur
Standard CPWD contract Form: (Whether correction vide latest circulars are Incorporated or not in this document).	GCC 2020 for EPC projects as amended / modified upto the last date of submission of bid, **Clause -34 has been modified and the modified clause – 34 may now be read as:-** **Clause - 34** **The quoted rates shall be inclusive of all materials, labour, T&P, royalty,all taxes cess etc but excluding the GST. The GST shall be paid extra as applicable along with the bills.**

Clause 1	i)	Time allowed for submission of Performance Guarantee and, applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board or proof of applying thereof from the date of issue of letter of acceptance	15 days
	ii)	Maximum allowable extension **with late fee@ 0.1% per day of Performance Guarantee amount beyond the period as provided in (i) above**	7 days

Clause 1A	The defect liability period shall be 3 years after the date of completion of work for this contract agreement.	
Clause 2	Authority for fixing Compensation under Clause 2	Superintending Engineer
Clause 2 A	Whether Clause 2A shall be applicable	**Not applicable**
Clause 5	Number of days from the date of issue of letter of acceptance for reckoning date of start	**22 days**
Clause 5.2	**Nature of hindrance register : Physical** (either Physical or Electronic)	**Physical**

Time allowed for execution of work	**20 Months**
Authority to decide	
(i) Extension of time :	Superintending Engineer, IWD IIT Kanpur
(ii) Rescheduling of mile stone :	Superintending Engineer, IWD IIT Kanpur
(iii) Shifting of date of start in case of delay in handing over of site.	Superintending Engineer, IWD IIT Kanpur

S. No.	Description of mile stone (Physical)	Time allowed from date of start	Amount to be with held in case of non-achievement of milestone (% of composite tendered amount)
1.	**A- Activity completion of Civil work** (a) diversion of exiting sewer line and construction of sump well with pump/ Motor etc complete up to its commissioning. (b)RCC work in foundation upto plinth level of all seven blocks complete. **B- Activity completion of E&M work** (a) Submission of eligibility document of associate agencies for E&M as per eligibility condition. (b) Submission of shop / layout drawing for conduits/ equipment of EI, fire fighting lift, CCTV etc. as required for all E&M services. Or Gross value of work done not lees them **10%** of the accepted tendered value.	04 Months	0.5% of the accepted tendered value.
2.	**A- activity completion of Civil work:** (a) RCC slab upto floor level 3 of (S+7) storied block (b) Brick work upto floor level 1 (c) Sample room one single seated one double stated at ground floor including all fittings and fixtures etc complete . (Floor level shall be defined as per CPWD specification 2009, val-1) **B- Activity completion of E&M work:** (a) Slab conducting upto floor level 3 (b) Wall conducting upto floor level 1 (c) Sample lab at ground floor with all wiring, switch, socket, fan fitting etc installed &compete **Or** Gross value of work done not lees them **30%** of the accepted tendered value.	07 Months	0.5% of the accepted tendered value.
3.	**A- Activity completion of civil work:** (a) RCC slab upto floor level 6 of (S+7) storied block. (b) RCC slab upto floor level 3 of (S+5) storied block (c) Brick work up to floor level - 4 of (S+7) storied block (d) Brick work up to floor level – 1 of (S+5) storied block (e) Internal work i/c flooring upto level -3 of (S+7) storied block (f) Water proofing of toilets, internal plumbing work upto level – 3 of (S+7) storied block **B- Activity completion of E&M work:** (a) Slab conduiting upto level 6 of (S+7) & up to level 1 of (S+5)	10 Months	0.5% of the accepted tendered value.

	(b) Wall conduiting , socket boxes and DBS upto level 4 of (S+7) (c) Making of holes in toilets , guest rooms, lift lobby, lift shaft, etc pressurization, fire fighting and exhaust etc.upto level 4 of (S+7) (d) P/F of sleeves in beams /slabs/ brick wall to pass the A/C line in corridors/rooms. Or Gross value of work done not less them 50% of the accepted tenderend value.		
4.	**A- activity completion of Civil work:** (a)RCC slab upto terrace level of (S+7) storied block (b)RCC slab upto terrace level of (S+5) storied block (c) brick work upto floors level 6 of (S+7) storied block (e)Brick work upto floor level 5 of (S+5) storied block (e)Plastering work upto floor level -6 (f) internal flooring work up to floor level -5 (g) water proofing of toilets/ internal plumbing upto floor level -6 **B. Activity completion of E&M work:** (a)Slab conduiting up to floor level -6 (b) Wall conduiting , socket boxes and DBS upto level 6 (c) Making of hole in toilets/ room/ lift lobby/lift shaft pressurization, fire fighting. & exhaust upto level -6 **Or** Gross value of work done not less them 70% of the accepted tenderend value.	13 Months	0.5% of the accepted tendered value
5.	**A- activity completion of Civil work:** (a) Over Head water tank, machine room, brick coba complete (b) Completion of brick work (c) Toilet work including internal plumbing work, wall tiling work up to level - 6 (d) Completion of all flooring work etc upto level - 6 **B- activity completion of E&M work:** Submission of inspection call at OEM premises far all major materials such as panels, lift, UPS, equipments cables etc. and and any other materials as required. (a) Wall conduiting, socket boxes and DBs of all floors (b) Making of hole s in toilets, labs/rooms ,lift lobby, lift shaft etc.pressurization, fire fighting And exhaust etc. upto all floors (C) wiring laying of raceway work upto level 5 Or Gross value of work done not less them 80% of the accepted tendered value.	15 Months	0.5% of the accepted tendered value

6.	**A- activity completion of Civil work** **(1)**Completion of internal & external painting, of a;; buildings and flooring, (2.) completion of external plumbing, sewerage work, drainage and road work **B- activity completion of E&M work:** (a) Installation of fan, switch & socket and fittings in all floors of the building complete. (b) Testing and commissioning of lifts. (c) Completion & testing of fire fighting and fire alarm work in all building including pump room & yard hydrant work and submission for inspection by CFO. (d) Service connection to substation and outdoor lighting. **Or** Gross value of work done not less them 90% of the accepted tendered value.	18 Months	1.0% of the accepted tendered value
7.	**Completion of all works in all respect upto the satisfaction of Engineer-in-charge including testing and commissioning of the water supply/ sewage/electrical/Rain water harvesting rooms including its handing over to the user.**	20 Months	1.0% of the accepted tendered value

Clause 6, 6A	Clause applicable		**Clause 6 A**
Clause 7	Gross work to be done together with net payment/Adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment.		**Rs. 285. 00 lacs**
Clause 7A	Whether clause 7A shall be applicable. **(No Running account bill shall be paid for the work till the applicable labour licenses, registration with EPFO, ESIC and BOCW welfare Board. Whatever applicable are submitted by the contractor to the Engineer- in –Charge)**		**Yes**
Clause 10A	List of testing equipment to be provided by the contractor at site lab.		As per section B of NIT
Clause 10 B	Whether clause 10-B(ii)	(ii) Shall be applicable	**Yes**
Clause 10 B	Whether clause 10-B(iii)	(iii) Shall be applicable	**No**
Clause 10 C	Component of labour expressed as percentage of value of work.		**Not Applicable**

Clause 10 CA	Materials covered under this clause.	**Nearest material (**other than cement *, reinforcement bars and structural steel**) for which All India Wholesale Price Index is to be followed.**	Base price and corresponding period of all the materials covered under clause **10 CA**	
			Base Price without GST **(Per Metric tonne)**	Corresponding Period
	1. Cement (PPC)	**NIL**	**Rs. 4453/-**	**February, 2020**
	2. Steel (TMT Bars) reinforcement	**NIL**	**Rs. 40500/-**	**February, 2020**
	3. Structural Steel	**Nil**	**Rs. 39630/-**	**February, 2020**
*** Includes cement component used in RMC brought at site from outside approved RMC plants, if any.**				
Clause 10 CC	Clause 10CC to be applicable in contracts with stipulated period of completion exceeding the period shown in next column			**12 month**
Schedule of component of other Materials, Labour, POL etc. for price escalation				
Component of civil (except materials covered under clause 10CA) /Electrical construction Materials expressed as percent of total value of work - Xm				**30%**
Component of Labour expressed as percent of total value of work - Y				**25%**
Component of P.O.L. expressed as percent of total value of work – Z				**Nil%**
Note: Payment under this clause is admissible when contractor submits proof of having paid wages due to every worker through bank or ECS or online transfer to his bank				

Clause 11	**Specification to be followed for execution of work**:
For Civil items of works	CPWD Specifications 2009 Vol. 1 and Vol. 2 with correction slips up to the last date of submission of bid
For Electrical	As per Electrical component

Clause 12

Clause 12: Type of work	Original work
12.2 Extra substituted item	Applicable

Clause16	**Competent Authority for Deciding reduced rates:**	
	For Civil items of work	**Superintending Engineer, IWD, IIT Kanpur**
	For Electrical items of work	**Superintending Engineer, IWD, IIT Kanpur**
Clause 17	Defect liability period	36 months from the date of handing over of the completed work
Clause 18	List of mandatory machinery, tools & plants to be deployed by the contractor at site.	As per Annexure-I

Clause 25

Constitution of Dispute Redressal Committee (DRC)	**Competent Authority to appoint DRC**
DRC shall constitute one Chairman and two members	Director, IIT Kanpur
Place of Arbitration:	To be decided by Arbitral Tribunal in consultation with both Parties. Failing any such agreement, then the Arbitral Tribunal shall decide the venue.
Clause 30 A	The contractor shall have to make his own arrangement of water. The withdrawal of water from the network of institute shall not be allowed. No charges shall be recovered if the contractor develops tube well at site and pumping arrangement at his own cost. The contractor shall have to seek permission digging tube well etc for the water arrangement from the Engineer – in charge).

Clause- 32 Requirement of Technical Representative(s) and Recovery Rate

S. No.	Requirement of Technical staff (of major + minor component)		Minimum experience (Years)	Designation	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of Clause- 32	
	Qualification	Number (of major +minor component)			Figures	Words
1.	Graduate engineer (Major component)	1	20(and having experience of one similar nature of work)	Project Manager with degree in Major discipline of engineering	Rs.1,00,000/- Per month	Rupees One lakh only per month.
2.	Graduate Engineer	1(Civil) + 1 (E&M)	12(and having experience of one of similar nature of work)	Deputy Project manager (Civil) + Deputy Project manager(E&M)	Rs.60,000/- Per month Per person	Rupees Sixty Thousand only per month person.
3.	Graduate Engineer Or Diploma Engineer	2(Civil) + As detail in respective sub – head of part -C	5(in case of degree in (civil engg) Or 10 (in case of diploma in civil engg)	Project/Site Engineer	Rs.40,000/- pm per month per person	Rupees forty thousand per month per person.
4.	Graduate engineer	1	8	Quality engineer	Rs 40,000/- pm per person	Rupees forty thousand per month per person.
5.	Diploma Engineer	1	8	Surveyor	Rs.30,000/- pm Per person	Rupees thirty thousand per month per person.
6.	Graduate engineer	1(Civil) + 1(E&M)	6	Project Planning /billing engineer	Rs .40,000/- per month per person	Rupees forty thousand per month per person.
7.	Safety manager (graduate with one year full time advanced safety diploma from central labour institute Mumbai /NICMAR Hyderabad/Mahatma Gandhi labour institute Ahmadabad or an equivalent qualification)	1	Three year in construction /infrastructure or allied sector	Safety manager	40,000 per month per person	Rupees forty thousand per month.

Assistant Engineer retied from government services who are holding Diploma will be treated at par with Graduate Engineer.

Clause 38

(i)	(a)	Schedule/statement for determining theoretical quantity of cement bitumen etc on the basis of Delhi Schedule of rates.	Delhi schedule of rates 2018 with correction slips up to the last date of receipt of tenders
(ii)		Variations permissible on theoretical quantities	
	(a)	Cement	+_(plus/minus) 2% (Two percent)
	(b)	Bitumen for all works	+ (plus) 2.5% (Two point five percent only and nil on – (minus) side.
	(c)	Steel reinforcement and structural steel sections for each diameter, section and category	+ (plus) 2.0% (Two percent) only and nil on – (minus) side.
	(d)	Paint	As per co-efficient of standard Delhi analysis of rate 2018.
	(e)	Any other item viz fire rate paint etc	As per manufacture specification.

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

S. No.	**Description of Item**	**Rates in figures and words at**	
		Excess beyond permissible variation	**Less use beyond permissible variation**
1.	Cement (PPC)	**NIL**	**Rs. 4898.30 per MT**
2.	Steel Reinforcement	**NIL**	**Rs. 44550.00 per MT**
3.	Structural Steel	**NIL**	**Rs. 43593.00 per MT**

Superintending Engineer

Annexure-I

LIST OF BASIC MINIMUM REQUIRED MACHINERY, TOOLS & PLANTS TO BE DEPLOYED BY THE CONTRACTOR AT SITE

Sl. No.	Name of Equipment	Numbers
1.	Excavators (various sizes)	1 Nos.
2.	Builder's hoist / tower crane	1 No.
	Equipment for Concrete work	
3.	Automatic weight batching plant	1 Nos.
4.	Concrete mixer (electrical)	1 Nos.
5.	Needle vibrator (electrical)	5 Nos.
6.	Needle vibrator (petrol)	5 Nos.
7.	Surface and Plate vibrator	2 Nos.
	Equipment for Building work	
8.	Bar bending Machine	2 Nos.
9.	Bar cutting machine	2 Nos.
10.	Drilling machine	1 No.
11.	Welding machine i/c transformer	2 Nos.
12.	Cube testing machines automatic (Digital 100 MT)	1 No.
13.	Steel shuttering/ water proof ply shuttering	8000 sqm
14.	Adjustable spans	4000Nos.
15.	Steel scaffolding system (cup lock type)	16000 Nos.
16.	Grinding/polishing machines	2 Nos.
	Equipment for transportation	
17.	Tippers	As per requirement of the project and milestones.
18.	Trucks	As per requirement of the project and milestones.
	Pneumatic equipment	
19.	Monkey lift	2Nos.
	Dewatering equipment	
20.	Pump (diesel)	As per requirement of project
21.	Pump (electric) (Desirable)	As per requirement of project
	Power equipment	
22.	Diesel generator (to meet requirement at site for uninterrupted work)	As per requirement of project

	Survey equipments	
23.	Total Work Station	1 No.
24.	Vernier Callipers	1 No.
25.	Weighing Machine	1No.
26.	Earth Compactor	2Nos.

Superintending Engineer

SPECIFICATIONS

C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

1. The order of preference in case of any discrepancy as indicated in condition No. 8.1 under "Conditions of Contract" given in standard CPWD contract form may be read as the following:

   i) Particular specifications and special conditions if any.

   ii) Architectural Drawings

   iii) CPWD specifications.

   iv) Indian standard specifications of B.I.S.

   v) Sound Engineering Practice

   A reference made to any Indian Standard specification in these documents, shall imply to the latest version of that standard. Including such revision/amendments as issued by the bureau of Indian standard upto last date of receipt of tenders. The contractor shall keep at his own cost all such publications of relevant Indian standard applicable to the work at site.

2. Except for the items, for which particular specifications are given or where it is specifically mentioned otherwise in the description of items in work shall generally be carried out in accordance with the CPWD specification. Wherever CPWD specifications are silent the latest B I S codes/ MOST specifications shall be followed.

Details of Electrical Contractor

(**To be submitted before award of work**)

i. Name of Electrical Contractor : M/s .....
ii. Address: .....
iii. Class of License: .....
(A Class government approved)
iv. Details of Registration of the Electrical Contractor

Sl. No.	Department	Registered Yes/No	Registration No.	Tendering limits Rs. Lacs	Validity of Registration	Debarred from Tendering Yes/No
1	2	3	4	5	6	7
1.						
2.						
3.						

Note : All columns of above Proforma must be filled in.

Contractor's signature

CONSENT LETTER

I hereby give my consent to work as electrical contractor till the completion of work. Also I will be responsible for necessary action to hand over the installation and for rectification of defects and repair during the obligatory maintenance period. I will execute the work as per CPWD Specifications and Additional Conditions of the Contract.

I will also engage suitable Engineer for the work as per condition of the contract. I further certify that the above particulars pertaining to me are correct.

Dated :

Signature of Electrical Contractor

PART–B

GENERAL CONDITIONS AND MATERIAL AND QUALITY ASSURANCE

GENERAL REQUIREMENTS FOR THE TENDER

Name of Work: "C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)."

1. The tenderer is advised to read and examine the tender documents for the work and the set of drawings available with Engineer-in-charge. He should inspect and examine the site and its surroundings by himself before submitting his tender.
2. Separate conditions & specification and scope are included in this tender. The contractor shall quote the amount/rates lump-sump in figures and words accurately in schedule of financial quote so that there is no discrepancy in figures and words.
3. Time allowed for the execution of work is **20 months**.
4. The contractor(s) shall submit a detailed program of execution in accordance with the **master programme/milestone within fifteen days** from the date of start of the work.
5. Quality of the project is of utmost importance. This shall be adhered to in accordance with the provisions of CPWD specifications and guidelines given in the relevant paras.
6. Temporary Electric connection (Single/ Three phase) shall be provided by the Institute from its distribution network and the charges shall be realized prevalent commercial tariff of the institute presently recovery rate is Rs. 9.19
   Per unit on the basis of actual consumption through the separate meter under the control of Engineer-In-Charge. If the rates are revised in future the same
   shall be applicable to the contractor. The contractor at his own cost shall
   arranged the cables for the service connection and the sub meter.
7. No labour huts/jhuggies shall be allowed to construct in the campus except for the security persons at work site with proper sanitation arrangements after due approval of Superintending Engineer.
8. The contractor has to appoint qualified safety officer for proper adhering safety requirements during the entire period of contract.
9. In case of any serious accident at work site, the Institute may cause an enquiry/ investigation into the accident and depending on the outcome of such enquiry/ investigation, the Institute may take such action against the contractor as may be deemed fit and appropriate in the discretion of the Director, which may also lead to termination of the contract, and/ or the contractor may be debarred from applying for further works in the campus for a specified period.
10. **Cement shall be arranged by the contractor himself.**
11. **Steel Reinforcement shall be arranged by the contractor himself.**
12. Contractor has to engage specialized agencies for specialized items of works such as water proofing, aluminium & glazing works, fire doors and

fittings, plumbing work, all type of false ceiling, expansion joint system and other specialized items as mentioned in the tender documents. Only those specialized agencies/firms who have satisfactorily executed works as per following criteria during last seven years are eligible for the specialized works-

(a) Three works each costing not less than 40% of estimated cost for concerned sub head.

Or

(b) Two works each costing not less than 60% of estimated cost for concerned sub head. **Or**

(c) One work costing not less than 80% of estimated cost for concerned sub head.

The value of specialized 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 of specialized work to upto one month of award of this work .

Estimated cost of the specialized item/work for various items/schemes shall be determined by Engineer-in-charge based on market rate. The decision of Engineer- in- charge shall be final and binding on the contractor. The various specialized items of works under this agreement in respect of civil construction are evoled as water proofing treatment, , plumbing/sanitary work, Aluminium works etc.

13. Approval of the specialized agencies for each specialized work shall be obtained from the Engineer-in-Charge within one month of award of work. Even if, such specialized items of work shall be executed by the specialized agencies, 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.

14. Contractor has to deploy basic minimum required machinery on the project to complete the work in time as stipulated in the tender in **annexure -I**.

15. The contractor shall submit the running bills in the shape of the computerised MB in pages of A-4 size as per the standard format of department and shall act as per modified Clause 6 A of CPWD-7

16. Contractor has to provide reinforcement cover blocks made of approved proprietary pre packed free flowing mortars (Conbextra as manufactured by M/s Fosroc Chemical India Ltd. or approved equivalent) of high early strength.

17. Measurements of all hidden items under Civil/Plumbing/ Fire fighting/ Electrical/ have to be submitted by the contractor to office of the Engineer-in-charge for record purpose only.

18. Payment of bills of the contractor shall be made on the basis of stage wise completion of work as per schedule of stage payment of the contract agreement.

19. **Protocol pertains to Covid-19 to be followed at site by the contractor as decided by Government of India time to time.**

(FOR CIVIL WORKS)

MATERIAL AND QUALITY ASSURANCE

1. The contractor shall ensure quality control measures on different aspects of construction including materials, workmanship and correct construction methodologies to be adopted. He shall have to submit quality assurance programme within two weeks of the award of work. The quality assurance programme should include method statement for various items of work to be executed along with check lists to enforce quality control.

2. The contractor shall get the source of all other materials, not specified else here in the document, approved from the Engineer-in-Charge. The contractor shall stick to the approved source unless it is absolutely unavoidable. Any change shall be done with the prior approval of the Engineer-in-Charge for which tests etc. shall be done by the contractor at his own cost. Similarly, the contractor shall submit brand/ make of various materials not specified in the agreement, to be used for the approval of the Engineer-in- Charge along with samples and once approved, he shall stick to it.

3. The contractor shall submit shop drawings of staging and shuttering arrangement, aluminum & glazing work, fire doors and fittings, plumbing work and other works as desired by Engineer In Charge for his approval before execution. The contractor shall also submit bar bending schedule for approval of Engineer-in- charge before execution.

4. Frequency and type of tests of various Materials/items/ article shall be conducted as per specifications and relevant BIS-Codes. The test results confirm to the specification/codes.

5. Test Laboratories :

A) Laboratory at site :

The contractor shall establish a testing lab at site and provide testing equipment
and materials for the field tests mentioned in the list of mandatory tests given in CPWD specifications 2009 Vol. 1 & 2. Nothing extra shall be payable to him on this account. **In case of delay in establishment of Lab at site, an non refundable recovery of Rs. 1000/- per day shall be made from Running account bill of the contrctor for each delayed days.**

The representatives of the department shall be at liberty to inspect the testing facilities at site and conduct testing at random in consultation with Engineer in charge. The contractor shall provide all necessary facilities for the purpose. The laboratory shall be equipped, inter alia, with the following equipments:

a) **Balances:**
i) 7 kg to 10 kg capacity, semi-self indicating type – Accuracy 10 gm.
ii) 500 gm capacity, semi-self indicating type Accuracy 1 gm.
iii) Pan Balance- 5 kg Capacity- Accuracy 10 gm.
b) **Ovens-** Electrically operated, thermostatically controlled upto 1100C- Sensitivity 10C.
c) **Sieves:** as per IS: 460

i) IS Sieves – 450 mm internal dia of sizes 100 mm, 80 mm, 63 mm, 50 mm, 40 mm, 25 mm, 20 mm, 12.5 mm, 10 mm, 6.3 mm, 4.75 mm, complete with lid and pan.

ii) IS Sieves – 200 mm internal dia (brass frame) consisting of 2.36 mm, 1.18 mm, 500 microns, 425 microns, 300 microns, 212 microns, 150 microns, 90 microns, 75 microns with lid and pan.

iii) Sieve shaker capable of 200 mm and 300 mm dia sieves, manually operated with timing switch assembly.

d) Equipment for slump test- slump cone, steel plate, taping rod, steel scale, scoop.

e) Equipment for concrete testing

f) Concrete cube moulds 15x15x15cm.	18 Nos.
g) Pruning Rods 2Kg weight length 40cm and ramming face 25mm	2 No.
h) Extra Bottom plates for 15cm cube mould	6 Nos.
i) Standard Vibration table for cubes	1 No
j) Dial gauges 25 mm travel- 0.01 mm/division Least count-	1 No.
k) Automatic compression testing machine of 100 tonne capacity.	1 No.

Not less than 90% tests for material be performed at site lab with above stated equipment's, however at least 10% testing of materials shall be got done from external laboratories. However, for the tests to be carried out through the Institute structure lab, the contractor shall supply free of charge all the materials required for testing, including transportation. The cost of such tests conducted through the Institute labs shall be charged to the project.

B) Other Laboratories :

The all such tests which are not available in the Institute lab but required to be carried out from outside Institute laboratories the cost of such tests shall be borne by the contractor i/c all arrangements for conducting such tests .

C) Sampling of Materials :

1. Sample of building materials fittings and other articles required for execution of work shall be got approved from the Engineer-in-Charge. Articles manufactured by companies of repute and approved by the Engineer-in- Charge shall only be used. Articles bearing BIS certification mark shall be used in case the above are not available, the quality of samples brought by the contractor shall be judged by standards laid down in the relevant BIS specifications. All materials and articles brought by the contractor 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.
2. The contractor shall ensure quality construction in a planned and time

bound manner. Any sub-standard material/work beyond set out tolerance limit shall be summarily rejected by the Engineer-in-Charge.

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

4. The contractor shall procure all the materials in advance so that there is sufficient time to testing and approving of the materials and clearance of the same before use in work.

5. All materials brought by the contractor for use in the work shall be got checked from the Engineer-in-Charge or his authorized representative of the work on receipt of the same at site before use.

6. The contractor shall be fully responsible for the safe custody of the materials issued to him even if the materials are in double lock and key system.

7. The Stone aggregate/stone, sand shall be brought from any quarries subjected to the said materials confirm CPWD specifications.

8. The day to day receipt and issue accounts of different grade/brand of cement shall be maintained separately in the standard proforma by the Jr. Engineer/Assistant Engineer - in-Charge of work and which shall be duly signed by the contractor or his authorised representative.

9 The contractor shall render all help and assistance in documenting the total sequence of this project by way of photography, slides, audio-video recording etc. Nothing extra shall be payable to the contractor on this account.

10. Cement register showing the receipt of the PPC shall be maintained at site. The contractor shall construct godown for storage of PPC at site and nothing extra on this account shall be payable.

11. Cement issued shall be for consumption at site only. No cement for factory made items and those not manufactured at site shall be issued.

12. In case there is any discrepancy in frequency of testing as given in the list of mandatory test and that in the individual sub-head of work as per CPWD specification 2009 Vol. 1 & 2 the higher of the two frequencies of testing shall be adopted.

13. The contractor has to make a proper earthing arrangement near Electric Meter. The ELCB (Electric Leakage Circuit Breaker) shall also be provided on this point. The power supply to all machine / Equipment shall have to properly earthed. A certificate form electrical engineer shall have to be taken on record. The connections with switch socket shall only be made at site. No loose wire connections are allowed to be made at site.

D) Maintenance of Registers:

(1) All the register of tests to be carried out at construction site or in outside laboratories shall be maintained by the contractor which shall be issued to the contractor by Engineer-in-Charge.

(2) The test registers to be issued to the contractor are:

a) Materials at site account register such as steel, bricks, AAC blocks, coarse aggregates etc.

b) Cement register.

c) Master test registers.

d) Cube test register.

e) Paint register.

f) Inspection register.

(3) All the entries in the register will be made by the designated engineering staff of the contractor and same should be regularly reviewed by JE/AE/EE.

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

(5) Submission of copy of all test registers, material at site register along with each alternate running account bill and final bill shall be mandatory. These registers should be duly checked by Engineer-in-Charge.

(6) All Material received at site shall be entered in MAS Register and copy of supply order, MTC and bill-invoice shall be maintained in order. The MAS registers shall be maintained by a qualified staff of agency which may be inspected by Engineer- in-charge or his/her designee at any time. The daily report of receipt of material shall be sent to Engineer-in- charge or his/her designee.

(7) All the registers of tests carried out at Construction site or in outside laboratories shall be maintained by the agency. Which may be inspected by Engineer-in-charge of his/her designee at any point of time.

ADDITIONAL CONDTIONS FOR CEMNET

1. The contractor shall procure 43 grade Portland Pozzolana Cement conforming to IS: 1489 (Part-I) as required in the work, from reputed manufacturers of cement, such as A.C.C., Ultratech, Vikram, Shree cement, Ambuja, Jaypee Cement, Century Cement & J.K. Cement. The tenderers may also submit a list of names of cement manufacturers which they propose to use in the work. The tender accepting authority reserves right to accept or reject name(s) of cement manufacturer(s) which the tenderer proposes to use in the work. No change in the tendered rates will be accepted if the tender accepting authority does not accept the list of cement manufacturers, given by the tenderer, fully or partially.

   Supply of cement shall be made in 50 kg. bags bearing manufacturer's name and ISI marking. Samples of cement arranged by the contractor shall be taken by the Engineer- in-Charge and got tested in accordance with provisions of the relevant BIS codes. In case the test results indicate that the cement arranged by the contractor does not conform to the relevant BIS code the same shall stand rejected and shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in- Charge to do so.

2. The cement shall be brought at site in bulk supply of approximately 50 tonnes or as decided by the Engineer-in-Charge. The cement godown of the capacity to store a minimum of **2000** bags of cement shall be constructed by the contractor at site of work for which no extra payment shall be made.

3. Double lock provision shall be made to the door of the cement godown. The keys of one lock shall remain with the Engineer-in-charge or his authorized representative and the key of the other lock shall remain with the contractor. The contractor shall be responsible for the watch and ward and safety of the cement go down. The contractor shall facilitate the inspection of the cement go down by the Engineer-in-Charge at any time.

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 contractor shall supply free of charge the cement required for testing including its transportation cost to test laboratories. The cost of tests shall be borne by the contractor/department in the manner indicated below :

   a) By the contractor, if the results show that the cement does not conform to relevant CPWD Specifications / BIS code or specification mentioned else where in the documents.
   b) By the department, if the results show that the cement conforms to relevant CPWD Specifications / BIS code or specification mentioned else where in the documents.

5. The actual issue and consumption of cement on work shall be regulated and Proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case the cement consumption is less than theoretical consumption including permissible variation, recovery at the rate show prescribed shall be made. In case of excess consumption, no adjustment need to made.

6. The cement brought to 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.

7. The damaged cement shall be removed from the site immediately by the contractor on receipt of a notice in writing from the Engineer-in-Charge. If he does not do so within three days of receipt of such notice, the Engineer-in-Charge shall get it removed at the cost of the contractor.

8. Wet curing period shall be enhanced to a minimum of 10 days or its equivalent. In hot & arid regions, the minimum curing period shall be 14 days or its equivalent.

9. Till the time, BIS makes it mandatory to print the % age of fly ash on each bag of cement, the certificate from the PPC manufacturer indicating the same shall be obtained and permission obtained from Engineer-in-Charge before use of such cements in works.

10. The contractor may use OPC in place of PPC only after written permission of Engineer-in- Charge. In such case, no extra payment shall be made in any form to the contractor by the Department.

ADDITIONAL CONDITIONS FOR STEEL REINFORCEMENT

1 The contractor shall procure TMT bars of **Fe 500D/Fe 550D** grade (the grade to procured is to be specified) from primary steel producers such as **SAIL, Tata Steel Ltd, RINL, Jindal Steel & power Ltd., and JSW Steel Ltd.** or any other producer as approved by CPWD who are using iron ore as the basic raw material/input and having crude steel capacity of 2.0 million tonnes per annum and above.

(**a**) The TMT bars procured from primary producers shall conform to manufacture's specifications.

(**b**) TMT bars procured from primary producers, the specifications shall meet the provisions of IS 1786: 2008 pertaining to **Fe 500 D/Fe 550D** grade of steel.

2. The contractor shall have to obtain vouchers and furnish test certificates to the Engineer-in-charge in respect of all supplies of steel brought by him to the site of work.

3. Samples shall also be taken and got tested by the Engineer-in-charge as per the provisions in this regard in the relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications as defined under para 1.1 and 1.2 above, the same shall stand rejected and it shall be removed from the site of work by the contractor at his cost within a week time of written orders from the Engineer-in-charge to do so.

4. The steel reinforcement shall be brought to the site in bulk supply of 50 tonnes or more or as directed by the Engineer-in-charge.

5. The steel reinforcement bars shall be stored by the contractor at site of work in such a way as to prevent distortion & corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.

6. For checking nominal mass, tensile strength, bend test, re-bend test etc. specimens of sufficient length shall be cut from each size of the bar at random at frequency not less than that specified below:

Size of bar	For consignment below 100 tonnes	For consignment over 100 tonnes
Under 10 mm dia bars	One sample for each 25 tonnes or part thereof	One sample for each 40 tonnes or part thereof
10 mm to 16 mm dia bars	One sample for each 35 tonnes or part thereof	One sample for each 45 tonnes or part thereof
Over 16 mm dia bars	One sample for each 45 tonnes or part thereof	One sample for each 50 tonnes or part thereof

7. The contractor shall supply free of charge the steel required for testing including its transportation to testing laboratories. The cost of tests shall be borne by the contractor.

8. The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by the conditions laid therein. In case the consumption is less than theoretical consumption including permissible variations recovery at the rate so prescribed shall be made. In case of excess consumption no adjustment need to be made.

9. The steel brought to the site and the steel remaining unused shall not be removed from site without the written permission of the Engineer-in-charge

10. Steel bars brought by the contractor for use in the work shall be got checked from the Engineer-in-Charge or his authorized representative of the work on receipt of the same at site before use. The contractor shall supply free of charge the steel required for testing including its transporation to testing laboratories. The cost of the test shall be borne by the contractor.

11. If the quantity of steel actually used in the work is found to be more than the theoretical quantity of steel including authorised variation, nothing extra shall be payable to the contractor on this account. In the event of it being discovered that after the completion of the work the quantity of steel used is less than the quantity ascertained as herein before provided (allowing variation on the minus side as stipulated in clause 42). The cost of quantity of steel so less used shall be recovered from the contractor at rate as specified in schedule 'F'. Decision of the Engineer-in- Charge in regard to theoretical quantity of steel which should have been actually used and recovery of the rate specified shall be final and binding on the contractor.

12. In case the contractor brings surplus quantity of steel the same after completion of the work will be removed from the site by the contractor at his own cost after approval of the Engineer-in-Charge.

13. Reinforcement including authorised spacer bars and lappages shall be measured in length of different diameters, as actually (not more than as specified in the drawing) used in the work, nearest to a centimeter. Wastage and unauthorised overlaps shall not be measured.

14. The standard sectional weights referred to as in Table 5.4 under para 5.3.4 in CPWD specifications for works 2009 Vol. 1 will be considered for conversion of length of various sizes of MS bars, Tor steel bars and TMT bars into standard weight.

15. Records of actual sectional weight shall also be kept dia-wise & lot-wise. The average sectional weight for each diameter shall be arrived at from samples from each lot of steel received at site. The decision of the Engineer-in-Charge shall be final for the procedure to be followed for determining the average sectional weight of each lot. Quantity of each diameter of steel received at site

of work each day will constitute one single lot for the purpose. The weight of steel by conversion of length of various sizes of bars based on the actual weighted average sectional weight shall be termed as derived actual weight.

16. If the derived weight as in para 15 above is lesser than the standard weight as in para 14 above, the derived actual weight shall be taken for payment.

If the derived actual weight is found more then the standard weight then the standard weight as worked out in para 14 above shall be taken for payment. In such case nothing extra shall be paid for the difference between the derived actual weight and the standard weight.

17. Mixing of different type of steel/different grades of steel shall not be allowed in the same structural members as main reinforcement to satisfy clause 26.1 of IS:456.

18. Tolerances on Nominal Mass (individual sample) shall be as under:-

Sl. No.	Nominal size mm	Tolerances on the Nominal Mass, percentage
1	Upto and including 10	-8%
2	Over 10 upto & including 16	-6%
3	Over 16	-4%

GENERAL TERAMS AND CONDITONS

1. In the case of discrepancy between the specifications and / or the drawings, the following order of preference shall be observed:-

   a) Nomenclature of items as per schedule of quantities. b) Particular specification and special condition, if any. c) Architectural Drawings

   d) CPWD specifications.

   e) Indian standard specifications of B.I.S.

   f) Sound Engineering Practice

   g) Decision of Engineer-in-Charge.

   A reference made to any Indian Standard specification in these documents, shall imply to the latest version of that standard. Including such revision/amendments as issued by the bureau of Indian standard upto last date of receipt of tenders. The contractor shall keep at his own cost all such publications of relevant Indian standard applicable to the work at site.

2. Except for the items, for which particular specifications are given or where it is specifically mentioned otherwise in the description of items in the schedule of quantities the work shall generally be carried out in accordance with the "CPWD specifications 2009 Vol. 1 and Vol. 2 with upto date corrections slips (hereinafter to be referred to as CPWD specifications) and instructions of Engineer-in-Charge. Wherever CPWD specifications are silent the latest IS codes/specification shall be followed.

3. Unless otherwise provided in the Schedule of Quantities/Specifications, the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the work i/c centering & shuttering for heights grater then 3.5 mts. nothing extra shall be payable to him on account of the same.

4. The proposed building is a prestigious project and quality of work is paramount importance. Contractor shall have to engage well experienced skilled labour and deploy modern T&P and other equipment to execute the work. Many items like, stone flooring, aluminium, glazing, stainless steel, & plumbing work and other specialised works will specially require engagement of skilled workers having experience particularly in execution of such items.

5. **a)** The contractor (s) shall inspect the site of work before tendering and acquaint himself with the site conditions and no claim on this account shall be entertained by the department.

   b) The contractor (s) shall get himself acquainted with nature and extent of the work and satisfy himself about the availability of materials from kiln or approved quarries for collection and conveyance of materials required for construction.

6. The contractor (s) shall study the soil investigation report for the site, available in the office of the Engineer-in-Charge and satisfy himself about complete characteristics of soil and other parameters of site. However, no claim on the alleged inadequacy or incorrectness of the soil data shall be entertained.

7. The tenderer shall see the approaches to the site. In case any approach from main road is required by the contractor, the same shall be made good, improved and maintained by the contractor at his own cost. No payment shall be made on this account.

8. The contractor 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 dangers and incidents caused to existing / new work due to negligence on his part. No hindrances shall be caused to traffic during the execution of the work.

9. Contractor shall provide permanent bench marks and other reference points for the proper execution of work and these shall be preserved till the end of work. All such reference points shall be in relation to the levels and locations, given in the Architectural and plumbing drawings

10. Other agencies doing works related with this project may also simultaneously execute their works and the contractor shall afford necessary facilities for the same. The contractor shall leave such necessary holes, openings etc. for laying/burying in the work, pipes cables, conduits, clamps, boxes and hooks for fan clamps etc. as may be required for the other agencies. Nothing extra over the Agreement rates shall be paid for doing these.

11. 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.

12. The contractor shall fully comply with all legal orders and directions of the Public or local authorities or municipality and adhere 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.

13. The building work shall be carried out in the manner complying in all respects with the requirements of the relevant bylaws and regulations 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.

14. The contractor shall give a performance test of the entire installation(s) as per standing specifications before the work is finally accepted by making his own arrangements for water supply, electricity etc. and nothing extra whatsoever shall be payable for the same.

15. In case of items for which abbreviated nomenclature is not available in the aforesaid publication and also in case of extra and substituted items for which abbreviated nomenclature are not provided for in the agreement, full nomenclature of item shall be reproduced in the measurement books and bill forms for running account bills.

16. For the purpose of recording measurements and preparing running account bills, the abbreviated nomenclature indicated in the

publications Abbreviated Nomenclature of Items of DSR 2018 shall be accepted. The abbreviated nomenclature shall be taken to cover all the materials and operations as per the complete nomenclature of the relevant items in the agreement and relevant specifications.

17. For the final bill, however, full nomenclature of all the items shall be adopted in preparing abstract in the measurement books and in the bill forms.

18. The structural and architectural drawings shall at all times be properly co-related before executing any work.

19. The contractor shall maintain in perfect condition, all portions executed till completion of the entire work allotted to him. Where however phased delivery of work is contemplated these provisions shall apply separately to each phase.

20. The entire royalty at the prevalent rates shall have to be paid by the contractor on all the boulders, metals, shingle sand, earth etc. collected by him for execution of the work, directly to the Revenue authority or authorized agents of the State Government concerned or the Central Government, as the case may be.

21. PROGRAMME CHART

1. The contractor shall submit a Detailed construction programme (Time and Progress Chart) for execution of work in stipulated period of completion considering each mile stone within 15 days of date of issue of letter of acceptance. The Engineer-in-charge may within 30 days thereafter, if required modify, and communicate the programme approved to the contractor failing which the programme submitted by the contractor shall be deemed to be approved by the Engineer-incharge. The work programme shall include all details of balance drawings and decisions required to complete the contract with specific dates by which these details are required by contractor without causing any delay in execution of the work. The chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in- charge and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per mile stones given in Schedule "F".

2. In case of non submission of construction programme by the contractor the program approved by the Engineer-in-charge shall be deemed to be final.

3. The approval by the Engineer-in-charge of such programme shall not relieve the contractor of any of the obligations under the contract.

4. The contractor shall submit the Time and Progress Chart and progress report using the mutually agreed software or in other format decided by Engineer-in-

charge for the work done during previous month to the Engineer-in-charge on or before 5th day of each month.

5. The program chart should include the following: -
   a) Descriptive note explaining sequence of various activities.
   b) BAR CHARTS prepared in mutually agreed software or in other format decided by Engineer-in-charge which will indicate resources in financial terms, manpower and specialized equipments for every important stage.
   c) Program for procurement of materials by the contractor.
   d) Program for arranging and deployment of manpower both skilled and unskilled so as to achieve targeted progress.
   e) Program of deployment of machinery / equipments having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor.
   f) Programme for achieving milestones.

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

22. The submission for approval by the Engineer-in-Charge of such programme or the furnishing of such particulars shall not relieve the contractor 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 contractor as per terms and conditions of the agreement.

23. If the work is carried out in more than one shift or during night no claim on this accounts shall be entertained.

24. 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. 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.

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

26. Any cement slurry added over base surface for continuation of concreting for better bond is deemed to have been built in the items and nothing extra shall be payable for extra cement considered in consumption on this account.

27. The contractor shall take instructions from the Engineer-in-charge for stacking of materials. No excavated earth or building materials etc. shall be stacked/collected in areas where other buildings, roads, services, compound walls etc. are to be constructed.
    Any trenching and digging for laying sewer lines/water lines/cables etc. shall be commenced by the contractor only when all men, machinery's and materials

have been arranged and closing of the trench(s) thereafter shall be ensured within the least possible time.

28. The contractor shall submit for the approval of Engineer-in-Charge names of specialized agencies of repute along with their technical capacity proposed to be engaged by him, who must have executed satisfactorily works of value as specified in mandatory conditions.

a) The works shall be carried out in accordance with the Architectural drawings and structural drawings. Before commencement of any item of work, the contractor shall correlate all the relevant architectural and structural drawings issued for the work and satisfy himself that the information available there of is complete and unambiguous.

The discrepancy, if any shall be brought to the notice of the Engineer-in-Charge before execution of the work. The contractor alone shall be responsible for any loss or damage executing by the commencement of work on the basis of any erroneous and or incomplete information.

b) The contractor shall take all precautions to avoid accidents by, exhibiting caution boards day and night, speed limit boards, red flags, red light and providing necessary barriers and other measures required from time to time. The contractor shall be responsible for all damages and accidents due to negligence on his part.

c) Other agencies will also simultaneously execute and install the works of electrification, air conditioning, lifts, fire-fighting etc. for this work and the contractor shall provide necessary facilities for the same. The contractor shall leave such recesses, holes openings etc. as may be required for the electric, air- conditioning and other related works (for which inserts, sleeves, brackets, conduits base pinion, clamps etc. shall be supplied free of cost by the department unless otherwise specifically mentioned) and the contractor shall fix the same at time of casting of concrete, stone work & brick work, if required and nothing extra shall be payable on this account.

d) The contractor shall conduct 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 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.

29. The works to be governed by this contract shall cover delivery and transportation up to destination, safe custody at site, insurance, erection, testing and commissioning of the entire works.

30. The works to be undertaken by the contractor shall inter-alia include the following:

(a) Preparation of detailed SHOP drawings and AS BUILT drawings wherever applicable.

(b) Obtaining of Statutory permissions where-ever applicable and required.

(c) Pre-commissioning tests as per relevant standard specifications, code of practice, Acts and Rules wherever required.

(d) Warranty obligation for the equipments and / or fittings/fixtures supplied by the contractor. Contractor shall provide all the shop drawings or layout drawings for all the co-ordinated services before starting any work or placing any order of any of the services etc. These shop drawings/layout drawings shall be got approved from Engineer-in-charge before implementation and this shall be binding on the contractor. The contractor shall submit material submittals along with material sample for approval of Engineer-in-Charge prior to delivery of material at site.

31. Samples of all materials and fittings to be used in the work in respect of brand manufacturer and quality shall be got approved from the Engineer-in-Charge, well in advance of actual execution and shall be preserved till the completion of the work. Articles bearing BIS certifications mark shall only be used unless no manufacturer has got BIS mark for the particular material. Any material/fitting whose sample has not been approved in advance and any other unapproved material brought by the contractor shall be immediately removed as soon as directed.

32. **PREVENTION OF NUISANCE AND POLUTION CONTROL**

a) The contractor 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 damage to such properties from pollutants like smoke, dust, noise. The contractor shall use such methodology and equipment so as to cause minimum environmental pollution of any kind and minimum hindrance to road users and to occupants of the adjacent properties or other services running adjacent/near vicinity. The contractor shall make good at his cost and to the 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. All waste or superfluous materials shall be

carried away by the contractor, without any reservation, entirely to the satisfaction of the Engineer-in- Charge.

b) The contractor shall ensure that all the trucks or viechels of any kind which are used for construction purposes/ or are carrying construction material like cement, sand and other allied materials are fully covered.

c) The contractor shall ensure that the construction materials including transportation of earth are covered by tarpaulin.

33. **Security and Traffic Arrangments**

a) In the event of any restrictions being imposed by the Institute authorities/ or any other authority having jurisdiction in the area on the working or movement of labour /material, the contractor shall strictly follow such restrictions and nothing extra shall be payable to the contractor on such

accounts. The loss of time on these accounts, if any, shall have to be made up by augmenting additional resources whatever required.

b) No payment shall be made for any damages caused by rain, snowfall, flood, earthquake 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 the work for which payment has been advanced to him under the contract and he shall make good the same at his risk and cost. The contractor shall be fully responsible for safety and security of his material, T&P/Machinery brought to the site by him.

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

d) 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 to, by the contractor, during the execution of work. The Contractor shall also adhere to all traffic restrictions notified by
the local authorities. The Contractor shall arrange to give all notices as required by any statutory / regulatory authority and shall pay to such authority all the fees that is required to be paid for the execution of work. He shall protect and indemnify the Department and its officials & employees against any claim and /or liability arising out of violations of any such laws, ordinances, orders, decrees, by himself or by his employees or his authorized representatives. Nothing extra shall be payable on these accounts.

e) For works below ground level the contractor shall keep that area free from water. If dewatering or bailing out of water is required the contractor shall do the same at his own cost and nothing extra shall be paid.

f) The Contractor shall make all necessary arrangements for protecting from rains, fog or likewise extreme weather conditions, the work already executed and for carrying out further work, during monsoon including providing and
fixing temporary shelters, protections etc. Nothing extra shall be payable on this account and also no claims for hindrance shall be entertained on this account.

g) In case of flooding of site on account of rain or any other cause and any consequent damage, whatsoever, no claim financially or otherwise shall be entertained notwithstanding any other provisions elsewhere in the contract agreement. Also, the Contractor shall make good, at his own cost, the damages caused, if any. Further, no claims for hindrance shall be entertained on this account.

h) The contractor will take reasonable precautions to prevent his workman and employees from removing and damaging any flora (tree/plant/vegetation) from the project area.

34. **Setting out**

a) The Contractor shall carry out survey of the work area, at his own cost, setting out the layout of buildings/ roads/ services in consultation with the Engineer
-in-Charge & proceed further. Any discrepancy between architectural drawings and actual layout at site shall be brought to the notice of the
Engineer -in-charge. It shall be responsibility of the Contractor to ensure
correct setting out of alignment. Total station survey instruments only shall be used for layout, fixing boundaries, and centre lines, etc., Nothing extra shall be payable on this account.

b) The Contractor shall establish, maintain and assume responsibility for grades, lines, levels and benchmarks. He shall report any errors or inconsistencies regarding grades, lines, levels, dimensions etc. to the Engineer -in-Charge before commencing work. Commencement of work shall be regarded as the Contractor's acceptance of such grades, lines, levels, and dimensions and no claim shall be entertained at a later date for any errors found.

c) If at any time, any error appears due to grades, lines, levels and benchmarks
during the progress of the work, the Contractor shall, at his own expense rectify such error, if so required, to the satisfaction of the Engineer -in- Charge. Nothing extra shall be payable on this account.

d) The approval by the Engineer-in-Charge, of the setting out by the Contractor, shall not relieve the Contractor of any of his responsibilities and obligation to rectify the errors/ defects, if any, which may be found at any stage during the progress of the work or after the completion of the work.

e) The Contractor shall be entirely and exclusively responsible for the horizontal, vertical and other alignments, the level and correctness of every part of the work and shall rectify effectively any errors or imperfections therein. Such rectifications shall be carried out by the Contractor at his own cost to the entire satisfaction of the Engineer - in-Charge.

f) The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work (including marking of reference points, center lines
of buildings), construction and maintenance of reference bench mark(s), taking spot levels, construction of all safety and protection devices, barriers, signage, labour safety, labour welfare and labour training measures, preparatory works, working during monsoon, working at all depths, height and location etc. and any other incidental works required to complete this work. Nothing extra shall be payable on this account.

35. The contractor should have own constructions equipment required for the proper and timely execution of the work. Nothing extra shall be paid on this account. No tools and plants including any special T&P etc. shall be supplied by the Department and the Contractor shall have to make his own arrangements at his own cost. No claim of hindrance (or any other claim) shall be entertained on this account

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

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

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

39. The Contractor shall take all precautions to abide by the Environmental related restrictions imposed by any statutory body having jurisdiction in the area as well as prevent any pollution of streams, ravines, river bed and waterways. All waste or superfluous materials shall be transported by the Contractor, entirely to the satisfaction of the Engineer- In-Charge and disposed at designated places only. No claim what so ever on account of site constraints mentioned above or any other site constraints, lack of public transport, inadequate availability of skilled, semi- skilled or unskilled workers in the near vicinity, non-availability of construction machinery spare parts and any other constraints not specifically stated here, shall be entertained from the Contractor. Therefore, the Tenderers are advised to visit site and get first-hand information of site constraints. Accordingly, they should quote their tenders. Nothing extra shall be payable on this account.

40. The Contractor shall cooperate with and provide the facilities to the associate Contractors and other agencies working at site for smooth execution

of the work. The contractor shall indemnify the Department (IWD) against any claim(s) arising out of such disputes. The Contractor shall:

a) Allow use of scaffolding, toilets, sheds etc.

b) Properly co-ordinate their work with the work of other Contractors.

c) Provide control lines and benchmarks to his associate Contractors and the other Contractors.

d) Provide electricity and water at mutually agreed rates.

e) Provide hoist and crane facilities for lifting material at mutually agreed rates.

f) Co-ordinate with other Contractors for leaving inserts, making chases, alignment of services etc. at site.

g) Adjust work schedule and site activities in consultation with the Engineer-In-Charge and other Contractors to suit the overall schedule completion.

h) Resolve the disputes with other Contractors/ associate contractors amicably and the Engineer-in-Charge shall not be made intermediary or arbitrator.

41. The work should be planned in a systematic manner so as to ensure proper co-ordination of various disciplines viz. sanitary & water supply, drainage, rain water harvesting, electrical, fire fighting & fire alarm system, information technology, communication & electronics and any other services.

42. All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on project location during excavation/construction shall be the property of the Government, and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precaution to prevent his work men or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer-in-charge of such discovery and carry out the official instructions of Engineer-in- charge for dealing with the same, till then all work shall be carried out in a way so as not to disturb/damage such article or thing.

43. He shall protect and indemnify the Department and its officials & employees against any claim and /or liability arising out of violations of any such laws, ordinances, orders, decrees, by himself or by his employees or his authorized representatives. Nothing extra shall be payable on these accounts.

44. The Contractor shall assume all liability, financial or otherwise in connection with this contract and shall protect and indemnify the Department from any and all damages and claims that may arise on any account. The Contractor shall indemnify the Department against all

claims in respect of patent rights, royalties, design, trademarks- of name or other protected rights, damages to adjacent buildings, roads or members of public, in course of execution of work or any other reasons whatsoever, and shall himself defend all actions arising from such claims and shall indemnify the Department in all respect from such actions, costs and expenses. Nothing extra shall be payable on this account.

45. **Supervision of work**

The Contractor shall depute experienced & qualified Site Engineers & skilled workers as required for the work. He shall submit organization chart alongwith 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 Kanpur 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 with quality and in stipulated time limit. Principle Technical representative of the Contractor having minimum experience in similar nature of work as mentioned in the clause 32 of the General Conditions of the Contract, shall always be available at the site during the actual execution of the work.

46. **Cleaniness of site**

a. The Contractor shall not stack building material/malba/muck on the land or road of the institute or on the land owned by the others, as the case may be. So the muck, rubbish etc. shall be removed periodically as directed by the Engineer-in- Charge, from the site of work to the approved dumping grounds as per the local bye laws and regulations of the concerned authorities and all necessary permissions in this regard from the local bodies shall be obtained by the Contractor. Nothing extra shall be payable on this account. In case, the Contractor is found stacking the building material/malba as stated above, the Contractor shall be liable to pay the stacking charges/penalty as may be levied by the local body or any other authority and also to face penal action as per the rules, regulations and bye- laws of such body or authority. The Engineer –in-Charge shall be at liberty to recover, such sums due but not paid to the concerned authorities on the above accounts, from any sums due to the Contractor including amount of the Security Deposit and performance guarantee in respect of this contract agreement.

b. The contractor 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 buildings, roads, services and compound walls are to be constructed.

c. The Contractor shall take all care to prevent any water- logging at site. The waste water, slush etc. shall not be allowed to be collected at site. For discharge into public drainage system, necessary permission shall be obtained from relevant authorities after paying the necessary charges, if any, directly to the authorities. The work shall be carried out in such a way

that the area is kept clean and tidy. All the fees/charges in this regard shall be borne by the Contractor. Nothing extra shall be payable on this account.

47. **Inspection of work**

Institute authorities, MHRD, HEFA, Local authorities and other Govt. authorities shall be inspecting the on-going work at site at any time with or without prior intimation. The contractor shall, therefore, keep updated the following requirements and detailing.

a) Display Board showing detail of work, weekly progress achieved with respect to targets, reason of shortfall, status of manpower, wages being paid for different categories of workers.

b) Entrance and area surrounding to be kept cleaned.

c) Display layout plan key plan, Building drawings including plans, elevations and sections.

d) Upto date displays of Bar chart, CPM and PERT etc.

e) Keep details of quantities executed, balance quantities, deviations, possible Extra item, substituted Item etc.

f) Keep plastic / cloth mounted one sets of building drawings.

g) Set of Helmets (ISI approved) and safety shoes for exclusive use for officers/dignitaries visiting at site.

48. **Insurance Policy**

(a) Before commencing the execution of work, the Contractor 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 Contractor shall obtain and submit to the Engineer-in-Charge 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). Also, he shall indemnify the Department from any liability during the execution of the work.

(c) The Contractor shall, from time to time, provide documentary evidence as regards payment of premium for Insurance Policy for keeping them valid till the completion of the work. Without prejudice to any of its obligations and responsibilities specified above, the Contractor shall within 15 days from the date of letter of acceptance of the tender and thereafter at the end of each quarter submit a report to the Department giving details of the Insurance Policy along with Certificate of this insurance policy being valid, alongwith documentary evidences as required by the Engineer-in-Charge. No work shall be commenced by the Contractor unless he obtains the Insurance Policy as mentioned above. Also, no payment shall be made to the Contractor on expiry of insurance policy unless renewed by the Contractor.

Nothing extra shall be payable on this account. No claim of hindrance (or any other claim) shall be entertained from the contractor on this account.

49. On completion of work, the contractor shall submit at his own cost four prints of **"as built" drawings to the Engineer-in-Charge within 30 days of completion of work**. These drawings shall have the following information:

a) Route of all piping and their diameters including soil waste pipes & Vertical stacks.

b) Ground and invert levels of all drainage pipes together with locations of all manholes and connections upto outfall.

c) Route of all water supply lines with diameters, location of control valves, access panels etc.

50. **Personal Safety Measures for Labour**

Contractor shall provide the following items for safety of workers employed by contractor and associate agencies:

(i). Safety Shoes (ISI approved)/helmet and gloves to all workers employed for the work on mixing, cement, lime mortars, concrete etc. and openings in water pipeline/sewer line.

(ii). Welder's protective eye-shields to workers who are engaged in welding works.

(iii) Safety helmet ISI approved & ISI marked double harness safety belt Provide adequate sanitation/safety facilities for construction workers to ensure the health and safety of the workers during construction, with effective provisions for the basic facilities such as sanitation, drinking water and safety equipments or machinery.

(iv) All the workers should be wearing helmet and shoes all the time on site.

(v) Masks and gloves should be worn whenever and wherever required.

(vi) Adequate drinking water facility should be provided at site, adequate number of decentralized latrines and urinals to be provided for construction workers.

(vii) Full time Guard for watch and ward of materials & T&P at site (if any with the approval of Engineer-in-Charge) residing on site should be provided with clean and adequate temporary hutment.

(viii) First aid facility should also be provided.

(ix) Overhead lifting of heavy materials should be avoided. Barrow wheel and hand-lift boxes should be used to transport materials onsite.

(x) Tobacco and cigarette smoking should be prohibited onsite.

(xi) All dangerous parts of machinery are well guarded and all precautions for working on machinery are taken.

(xii) Maintain hoists and lifts, lifting machines, chains, ropes and other lifting tackles in good condition. Provide safety net of adequate strength to arrest falling material down below.

(xiii) Use of durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.

(xiv) Ensure that walking surfaces or boards at height are of sound construction and are provided with safety rails and belts. Provide protective equipments such as helmets.

(xv) Provide measure to prevent fire. Fire extinguisher and buckets of sand to be provided in fireprone area and elsewhere.

(xvi) Provide sufficient and suitable light for working during night.

(xvii) Ensure that measures to protect workers from materials of construction, transportation, storage and other dangers and health hazards are taken.

(xviii) Ensure that the construction firm/division/company have sound safety policies.

(xix) Comply with the safety procedure, norms and guidelines (as applicable) as outlined in NBC 2005 (BIS 2005c). All workers shall be provided regular safety training by the designated safety officer of the contractor before allowing them to work at site.

(xx) Adopt additional best practices and prescribed norms as in NBC 2005 (BIS2005).

51. Water Pollution

(i) The Contractor shall take all precautionary measures to prevent the wastewater during construction to accumulate anywhere.

(ii) The wastewater arising from the project is to be disposed off in the manner that is acceptable to the Engineer –in-charge.

52. Air and Noise Pollution

Contractor shall use dust screens and sprinkle water around the construction site to arrest spreading of dust in the air and surrounding areas.

a. Contractor shall ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that emission levels comply with environmental emission standards/norms.

b. For controlling the noise from Vehicles, Plants and Equipments, the contractor shall confirm the following:-

(i) All vehicles and equipment used in construction will be fitted with exhaust silencers.

(ii) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.

c. Noise emission from compactors (rollers) front loaders, concrete mixers, cranes (movable), vibrators and saws should be less than 75 dB(A).

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

55. **Construction Vehicles, Equipment and Machinery**

a. All vehicles, equipment and machinery to be procured for construction shall conform to the relevant Bureau of India Standard (BIS) norms.

b. Emission from the vehicles must conform to environmental norms.

c. Dust produced from the vehicular movement and other site activities is to be mitigated by sprinkling of water.

d. Noise limits for construction equipments shall not exceed 75 dB(A), measured at one meter from the edge of the equipment in free area, as specified in the Environment Protection Act,1986, schedule VI part E, as amended on 9th May,1993. The maximum noise levels near the construction site should be limited to 65 dB (A) Leq (5 min) in project area.

53. Construction Wastes Disposal

(i) The pre-identified dump locations will be a part of solid waste management plan to be prepared by the Contractor in consultation with Engineer-in- charge.

(ii) Contractor shall get approved the location of disposal site prior to commencement of the excavation on any section of the project location.

(iii) Contractor shall ensure that any spoils of material / construction waste will not be disposed off in any municipality solid waste collection bins.

(iv) No construction waste shall be allowed to be thrown directly on the ground from the higher floors of the building. The required number of chutes shall have to be provided by the contractor for the disposal of construction waste. Nothing extra shall be paid on this account.

54. Procurement of Construction Materials

(i) All vehicles delivering construction materials to the site shall be covered to avoid spillage of materials and maintain cleanliness of the roads.

(ii) Wheel Tyres of all vehicles used by the contractor, or any of his sub contractor or materials suppliers shall be cleaned and washed clear of all dust/mud before leaving the project premises. This shall be done by routing the vehicles through tyre washing tracks.

(iii) Contractor shall arrange for regular water sprinkling at least twice a day (i.e. morning and evening) for dust suppression of the construction sites and unpaved roads used by his construction vehicles.

(iv) All material storages should be adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust/particulate emissions.

(v) Ensure that water spraying is carried out by wetting the surface by spraying water on:

(a) Any dusty material.

(b) Areas where demolition work is carried out.

(c) Any unpaved main-haul road and.

(d) Areas where excavation or earth moving activities are to be carried out.

(vi) The contractor shall ensure the following:

(a) Cover and enclose the site by providing, erecting & maintaining 5.00 meter high temporary barricading with MS tubular members of appropriate sizes

out of which brand new profile sheet of 3.00 meter height & rest 2.00 meter height covered with green garden cloth (90/10) which also covered entire height of profile sheet as approved by Engineer-in-charge on the construction site. After completion of work, the contractor will take away all the barricading materials

(b) Covering stockpiles of dusty material with impervious sheeting.

(c) Covering dusty load on vehicles by impervious sheeting before they leave the site.

(d) Transferring, handling/storing dry loose materials like bulk cement and dry pulverized fly ash inside a totally enclosed system.

(e) Spills of dirt or dusty materials shall be cleaned up promptly so that the spilled material does not become a source of fugitive dust and also to prevent seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean-up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained / cleaned up immediately before they can infiltrate into the soil/ground or runoff in nearb y areas. Clear vegetation only from areas where work will start right away.

(vii) Adopt measures to prevent air pollution in the vicinity of the site due to construction activities. There is no standard reference for this. The best practices should be followed (as adopted from international best practice documents and codes).

(viii) The contractor shall provide experienced personnel with suitable training to ensure that these methods are implemented. Prior to the commencement of any work, the method of working, plant equipment and air pollution control system to be used on –site should be made available for the inspection and approval of the Engineer –in-Charge to ensure that these are suitable for the project.

(ix) Employ measures to segregate the waste on-site into inert, chemical or hazardous wastes. Recycle the unused chemical/hazardous wastes such as oil, paint, batteries and asbestos. The inert waste is to be disposed off to Municipal Corporation/local bodies dump yard and landfill sites.

(X) To preserve the existing landscape and protect it from degradation during the process of construction. Select proper timing for construction activity to minimize the disturbance such as soil pollution due to spilling of the construction material and its mixing with rainwater. The construction management plan including soil erosion control management plan shall be prepared accordingly for each month. The application of erosion control measures includes construction of gravel pits and tyre washing bays of approved size and specification

for all vehicular site entry/exits, protection of slopes greater than 10%. Sedimentation Collection System and run-off diversion systems shall be in place before the commencement of construction activity. Preserve and protect the existing vegetation by not-disturbing or damaging to specified site areas during construction.

(xi) The Contractor should follow the construction plan as proposed by the Engineer-in-charge / landscape consultant to minimize the site disturbance such as soil pollution due to spilling. Use staging

and spill prevention and control plan to restrict the spilling of the contaminating material on site.

(xii) Spill prevention and control plans should clearly state measures to stop the source of the spill. Measures to contain the spill and measures to dispose the contaminated material and hazardous wastes. It should also state the designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners and petroleum products.

(xiii) The contractor shall prepare and submit 'Spill prevention and control plans' before the start of construction, clearly stating measures to stop the source of the spill, to contain the spill, to dispose the contaminated material and hazardous wastes, and stating designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners, and petroleum products.

(xiv) The contractor shall ensure that no construction leaches (Ex: cement slurry) is allowed to percolate into the ground. Adequate precautions are to be taken to safeguard against this including reduction of wasteful curing processes, collection, basic filtering and reuse. The contractor shall follow requisite measures for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant – laden water directly to the treatment device or facility (municipal sewer line).

(xv) All lighting installed by the contractor around the site and the gowdons, offices shall be of LED lights of the appropriate illumination levels. This condition is a must, unless specifically prescribed otherwise.

(xvi). No extra payment will be made for operation/activity mentioned at Sl. No. **(i) to(xv)** above unless specifically mentioned otherwise.

55. NATIONAL GREEN TRIBUNAL NORMS TO BE FOLLOWED AT SITE

(i) The contractor shall not store/dump construction material or debris on metalled road.

(ii) The contractor shall get prior approval from Engineer-in-charge for the area where the construction material or debris can be stored beyond the material road. This area shall not cause any obstruction to the free flow of traffic/ inconvenience to the pedestrians. It should be ensured by the contractor that no accidents occur on account of such permissible storage.

(iii) The contractor shall ensure that all the trucks or vehicles of any kind which are used for construction purpose/or are carrying construction material like cement, sand and other allied material are fully covered. The contractor shall take every necessary precautions that the vehicles are properly cleaned and dust free to ensure that enroute their destination, the dust, sand or any other particles are not released in air/contaminate air.

(iv) The contractor shall provide mask to every worker working on the construction site and involved in loading, unloading and carriage of construction material and construction debris to prevent inhalation of dust particles.

(v) The contractor shall provide all medical help, investigation and treatment to the workers involved in the construction of building and carry of construction material and debris relatable to dust emission.

(vi) The contractor shall ensure that C&D waste is transported to the C&D Waste site only and due record shall be maintained by the contractor.

(vii) The contractor shall compulsory use of wet jet in grinding and stone cutting.

(viii) The contractor shall comply all the preventive and protetive environmental steps as stated in the MoEF guidelines, 2010.

(ix) The contractor shall carry out on-Road-Inspection for black smoke generating machinery.

(x) The contractor shall use cleaner fuel.

(xi) The contractor shall ensure that all DG sets comply emission norms notified by MoEF.

(xii) The contractor shall use vehicles having pollution under control certificate. The emissions can be reduced by a lagre extent by reducing the speed of a vehicle to 20 kmph. Speed bumps shall be used to ensure speed reduction. In cases where speed reduction cannot effectively reduce fugitive, the contractor shall divert traffic to nearby paved areas.

(xiii) The contractor shall ensure that the construction material is covered by tarpaulin. The contractor shall take all other precaution to ensure that no dust particles are permitted to pollute air quality as a result of such storage.

(xiv) The paving of the path for plying of vehicles carrying constructon material is more permanent solution to dust control and suitable for longer duration projects.

(xv) The natural drainage system should be maintained by the contractor at his own cost. Local Bye-law/ provisions on Rain Water Harvesting should be followed.

(xvi) No extra payment shall be made for operation/activity mentioned at Sl No. **(I) to (xv)** above.

56. Project Monitoring

(i) The Agency shall prepare the phase wise (monthly) resource chart (materials, manpower and machinery) based on the project execution schedule.

(ii) The Agency shall submit the photographs & videos of progress of work on fortnightly basis to make it possible to create a short film of the entire execution of the work to be kept in archive.

(iii) Agency shall submit a detailed Monthly progress & program report to the Engineer-in- charge by 5th of every month. The format of monthly progress

& program report shall be as approved by Engineer-in-Charge.

(iv) The Agency will make it possible to be represented by a senior level executive who have sufficient financial powers to take decisions required for completing the project in time.

(v) 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.

57. **Documentation of Work**:

Agency shall make documentation in regard to the various stages of progress of work. Nothing shall be paid on this account to the contractor. The scope includes:-

(i) Colour photography of the work at every three month interval or lesser interval as per direction of Engineer-in charge and at the completion of work covering the entire work upto that stage and supplying the same in soft copy with storage instrument of required capacity as per direction of Engineer-in- charge.

(ii) Videography of the execution of work every six months or lesser interval and at completion of work i/c preparation of documentary with voice over showing the progress of work as directed by Engineer-in-charge.

(iii) Each photograph/video shall be suitably captioned and dated.

(iv) The photographs/video and materials including soft copy shall form a part of the records of IWD and the prints cannot be supplied to anybody else or published without the written permission of Engineer-in-charge. All documents i/c photograph/video and other documents in hard copy shall be submitted by the agency to the Engineer-in-charge on quarterly basis for recordpurpose.

PART - B1

GCC 2020 for EPC Contracts (Attached in "PDF" this shall be the part of Contract Agreement, Total Pages 111 Nos.)

https://drive.google.com/drive/folders/14-rJyZCRfaLZu8h5KycNaL5_4cUaPZG2?usp=sharing

PART-B2

PARTICULAR SPECIFICATION FOR CIVIL WORK

PARTICULAR SPECIFICATION
& SPECIAL CONDITION OF WORK

1. Scope of work –

Scope of Work shall cover the design and drawings wherever required for execution, preparation of shop drawings, supply, installation, testing, labor & workmanship etc. required to be provided in this said scheme/project. The design of component/ items /scheme where ever required also includes in the scope. Work shall be executed as per scope and specification and drawing. If any service and item and component and provision required making building/scheme functional/habitable if not specifically mentioned in the scope of this tender, the same shall be deemed to be included within the scope of this tender and nothing extra shall be paid on this account. The rates quoted in schedule of financial quote shall be inclusive of all materials, labors, T&P, r o y a l t y , all taxes (but excluding GST) and other incidental charges complete. The GST @ 12 % shall be paid extra along with the running bills.

The Contractor shall be fully responsible for the execution and supervision of all works. He shall engage a Professional Engineer and Specialist Professional Engineer to undertake work in accordance with statutory requirements and condition of this contract.

2. Soil Investigation Report:

i. Soil investigation report/ major characteristic of soil for site has been uploaded separately in PDF. Which shall be the part of agreement.

ii. The Contractor's attention is drawn to the presence of existing services such as, drainage lines, sewer lines, power lines and concrete footpath at site, and shall make the necessary provision for the removal, due to such encumbrances. The works shall be done on ground as available; therefore, no claim for extra cost or time shall be entertained for this account.

3. Technical specification for construction:

The Contractor shall be responsible to work in accordance to the complete set of Technical Specifications, Architectural Drawings, Interior Finishing drawings and other related drawings of services as per NIT

The Contractor shall ensure that the quality and workmanship shall be as per CWPD specifications 2009,Vol-I & II and other specification mentioned in the tender document.

4. Safety and working Conditions:

The Contractor has to fully comply with all the safety requirements of the latest NBC Safety guidelines / CPWD Safety guidelines / Central Labour Act and all other relevant local Byelaws, Acts, Regulations, Safety, Health and Environment Handbook 2019 etc. The workmen's compensation policy as per the number of workers employed at site shall have to be taken by the contractor at the starting of the work for the whole contract period. The contractor has to obtain the labour license & BOCW registration at the starting of the work.

The Contractor shall also comply with Authorities' requirements regarding the removal and discharge of any spoil, surplus materials, debris or other materials.

5. Materials:

The quality of the works throughout and workmanship shall be to the satisfaction of Engineer-in charge or his Representative.

All materials shall be conforming to the latest relevant Indian standards. All materials which do not comply with this Contract and BIS code shall be removed from the Site by the Contractor at his own expenses.

Earthwork

General

All types of excavation work shall be done in accordance with CPWD specifications 2009, Volume - I & II.

Any trenching and digging for laying sewer lines / water lines /cables etc. shall be commenced by the contractor only when all men, machinery's and materials have been arranged and closing of the trench(s) thereafter shall be ensured within the least possible time. The excavation through the mechanical means shall only be taken after conforming that there are no power cables in that area proposed for excavation.

a. Setting Out:

The Contractor shall be responsible for accurately setting out the Works to the specified positions, dimensions, levels, and building lines and also checking the site survey for dimensional and level accuracy and reporting any discrepancies before any commences. Any errors in position, level, dimension or alignment of any part of the Works at any time shall be rectified by the Contractor at his own expense. The Contractor shall provide the Engineer with all facilities, equipment and labour to enable him to check the setting out and levels of the Works at all times. The checking of any setting out points, lines or levels by the Engineer shall not in any way relieve the Contractor of his responsibility. All setting out points, benchmarks, site rails, pegs and other survey points shall be clearly marked and protected from damage or disturbance during the execution of the Works as per CPWD Specifications.

b. Applicable Standards:

The contractor shall ensure to follow the applicable CPWD Specifications Vol-I & II /BIS Standards related to the excavation and local building/statutory regulations.

c. Labour and Equipments:

The Contractor shall provide all labours, equipment, materials and any incidentals necessary to complete all aspects of work included in the drawings and specifications. The Contractor shall submit Earth Management Plan which is to be approved by the Employer or Engineer's Representative before commencing the work.

d. Related Works:

i) Clearing, grubbing, and removing all vegetation from the site.
ii) Excavation including getting out and necessary dressing to make surface ready to receive blinding.
iii) Filling and back filling and compaction of fills
iv) Removal and disposal of surplus material.
v) Dewatering.
vi) Road and Compound Wall Works

Earthwork in excavation by mechanical means (hydraulic Excavators)/ manual means over areas / Foundation trenches including getting out and disposal of excavated earth all lead and lifts up to all heights as per the structural drawings, for all kinds of soil including ordinary rock if any , as directed by Engineer-in-charge . Any deviation in earthwork in excavation as per site condition will be ignored and nothing extra shall be paid . Top soil to 300mm shall be preserved and used in future landscaping development, as per specification and direction of Engineer-in-charge . Excavation for the foundation depth shall be up to 4500 mm from natural ground level (NGL) or as specified in the relevant drawings.

Sub-soil water table at work site is reported to be at 8 meter below the general ground level. The contractor shall make at his own cost all necessary arrangements for lowering water level, in the area where works are under execution so enough so as not to cause any harm to the work shall be considered as inclusive of pumping out or bailing out water, if required, for which no extra payment shall be made. This will include water coming from any source, such as rains, accumulated rainwater, 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 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.

All Excavated material including excavated earth declared as surplus and not useful, shall only be removed from the Site by the contractor. The removal of surplus Material shall only be undertaken by the contractor when instructions in this regard are obtained from Engineer in charge.

Dumping shall be made only at the designated place identified by the Engineer-in-Charge. No payment/fees on this account shall be entertained by the department.

Filling available excavated earth (excluding rock) except unsuitable earth (black cotton soil, etc.) in trenches, plinth, sides of foundations, etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, in all lead and lift. If sufficient quantity of suitable filling earth is not available from excavated earth, the contractor shall bring local Ganga sand (including royalty) from outside by mechanical transport up to all lead and lifts. The work shall also include ramming and watering in layers not exceeding 20 cm in depth in trenches, plinth, sides of foundation etc. complete as per direction of Engineer-in-Charge.

Filling with sand in plinth under floors 150mm depth in electrical, HVAC and Guard Room and wherever mentioned in drawing , including watering, ramming, consolidating and dressing, complete as per directions of Engineer-in-Charge .

Injecting chemical emulsion for pre-constructional anti-termite treatment Bayer Premise (Imidacloprid 30.5% m/m SC (use 1% dilution or as per manufacturer's specification), as under Along the external wall below concrete or masonry apron using chemical emulsion @ 2.25 litres per linear meter including drilling and plugging holes etc.:

e. Disposal o f Excavated material /Earth/ Building Rubbish

All Excavated Material/earth of the building for any component should be stacked within 3 km at the designated place identified by the Engineer-in-charge & the earth shall be brought back for backfilling of foundation , plinth & development of plot area nothing extra shall be paid on this account .

The earth that is declared as surplus and not useful shall be removed from site by contractor within the scope of agreement . The removal of surplus material shall be only be undertaken by the contractor when instructions in this regard are obtained by the Engineer-in-charge . Contractor shall also obtain necessary permissions / approvals / authorization from the competent authority of local body / traffic / police as the case may be for removal of excavated earth/material. No payment/fees on this account shall be entertained by the department.

The construction work of this building may generate huge quantity of Building rubbish/malba. This Building rubbish/malba shall required to remove from the site on daily basis, if the same is not

removed, a penalty of Rs 1000/- per day levied till the removal of malba/building rubbish. The contractor should not throw the malba/rubbish from higher floors directly on the grounds. It should be brought down through the staircase by the workers or proper shoute should be installed for this purpose. The building rubbish/ malba shall have to be disposed and levelled at the designated place as directed by Engineer-in-charge by the contractor without any extra cost.

CONCRETE WORK:

a. Plain Cement Concrete / Lean Concrete:

Plain Cement Concrete / Lean concrete in required thickness as per design shall be laid below all type of foundation works, below kerb stone, under floors or wherever required as per CPWD Specifications 2009, Volume - I & II.

Base concrete below the footings, brick foundations, grade beam, grade slab, plinth Beam, under floors, below plinth protections, steps, ramps, etc. and wherever specified in structural/ architectural drawings, shall be in 1:4:8 (1 Cement: 4 coarse sand :8 graded stone aggregate 40 mm nominal size). Thickness of PCC should not less than 75mm or as specified in the relevant drawings.

The lightweight cement concrete shall be as per the specification for the cement concrete works given in CPWD Specifications except for the material used as coarse aggregate. The coarse aggregate used for the lightweight cement concrete works shall be lightweight aggregates like "Siporex", or Ultratech or Aerocon or equivalent as approved by the Engineer-in-charge. The grading of the light-weight coarse aggregate shall be the same as that of the specified size of the coarse aggregate. In case of non-availability of the specific or required sizes of the light-weight aggregates, it shall be broken into required sizes by using mechanical crushers or any other method approved by the Engineer-in-charge. The oven dry density of the lightweight aggregate shall not be more than 650 kg / cum for Sunken portions for toilets, kitchen and similar locations above ground and at all floor levels shall be filled with Light weight cement concrete 1:5:10 (1 cement : 5 course sand : 10 broken block of 20 mm nominal size specific gravity of light weight aggregate shall not be more than 650 kg/ cum).

Providing and laying damp-proof course 50mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 12.5mm, nominal size) mixed with water proofing material in cement concrete in damp-proof course, to be provided below all brick work/ AAC block work at ground floor plinth level and including applying a coat of residual petroleum bitumen of grade of VG-10 of approved quality using 1.7kg per square meter on damp proof course after cleaning the surface with brushes and finally with a piece of cloth lightly soaked in kerosene oil in HVAC room , Electrical Room , security Guard Room or Wherever mentioned in drawing .

Plinth Protection all around the building , should be provided with 50mm thick of cement concrete 1:3:6 (1 cement: 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75mm thick bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including necessary excavation, leveling & dressing & finishing the top smooth. The Edges of the plinth Protection to be done with

Brick 7 cm wide 11.4 cm deep to plinth protection with common burnt clay F.P.S (non modular) bricks of Class designation 7.5 (local Ist class only) including grouting with cement mortar 1:4 (1 Cement : 4 Coarse Sand).

1. Reinforced Cement Concrete Work:

The work shall be done as per CPWD specifications 2009, Volume - I & II .The agency shall have to follow the grade of mix as specified in structural drawings of the building.

i. If the quantity of cement used in the work is found to be more than the theoretical quantity of cement including authorized variation, nothing extra shall be payable to the contractor on this account. In the event of it being discovered even after the completion of the work, the quantity of cement used is less than the quantity ascertained as herein before provided (allowing variation on the minus side as stipulated in clause 42) the cost of quantity of cement so less used shall be recovered from the contractor at the rate as specified in schedule 'F'. Decision of the Engineer-in-Charge in regard to the quantity of cement which should have been actually used as per the schedule and recovery at the rate specified shall be final and binding on the contractor. For non-scheduled items, the decision of the Engineer-in-charge, regarding theoretical quantity of the cement which should have been actually, used shall be final and binding on the contractor.

ii. Cement brought to site and cement remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-Charge.

iii. In case the contractor brings surplus quantity of cement the same after completion of the work will be removed from the site by the contractor at his own cost after approval of the Engineer- in-Charge.

iv. Cement register for the cement shall be maintained at site.

Cement bags shall be stored in separate godowns to be constructed by the contractor at his own cost as per sketch (which is only indicative and actual size will depend on the site requirements) given in CPWD specifications with weather proof roofs and walls. Each godown shall be provided with a single shutter door with two locks. The key of one lock shall remain with Engineer-in-charge or his authorized representative and that of the other lock with the authorized agent of the contractor at the site of work so that the cement is issued from the godown according to the daily requirements with the knowledge of both parties and proper account for the same is maintained in the standard Performa.

PROFORMA FOR THE CEMENT REGISTER

PARTICULARS OF RECEIPT

Date of receipt	Quantity received	Progressive total	Date of issue	Quantity issued	Items of work for which issued
1	2	3	4	5	6

PARTICULARS OF ISSUE

Qty. returned at the end of the day	Total issued	Daily balance in hand	Contractor's initial	JE's initial	Remarks (AE/EE's periodical check)
7	8	9	10	11	12

a. DESIGN MIX CONCRETE:

The contractor shall be required to submit separate design mixes of concrete for each type of grade with and without using plasticizers, separately for machine batched mix concrete & RMC. The decision of the Engineer-in-charge to specify the design mix of concrete based on above shall be final.

i. Coarse aggregate: As per CPWD Specifications
ii. Fine Aggregate: As per CPWD Specifications.
iii. Water: It shall conform to requirements laid down in IS:456 : 2000 and CPWD specifications.
iv. Cement: Cement arranged by the contractor will be PPC (in bags) conforming to IS: 1489-Part-I
v. Slump: Design slump should be clearly specified in the mix design.
vi. Admixtures shall not be used without approval of Engineer-in-charge. Wherever required, admixtures of approved quality shall be mixed with concrete as specified. The admixtures shall conform to IS: 9103. The chlorides content in the admixture shall satisfy the requirements of BS: 5075. The total amount of chlorides admixture mixed concrete shall also satisfy the requirements of IS: 456. The contractor shall not be paid anything extra for admixture required for achieving desired workability without any change in specified water cement ratio for RCC/CC work.
vii. Grade of Concrete: The compressive strength of various grades of concrete shall be given as below:

	Grade designation	Compressive strength on 15 cm cubes min. 7 days (N/mm2)	Specified characteristic compressive strength at 28 days (N/mm2)	Minimum cement quantity (Kg. per cum. Mtr.)	Maximum water cement ratio
i	M 25	As per design	25	330	0.50
ii	M 30	As per design	30	330	0.45
iii	M 35	As per design	35	350	0.45
iv	M 40	As per design	40	360	0.40

Note-

i. In the designation of a concrete mix letter M refers to the mix and number to the specified characteristic compressive strength of 15 cm x 15 cm x 15 cm – cube 28 days expressed in N/mm2
ii. The minimum/maximum cement content for design mix concrete shall be maintained as per the quantity mentioned above. In case where the quantity of cement required is higher than the minimum specified above to achieve desired strength based on an approved mix design nothing extra shall be Paid in that scope.
iii. Design slump has to be constantly monitored and maintained during placing of concrete through slump tests carried out as per CPWD specification 2009 Vol. 1 for Mortar, Concrete and RCC works, and records maintained accordingly.
iv. **The concrete mix design / laboratory tests with and without admixture shall be got done by contractor at his own cost and will be carried out by the contractor from the I I T Kanpur, Structural Engineering laboratory of Civil Engineering Department.**
v. The various ingredients for mix design / laboratory tests shall be sent to the structural engineering lab of Institute through the Engineer-in-Charge and the samples of such aggregate & cement shall be preserved at site by the contractor.

vi. The contractor shall submit the mix design report of IIT Kanpur for approval of Engineer-in-Charge within 30 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the mix design is approved by the Engineer-in-charge.

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

viii. The Water to be used in concreting is to be tested from institute lab.

a. APPROVAL OF DESIGN MIX-

The mix design for a specified grade of concrete shall be done for a target mean compressive strength Tck=Fck+1.65 s.

Where Fck = Characteristic compressive strength of 28 days

s = Standard deviation which depends on degree of quality control

The degree of quality control for this work is "good" for which the standard deviation (s) obtained for different grades of concrete shall be as bellows:

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

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

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

ii. The batching plant shall conform to IS:4925. It shall have the facilities of presetting the quantity to be weighed with automatic cutoff when the same is achieved. Concreting at places may have to be resorted to through concrete pump for which nothing extra shall be paid.

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

b. WORK STRENGTH TEST SPECIMEN-

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

c. TEST RESULTS OF SAMPLE

The test result of the sample shall be the average of the strength of three specimen. The individual variation shall not be more than 15 percent of the average. If more the test results of the sample are invalid. 90% of the total test shall be done at the laboratory established at site by contractor and remaining 10% shall be tested through the structural lab of Civil Engineering Department of IIT Kanpur.

Lot size

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

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

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

d. STANDARDS OF ACCEPTANCE

i. In case the test result of all the samples is above the characteristic compressive strength, the concrete shall be accepted.

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

a. Any individual test result is not less than (Fck - 4) N/mm2

b. The mean of test result from any group of four consecutive samples is more than (Fck+4) N/mm2.

iii. Concrete of each grade shall be assessed separately

iv. Concrete is liable to be rejected if it is porous or honeycombed, its placing has been interrupted without providing a proper construction joint the reinforcement has been displaced beyond the tolerances specified, or construction tolerances have not been met. However the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the Engineer-in-Charge for which nothing extra is payable to the contractor.

v. 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 test (like cutting cores, ultrasonic pulse velocity test, load tests 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 without any extra cost. However, for payment the basis of rate payable to contractor shall be governed by the 28 days cube test results.

vi. Necessary arrangements shall be made for field tests and all required equipment's shall be arrange by establishing field lab by the Agency for mandatory tests of the materials as specified in CPWD specifications or as per direction of Engineer-in-Charge. No extra payment shall be paid on this account.

vii. In case of actual average compressive strength being less than specified strength which shall be governed by para "Standard of Acceptance" as above the rate payable shall be worked out accordingly on prorate basis.

All structural concrete works below plinth level and above plinth level up to floor VIII level (approx..20 meter from ground level) are to be ready mixed of following grades.

a) M 25 for reinforced cement concrete work below plinth level i.e. in footings, bases of columns, plinth beams & slab on grade.
b) M30 in slabs, lift slab and beams.

All as per structural drawings using cement content as per approved design mix, manufactured in fully automatic plant and transported to site of work in transit mixture for all leads and lifts, having continuous agitated mixer , manufactured as per mix design of specified grade for reinforced cement concrete work , including pumping of R.M.C from transit mixer to site of laying, including cost of all centering, shuttering, finishing reinforcement admixtures (in recommended proportion as per IS: 9103 to accelerate/ retard setting of concrete, improve workability of concrete , improve workability without impairing strength and durability as per direction of the Engineer-in-charge . The M35 design mix in Columns and Shear walls shall be laid with Automatic batch mixing plant installed at site.

e. Steel for Reinforcement –

i. The Work shall be carried out as per CPWD specifications 2009 Vol I & Vol II
ii. The Steel used for Reinforcement shall be of Thermo-Mechanically Treated (TMT) of grade Fe 500D Bars .
iii. The properties and strength of TMT Fe 500D bars shall be as per IS 1786.
iv. The agency shall prepare the Bar Bending schedule as per structural drawings and submit to engineer in charge in advance for approval.

Tests -

i. Selection and preparation of test samples .All the test pieces shall be selected by the Engineer in Charge or his authorized representative either -
   a. From cutting of bars

      Or

   b. If he so desire , from any bar after it has been cut to the required or specified size and the test piece taken from and any part of it.
ii. In either case the test piece shall be detached from the bar or coil except in the presence of the engineer in charge or his authorized representative .
iii. The test pieces obtained in accordance with as above shall be sections of the bar as rolled and subsequently cold worked and shall be subjected to physical testes without any further modification . No deduction in size by by machining or otherwise shall be permissible .
iv. Tensile test, 0.2% proof stress and percentage elongation -This shall be done as per ID 1608 ,read in conjunction with IS 226
v. RE Test- This shall be done as per IS 1608 , read in conjunction with IS 1786 . Rebend Test - This shall be done as per IS 1786.

i. **Binding Wire -** The wire shall be drawn from the wire rods conforming to IS 7887. Tolerances permitted on the diameter of wire shall be as

Size of Wire	Tolerance	Maximum Difference Between Two Readings Taken on Any Two Diameters on the Cross-Section
All finishes other than galvanized		
'UP to 0.25	+- 0.01	0.01
Over 0.25 up to 0.50	+-0.015	0.015
Over 0.50 up to 1.00	+-0.02	0.02
over 1.00up to 1.5	+- 0.03	0.03
Over 1.50 up to 2.50	+-0.04	0.04
Over 2.50 up to 5.00	+-0.05	0.05
Over 5.0	+-0.06	0.06
Galvanized: All sizes	+ 2.5 percent with a minimum of & 0.025	2.5 percent with a minimum of 0.025

The Test to be carried out on the Binding wire shall be as per IS 280:2006.

The contractor shall provide approved type of support/cover for maintaining the bars in position and ensuring required spacing and correct cover of concrete to reinforcement as called for in the drawings, spacer blocks of required shape and size. Chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. Spacer block/cover block shall be factory made having required thickness with desired strength and same colour as surrounding concrete.

f. Formwork-

Shuttering / Form Work - Formworks material should be in steel with rubberized joints. Centering and shuttering including strutting, propping etc. and removal of form work including cost of de-shuttering and de-centering at all levels, for all heights and depths. The work shall be done in accordance with CPWD Specifications - 2009 - Vol. I& Vol. II with up to date correction slips. Steel shuttering and 12 mm thick BWP grade film faced plywood shuttering to be used by contractor as per direction of engineer in charge. All shuttering should be new/fresh.

i. Minimum size of shuttering plates shall be 600mm x 900mm except for the case when closing pieces required to complete the shuttering panels. Dented, broken, cracked, twisted or rusted shuttering plates shall not be allowed to be used on the work.

ii. The shuttering plates shall be cleaned properly with electrically driven sanders to remove any cement slurry or cement mortar or rust. Proper shuttering oil or de-shuttering compound shall be applied on the surface of the shutter plates in the requisite quantity before assembly of steel reinforcement.

iii. The joint filler shall be resilient closed cell expanded polythene and non- tainting as manufactured by Supreme Industries Ltd or equivalent.

iv. Providing joint filler of required thickness in position to substrate using either double sided foam adhesive tape or neoprene synthetic rubber adhesive. When forming expansion joint with the Board in in-situ concrete, joint sealing slots can be readily formed in the following matter-

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

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

vi. Shuttering surface before concreting should be free from any defect/ deposits and fully cleaned so as to give perfectly straight smooth concrete surface. Shuttering surface should be therefore checked for any damage to its surface and excessive roughness before use.

vii. Form work including centering, shuttering, propping, staging shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. It shall be made sufficiently rigid by using adequate number of ties and braces, screw jacks or hard board wedges where required shall be provided to make up any settlement in the form work either before or during the placing of concrete.

viii. The agency shall provide and fix the Exposed shuttering in suspended floors, roofs, Landings ,balconies ,and access platforms with water proof ply 12 mm thick or wherever exposed quality of R.C.C is mentioned or desired by the Engineer-in-charge. The ply shuttering used for Exposed quality shall be used maximum for 2 castings.

Form work shall be properly designed for self-weight, weight of reinforcement, weight of fresh concrete, and in addition, the various live loads likely to be imposed during the construction process (such as workmen, materials and equipment). In case the height of centering exceeds 3.50 meters, the prop may be provided in multi-stages. Extra for additional height in centering, shuttering wherever required with adequate bracing , propping etc including cost of de shuttering at all levels , over a height of 3.5 m for every additional height of 1m nothing extra shall be paid .

i. Form shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections, care shall be taken to see that no piece is keyed into the concrete.

ii. Camber: Suitable camber shall be provided in horizontal members of structure, especially in cantilever spans to counteract the effect of deflection. The form work shall be so assembled as to provide for camber. The camber for beams and slabs shall be 4 mm per meter (1 to 250) or as directed by the Engineer-in-charge, so as to offset the subsequent Deflection, for cantilevers the camber at free end shall be 1/50th of the projected length or as directed by the Engineer-in-charge.

iii. Tolerance in Finished Concrete – The formwork shall be so made as to produce a finished concrete true to shape, lines, level, plumb and dimensions as shown in the drawings subject to the following tolerance unless otherwise specified in this specification or drawings.

Variation from Plumb	+-6 mm	Up to 3 m Height
Variation from the plumb of conspicuous liner	+-6 mm	Up to 6 m Height
Variation in the size of wall openings	(+)15mm (-) 6mm	

COLUMN/ FINS: SLAB, BEAM & GIRDER FORMS:
Variation from the level or from the specified grid for beam soffit before removal of shores,

IN any 6 /3m span	+- 6mm
In 10 m span	+- 10mm

All the tolerances mentioned above shall apply to concrete dimensions only, and not to positioning of vertical steel or dowels. The tolerances given above are specified for local aberration in the finished concrete surface and should not be taken as tolerance for the entire structure taken as whole for the setting and alignment of formwork. Any error, within the above tolerance limits, or any other if noticed in any of the structure after part or portion stripping of forms, shall be corrected in the subsequent work to bring back the structure to its true line, level and alignment.

Workmanship

i. Erection of form work may be from pre-molded, prefabricated, pre-assembled plates or forms reasonable enough to transport and erect at site to correct line and level as set out at site. Supports shall be firm and maintained in position by nails, cross bracings, tie rods, locking bolts and nuts. It shall be rigid and stiff so as to retain its shape during and after concreting. The tie rods shall be terminated at least 40mm inside the finished surface. Joints shall be water-tight, and no cement slurry shall be allowed to slip through. In joints foamed tapes shall be used. Prefabricated or site forms shall be assembled, to de-shutter without any jerk to the green concrete. For this double wedge shall be used. Wedges shall be nailed, the heads reasonably left out, allowing easy removal while de-shuttering .

ii. Prefabricated or on-site fabricated forms shall be of enough thickness and with the required supporting runners in either direction. Supporting runners shall be standardized in size for easy replacement and universal use at site. Props shall be of steel only. Size and verticality shall be approved by the Engineer-in-charge. Its spacing shall be as per design. It shall be vertical and plumbed. Base shall be a proper steel plate or timber plank, for equal distribution of load. In repeated use, panels shall be clearly marked for using at defined locations. Successive lift shall be tightened with previous lift by fixing foamed strips at joints to avoid grout leakage.

iii. In fill pieces and panels shall be well dressed, levelled and jointed with main formwork so as to achieve smooth, even natural finish. Props, Soldiers, walling's, Shores, bearers, Clamps, wall & ties etc. shall be at required spacings. Props, shores shall be securely braced with firm bearing.

iv. Provide and fix or fix only inserts pockets, to correct line and level and with enough rigidity to keep in position while concrete placing is in progress along with vibration.

v. Sloping, brackets, chajjas etc shall be well secured and firmly restrained. Adequate access and working platform shall be arranged with required safety to avoid reinforcement displacement, damage to shuttering and easy movement of concrete gang.

vi. Props and scaffolds are to be erected to correct plumb, line, level and with required tie. Load carrying capacity of props shall be as per table of manufacturer.

vii. Props and scaffolds shall not be loaded more than allowed by manufacturer of Props /scaffolds. Heavy, medium and light duty props shall not be mixed up. Beams and slabs shall have camber of 4 mm per meter or as directed by the Engineer-in-charge.

viii. All angles and corners shall be sharp and well defined. In places where concrete edges are permanently exposed and require no further treatment; they shall be chamfered in a triangle of 25x25mm.

ix. Props of steel shall be provided with adequate horizontal and cross - bracing. Steel props shall use steel pipes and steel couplers use of timber is not permitted.

At the design and erection stage, the following additional points shall be considered and incorporated into the shutters-

i. Openings for cleaning prior to start of concreting.

ii. Pouring points shall avoid high drops and provide easy access to vibrator needles.

Surfaces shall be treated with mould releasing oil or emulsion as approved by the Engineer-in-charge prior to reinforcement laying. The following point shall be observed very carefully:

i. Joints of moulds shall be water-tight & should be checked from bottom to make sure, that no light is visible.

ii. Props shall be on solid base, plumbed, in one straight line, and braced horizontally and cross.

iii. Tie bars in beams, walls and columns shall be at the correct place and fullybtight.

iv. Wedges shall be fully secured and nailed with head left out for easy removal.

v. All saw dust, dirt, shaving and any other unwanted materials shall be cleaned and hosed out.

vi. Provision shall be made for watching form work while concreting and any other platform needed for movement of workers without any disturbance to reinforcement.

Opening/inserts: All required openings and pockets shall be provided as detailed in the drawing. The contractor shall provide for the required material, labour for fixing and supporting during concreting, in his quoted price. It is imperative that all openings and pockets shall be de-shuttered with care and all corners of openings shall be preserved. All openings/pockets shall be in a correct line and level. After concreting, the openings shall be secured by proper covering against any accident and guard rail and warning notice, if any will be incorporated.

In case of multi-storey building, any upper floor shall be suitably supported on at least one floor below the same or as approved by the Engineer-in-charge. The concreting of upper floor shall be done only after lower floors have attained the strength.

Camber: Suitable camber shall be provided in horizontal members of structure, especially in cantilever spans to counteract the effect of deflection. The form work shall be so assembled as to provide for camber. The camber for beams and slabs shall be 4 mm per metre (1 to 250) or as directed by the Engineer-in-charge, so as to offset the subsequent deflection, For cantilevers the camber at free end shall be 1/50th of the projected length or as directed by the Engineer-in-Charge.In case of slab/ raft etc. chairs of dia minimum 12mm dia to 25mm of required length in double mesh portion should be provided @ 1 no. per sq.m.as directed by the Engineer-in-charge. The dia of chair should be such that they do not bend or buckle under the weight of reinforcement and other incidental load during construction. Bar bending schedule to be prepared and provided by the Contractor, as per structural drawings

i. Clear overhead space, hoisting hooks, exhaust fan opening, etc. are to be provided, as required for proper commission of lifts, as per manufacturer's specifications and approved shop drawings

ii. Form work shall be placed and removed as per time line provided in CPWD- specifications.

iii. Plaster drip course of size 25mm x 12mm in plastered surface or moulding to be provided for all R.C.C. projections/ chajjas, etc.

Formwork design shall consider the following:

i. Dimensional tolerance
ii. Demountable without shock, disturbance or damage to concrete
iii. All construction joints in beams and slabs shall be provided as shown in drawings.
iv. Ties shall be provided where required
v. Props / supports of extra ceiling height shall be specially designed.

Formwork: - Form work shall be placed and removed as per timeline provided in CPWD specifications.

2. **Expansion Joint Treatment:**

General

Seismic / separation joints shall be provided where shown on the drawings and required to make as per BIS code provisions. The contractor shall ensure that no debris is allowed to enter and be lodged in seismic and separation joints. Seismic or separation joints shall be provided with approved system appropriate to the design. Shop drawings to be submitted to Engineer in charge for approvals before executing the work

Work shall be carried out with specialized agency as per preferred make list. Cost of expansion Joint accessories both horizontal and vertical is in the scope of this tender.

Treatment is to be done to all floor to floor joints, wall to wall joints, and Roof to Roof Joints. Expansion joint treatment is to be done as approved by Engineer in Charge as per design requirement.

a. **Floor Joint**

General requirement of material:

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

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

Approval of expansion joint system : Sample of expansion joint system along with manufacturers latest published literature for material specified herein, material test reports, shop drawings etc. shall be submitted for obtaining approval before material are delivered at the site. The expansion joint cover assembly should be from one source (from single manufacturer) Installation of expansion joint system: In all cases the manufacturer's standard written instruction or specific instructions for installation shall be followed.

b. **Wall Joint :**

General requirement of material:

The expansion joint system related with wall joint (internal/ external) shall be of extruded aluminum base members, self- aligning / centering arrangement and support plates as per ASTM B221-02 of Kantaflex or as equivalent . The material shall be such that it provides an Expansion joints system suitable for vertical wall to wall/ wall to corner application, both new and existing construction in office buildings & complexes with no slipping down tendency amongst the components of the joint system. The Joint System shall utilize lightweight aluminum profiles exhibiting minimal exposed

aluminum surfaces mechanically snap locking the multi cellular to facilitate movement. (Material shall confirm to ASTM 6063) Performance Requirement: Material and works shall conform to the latest edition of reference specifications as specified in the item and to all applicable codes and requirement of local authorities having jurisdiction.

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

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

c. Guarantee for the Expansion Joint Work

The contractor shall be fully responsible for and shall guarantee proper performance of the entire expansion joint treatment work inclusive of all elements in the expansion joint.

Five 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. Ten percent amount of the cost of expansion joint work shall be retained as Security Deposit and the amount so deducted would be released after five years from the date of completion of the entire work under the agreement, if the performance of the treatment is found satisfactory. The cost of expansion joints for the purpose of retention of security deposit shall be determined by E-in-charge on prevailing market rate, whose determination and decision shall be final and binding on 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. Further this security deposit can be released in full, if bank Guarantee of equivalent amount for Full 5 (Five) years is produced and deposited with the Engineer-in-charge.

3. MASONRY WORK-

i. The work shall be done in accordance with CPWD specifications Volume - I & II with correction slips up to the last date of submission of tender documents.

ii. Autoclaved Aerated Concrete Blocks (AAC) of required thickness shall be provided for all types of Masonry Walls (Single and Cavity Walls) as per BIS code 2185 (part 3) 1984.

iii. AAC blocks masonry shall be of Grade I and of oven dry density 551-650 kg/cum. It shall be done with polymer modified adhesive mortar above plinth level except wet areas. Brick masonry with burnt clay F.P.S. (non modular) of class designation 7.5 Local Ist class bricks shall be done in foundation up to plinth and wet areas /Sunken Areas with cement mortar.

iv. Compressive strength of AAC blocks shall be not less than 5 N/mm^2 conforming to IS 2185/1984 RCC grade M-25 band 100mm thick to be provided at sill level and lintel level with 2nos of 8mm dia TMT steel bar & 8mm dia TMT steel stirrups @ 200mm c/c to be provided. In case of AAC block works, span more than 6-meter length, RCC grade M25 vertical column (250mm x AAC block width) with 4 nos of 10mm dia TMT steel bar & 8mm dia TMT steel stirrups @ 100mm c/c to be provided.RCC M25 mullion (200mm x AAC block width) with 4 nos of 10mm dia TMT steel bar & 8mm dia TMT steel stirrups @ 200mm c/c to be provided at vertical jambs of doors & windows, all complete as per direction of Engineer-in-Charge.

v. The AAC block shall conform to grade I of IS : 2185 part 3 (1984).The precast AAC blocks shall be procured from approved manufactures only and shall not be permitted to be cast at site. Acceptance criteria- The Blocks shall be of grade I confirming to S.No. (ii) or S.No (iii) of table No.1 of IS 2185 Part-3. Drying shrinkage shall not be more than 0.05 %. The maximum variation in the length of the units shall not be more than ± 5mm for length and ± 3mm for

width compressive strength of AAC blocks shall be not less than 5 N/mm2 conforming to IS 2185/1984.

Dimensions & Tolerances:

i. Autoclave Aerated Concrete Block shall be made in sizes and shapes to fit different concrete needs. They include stretcher, corner, double corner or pier, jamb, header, bull nose, partition block and concrete floor units.

ii. Autoclaved aerated cement blocks masonry with AAC blocks of thickness 100/ 200mm to be provided as per architectural drawings. The AAC blocks to be affixed with approved polymer modified adhesive mortar with split strength of 0.4 N/ Sq mm and compressive strength of 18 N/ sq mm with 3mm thickness.

iii. Autoclave Aerated Concrete Block shall be referred to by its normal dimension the term 'normal' means that the dimension includes the thickness of the mortar joints. The actual dimension shall be 10mm short of the normal dimension (or 6mm short in special areas finer joints as specified). The normal dimension of the concrete block shall be as follows:

Length: 400, 500or 600mm Height: 200, 250
or 300 mm Width: 100, 150, 200 or 250 mm

iv. In addition, Autoclave Aerated Concrete Block shall be manufactured in half length of 200, 250 or 300 mm correspond to the full lengths. The nominal dimensions of the units are so designed that taking account of the thickness of mortar joints, they will produce wall lengths and heights which will conform to the principles of modular co- ordination.

v. Block of sizes other than those specified above, may also be used if so specified in the case of special Autoclave Aerated Concrete Block such as jallie or screen wall and ornamental block, the specified size may not necessarily apply.

vi. The maximum variation in the length of the Autoclave Aerated Concrete Block shall not be more than plus/minus 5mm and maximum variation in the height and width of Autoclave Aerated Concrete Block, not more than plus/minus 3mm.

vii. The faces of Autoclave Aerated Concrete Block shall be flat & Rectangular, opposite faces shall be parallel and all arises shall be square. The bedding surfaces shall be at right angle to the face of the Blocks. The Autoclave Aerated Concrete Block with special faces shall be manufactured and supplied if so specified.

viii. The autoclaved Autoclave Aerated Concrete Block shall be classified in two grades according to their compressive strength as indicated in table below:

Sl. No.	Density in oven dry condition (kg/m2)	Compressive Strength		Thermal Condition in Air dry condition (W/m.k)
		Grade-I (N/mm2)	Grade-II (N/mm2)	
1	451 to 550	2.00	1.50	0.21
2	551 to 650	4.00	3.00	0.24
3	651 to 750	5.00	4.00	0.30
4	751 to 850	6.00	5.00	0.37
5	851 to 1000	7.00	6.00	0.42

All autoclave Aerated Concrete Block shall be sound, free of cracks or other defects which interfere with the proper placing of block units impair the strength or performance of the construction. Where block units are to be used in exposed wall construction, the face or faces that

are to be exposed shall be free of chips, cracks or other imperfections except that if not more than 5% of a consignment contains slight cracks or small chippings not larger than 25mm, this shall not be deemed grounds for rejection.

Block Density – The Block density shall conform to the requirements specified in above table, when tested accordance with IS 6441 (Part-1) -1972.

Compressive Strength – The min. compressive strength being the average of twelve block units shall be as prescribed in above table, when tested accordance with accordance with IS 6441 (Part-5) -1972

Thermal Conductivity – The thermal conductivity shall be not exceed the values specified in above table when tested accordance with IS 3346 -1980

Drying Shrinkage – The drying shrinkage shall be not more than 0 .05% for grade –1 block and 0.10% for grade-2 block when tested accordance with IS 6441 (Part-2) -1972.

a. **Number of tests**

A sample of 24 blocks shall be selected at random. All the 24 Blocks shall be checked for dimensions and inspected for visual defects. Out of the 24 blocks, 12 blocks shall be subjected to the test for compressive strength, 3 blocks to the test for density, 3 blocks to the test for thermal conductivity and 3 blocks to the test for drying shrinkage. The remaining 3 blocks shall be reserved for re-test for drying shrinkage if a need arises.

The samples of AAC blocks (each sample consisting of 6 specimen) shall be chosen randomly from the lot procured and tested for various parameters specified as above. One samples shall be tested for every 200 cum or part thereof. However, minimum one sample shall be tested from each lot received at site if the quantity procured in the lot is less than 200 cum. If required, Engineer-in-Charge or his authorized representative shall inspect the factory during production of the material for this work and also collect samples (of materials used for making AAC blocks and precast AAC blocks) from the factory itself.

The contractor shall consider this contingency also while placing the order with one of the approved firms. Nothing extra shall be payable on this account.

b. **Criteria for conformity**

The number of blocks with dimensions outside the tolerance limit and or with visual defects, among those inspected, shall not be more than two. For density, the mean value shall be within the range as specified in above Table. For compressive strength, the mean value, say X shall be determined. The test results shall be grouped into groups of 4, individual values of ranges shall be determined, the average range a calculated from these values and shall satisfy the following condition: X- 0.6 R> minimum value specified in above Table. For thermal conductivity, the mean value shall be equal to or less than the value specified in above Table. For drying shrinkage, all the test specimens

shall satisfy the requirements of the test. If one or more specimens fail to satisfy the requirements, the remaining 3 blocks shall be subjected to these tests. All these blocks shall satisfy the requirements.

c. **Manufacturer's Certificate**

The manufacturer shall satisfy himself that the masonry units conform to the requirements of this specification and, if requested, shall supply a certificate to this effect to the purchaser or his representative.

d. **Marking**

Each lot of concrete masonry units manufactured in accordance with this specification shall be suitably marked with information-

i. The identification of the manufacture.
ii. The grade and block density of the unit.
iii. The month and year of manufacturing.

The RCC band shall be provided on 150mm /200mm/300mm thick masonry to increase the strength and compatibility. The RCC band shall be provided at sill level and at lintel level over throughout the wall. This thickness of the band shall be approved by the Engineer-in-Charge or

as specified in drawing. Autoclave Aerated Concrete Block masonry shall be provided with polymer modified adhesive mortar. The polymer modified adhesive mortar shall be provided @ 30 kg per cum. RCC bands shall be properly anchored in columns for stability as directed by Engineer in charge. Autoclaved Aerated Concrete Block confirming the IS Code – 2185 (Part-3) 1984 (Reaffirmed 2005)Polymer modified adhesive mortar shall be used for construction of masonry walls as per the approval of Engineer in Charge and manufacturer's instructions.

For Low height Masonry Walls RCC Coping shall be provided of required sizes as per Architectural Drawings.

- Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 (local Ist class) in substructure and in wet areas or as designation of Engineer In-charge.

- First class red clay bricks to be used in areas marked in Drawings or whenever required or considered by the Engineer-in- charge. The same shall be used in the work with mortar as per CPWD specifications.
- RCC mullion of 100X100 shall be provided at the Doors or windows and at the locations marked in the drawings or as per the direction of Engineer-in-Charge.

e. Insulation -

The XPS insulation shall be incorporated in between the External and internal walls. The thickness of insulation on walls shall be 75 mm.

Composition -Extruded polystyrene (XPS) thermal insulation board is a rigid foam board having closed board cell structure and is produced in fully automated continuous extrusion process . Its unique properties of high compressive strength , higher R value and low water absorption makes it an ideal, walls .

Test Parameters	Unit	Test Method	Specification
Board Thickness	mm		Above 40 mm
Compressive strength @ 10% deflection minimum	Kpa	ASTM C 1621	350
Thermal resistance of 25.4 mm thickness @mean temperature 24+- deg C minimum	k.m2/w	ASTM C 518	0.88*
Equivalent thermal conductivity maximum	W/m.K	ASTM C 518	0.0289*
Flexural Strength maximum	Kpa	ASTM C 203	414
Water vapor permeance 25.4 mm thickness maximum	Ng/p.a.s.m2	ASTM E 96	63*
Water absorption by immersion maximum	%v/v	ASTM C 272	0.3
Dimension stability maximum	%	ASTM D 2126	2
Oxygen index, minimum	%v/v	ASTM D 2863	24

Density minimum	Kg/m3	ASTM D 1622	34
Flammability	Class	DIN 4102 Part 1	B2*
Surface burning characteristics	Class	ASTM E 84	A
Board Size			600*1250mm

External Wall insulation -

i. Surface preparation of the wall (leveling with cement plaster & surface cleaning) should be done before application of the XPS Board.
ii. Special XPS adhesive chemical is applied to that XPS board and board is thus fixed to Wall.
iii. Holes are drilled through the XPS board to insert the plastic expansion.
iv. The surface around the hole is prepared to ensure that the plastic fastener face is flu, with the XPS board insulation.
v. Plastic Fastener is inserted in the Holes & the nails are driven to the fastener to lock them up.

6. Flooring and Cladding :

General (applicable for all kinds of flooring and dado / cladding works under this Sub-head):

1. Various types of flooring, skirting, dado and window sill work shall be carried out by the contractor referring the floor finishing layouts as per Architectural drawings. Contractor needs to re r room data sheet / schedule of finishes and material palette attached with tender document.
2. The work under this sub-head in general shall be carried out as per the CPWD Specification 2009, Vol-I & II, as per the architectural drawings and as per the direction of Engineer-in-Charge.
3. The Engineer-in-Charge or his representative may, if required, visit the source of supply of the various stones to assess the quality as well as availability of the material in the required quantities. The Department shall bear the cost of such visits of the officers of the Department.
4. Based on the samples approved by the Engineer-in-Charge for various flooring and dado / cladding materials as specified hereinafter, the contractor shall prepare mock up(s) at site of work as specified under relevant flooring and dado / cladding items, for approval of quality of workmanship and material specified. If the quality of the workmanship and the material is as per the required standards and approved by the Engineer-in- Charge, the mock up shall be allowed as part of the work. Otherwise, it shall be dismantled by the contractor as directed by the Engineer-in-Charge and taken away from the site of the work at his own cost. The mock up(s) so made shall be kept till completion of respective works for reference.

5. The stones / tiles shall be transported to site well packed in boxes or otherwise. These shall be handled carefully to prevent any damage. The various types of stones and tiles, procured shall be free of any surface defect or any edge damage. The damaged stones and tiles shall not be allowed to be used in the work. So, the contactor shall procure additional quantity of the stone and tiles to cover such contingencies. However, nothing extra shall be payable on this account.
6. For the skirting in the enclosures with curvilinear profiles, the tiles / stones shall be cut to the required size and the shape to match the profile and/ or the joints as per the architectural drawings. Similarly, the skirting shall be fixed in a manner as to flush or project from the finished face of the wall as per the architectural drawings and as directed by the Engineer – in–Charge. Any chasing of the CC/Brick/AAC masonry works required for such fixing is deemed to be included in the cost of masonry. Nothing extra shall be payable on this account.
7. Proper gradient shall be given to flooring for toilets, verandah, kitchen, courtyard etc. so that the wash water flows towards the direction of floor trap. Any reverse slop if found, these shall be made good by the contractor by ripping open the floor/grading concrete and nothing shall be paid for such rectifications.
8. The flooring and skirting will be executed as per pattern shown in the architectural drawings. Skirting height shall be 100 mm except staircase portion. Skirting height at staircase will be executed as per approved architectural drawings.
9. Samples of flooring material are to be deposited well in advance to the Engineer-in-Charge for approval. Approved samples should be kept at site with the Engineer-in-Charge and the same shall not be removed except with the written permission of Engineer-in-Charge. No payment whatsoever will be made for these samples.
10. For flooring work, the joints between the different types of flooring shall be located as per the architectural drawings. Also, the Contractor shall maintain the uniform level of the finished flooring of the different types unless specifically mentioned on the architectural drawings. Nothing extra shall be payable on these accounts.
11. All the flooring works specified under this sub-head shall be adequately protected by a layer of plaster of Paris which shall be laid over a 400 micron PVC film. The protective Layer shall be maintained throughout the execution of works and removed just before handing over of the site for which nothing extra shall be payable.
12. At the time of handing over, flooring & dado / cladding shall be free of any scratches, stains etc. The flooring & dado / cladding shall be properly cleaned before handing over. However, abrasive/acid cleaners shall not be used to clean the marks and other scratches.
13. Pattern for any type of flooring / dado shall be as per detail drawings submitted. The cost of flooring work is inclusive all material, workmanship, labour, pattern, colour, style, skirting etc. complete. The flooring shall be laid in patterns with different kind of stone or tiles .No extra payment on this ground shall be entertained. The joints for all flooring to run in a straight line.
14. For steps up to 2 meter length, marble/ granite/ Kota stone flooring in treads & riser to be provided in single piece stone.

15. Providing and laying cushioning layer in cement mortar 1:4 (1 cement: 4 coarse sand) for difference of thickness in flooring of granite/ kota stone & vitrified/ rectified tile 8/ 15 mm as directed by the Engineer-in-Charge. Nothing extra shall be payable in this account.

a. Kota Stonework-

This can be read for Flooring / Skirting / Dado / Steps.

The work to be carried out in areas as mentioned in flooring layouts and material palette and as per the CPWD Specifications Volume I and 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.

The agency shall fix the 25mm (±2mm) thick polished Kota stone slab flooring over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab, including rubbing and mirror polishing complete with base of cement mortar 1 : 4 (1cement : 4 coarse sand) to be provided as per the drawings/ schedule of finishes.

The Kota stone along with marble stone shall be laid in patterns as per the architectural drawings .

b. **Terrazzo Tile Work -**

The Terrazzo shall be carried out in areas as mentioned in flooring layouts and as per the CPWD Specifications Volume I and II with correction slips up to the last date of submission of tender.

Precast Terrazzo tile shall generally confirm to IS 1237, edition 2.3. The tiles shall be supplied with initial grinding and grouting of wearing layer.

The tile shall be factory made Precast Terrazzo tile, 25 mm thick graded marble chips size Up to 12 mm of stone chips laid in floors/ skirting jointed with neat cement slurry mixed with colored pigments to match the shade of tiles including rubbing and polishing with tiles of 50% white cement and 50% ordinary cement as approved by Engineer-in-charge). The Size of tile shall be of 300 mm*300 mm.

Laying - Base concrete or RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. Cement mortar 1:4 (1 Cement : 4 coarse sand) bedding shall be used with medium shade pigments using 50% white cement and 50 % ordinary cement . Average thickness of the bedding mortar shall be 20 mm and the thickness at any place shall not be less than 10 mm.

Cement mortar bedding shall be spread, tamped and corrected to proper levels and allowed to harden for a day before the tiles are set. If cement mortar is laid in bedding the terrazzo tiles, these shall be set immediately after laying the mortar. Over this bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 4.4 kg of cement per square metre over such an area as would accommodate about twenty tiles. Tiles shall be washed clean and shall be fixed in this grout one after another, each tile being gently tapped with a wooden mallet till it is properly bedded, and in level with the adjoining tiles. The joints shall be kept as thin as possible not exceeding 1 mm and in straight lines or to suit the required pattern. The joints shall be properly cleaned before filling with cement grout of matching colour.

The surface of the flooring during laying shall be frequently checked with a straight edge of length at least 2 metre, to obtain a true surface with the required slope. Where full tiles or half tiles can not be fixed, tiles shall be cut (sawn) from full tiles to the required size and their edges rubbed smooth to ensure a straight and true joint. Tiles which are fixed in the floor adjoining the wall shall enter not less than 12 mm under the plaster, skirting or dado. The junction between wall plaster and tile work shall be finished neatly and

without waviness.After the tiles have been laid, surplus cement grout that may have come out of the joints shall be cleared off.The agency shall fix the factory made Precast Terrazo tiles 25 mm thick with graded marble chips of sizes upto 12 mm, in skirting and risers of steps not exceeding 30 cm in height, on 12 mm thick cement plaster 1:3 (1 cement : 3 coarse sand), jointed with neat cement slurry mixed with pigment to match the shade of the tiles, including rubbing and polishing complete with tiles of Medium shades pigment using 50% white cement and 50% ordinary cement .

The Agency shall submit to Engineer –in-charge the samples of Precast Terrazzo tiles with marble chips of size up to 12 mm with medium shade colored pigments and installation shall be started afer the approval of Engineer-in-charge .

Tolerance on length and breadth shall be plus or minus one millimeter, and tolerance on thickness shall be plus 5 mm. The variation of dimension in any delivery of tiles shall not exceed 1 mm on length and breadth and 3 mm on thickness.

c. Anti-Skid Vitrified Tiles –

Anti-skid vitrified Tiles of size 600X600 mm (Sterling Grey of Kajaria or as Equivalent) and of approved make to be provided as per schedule of finishes. Color, shade, pattern & size as given in the drawing. (thickness to be specified by the manufacturer) and as approved by Engineer-in-Charge, of 1st quality conforming to IS:15622, laid on 20 mm thick cement mortar 1:4 (1 Cement: 4 Coarse sand), jointing with grey cement slurry @ 3.3kg/ sqm including grouting the joints with white cement and matching pigments etc., complete. 600 x 600 mm vitrified tile shall be laid in the common area of toilet whereas 300 x 300 mm vitrified tile (Ranger Beige of kajaria or as equivalent) shall be laid in W.C bath and all other similar locations. The agency shall also provide the 100 mm high tile band at the Toilets and as wherever marked in Architectural drawings of (Albina Cotta of Kajaria or as Equivalent.)

d. Ceramic Wall tiles -

The Work Shall be carried out as per CPWD specifications 2009, Vol- I & Vol-II.

The tiles shall be of Angola Gray or as approved equivalent and shall generally conform to IS 15622.

They shall be flat, and true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance.

The tiles shall be rectangular of 200*300mm and fixed in pattern as per Architectural drawings. Thickness shall be specified by the manufacturer. The top surface of the tiles shall be glazed. Glaze shall be either glossy or matt as specified. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be preferably free from glaze. However, any glaze if unavoidable, shall be permissible on only up to 50 per cent of the surface area of the edges.Ceramic glazed tiles (white plain of kajaria or as Equivalent) for floor of the overhead and Underground RCC water tank to be provided (thickness to be specified by the manufacturer), in 1st quality conforming to IS :15622 of approved make in White/ Ivory color, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), Jointing with grey cement slurry @ 3.3 kg/sqm including pointing the joints with white cement and matching pigment etc., complete 1st quality ceramic glazed tiles for walls of overhead RCC water tank to be provided, conforming to IS : 15622 (thickness to be specified by the manufacturer) of approved make in White/ Ivory colour, of any size as approved by Engineer-in-Charge over 12 mm thick bed of cement Mortar 1:3 (1 cement: 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with pigment of matching shade complete.

Tactile Tile Work -

Tactile tile shall be of (Pelican ceramic industries or as Equivalent) high strength and high wear resistant Cement Concrete Tiles of size 300*300*15 mm with high finish with wear resistant aggregates and

balanced colour coordination aggregates in face mix . The design shall be as per Engineer-in-charge.

Laying-Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:4 (1 cement: 4 coarse sand) or as specified. The average thickness of the bedding shall be 20 mm or as specified while the thickness under any portion of the tiles shall not be less than 10 mm.

Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it.

Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square meter over an area up to one square meter. Tiles shall be soaked in water washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern. The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap. Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints.

Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado. After tiles have been laid surplus cement slurry shall be cleaned off.

S.NO	Parameters	Minimum Requirements (Testing as per IS 13801:1993)
1	Percentage Water Absorption	Not over 6%
2	Wet Transverse Strength	Not less than 4.5 N/mm2
3	Average wear in Thickness - Abrasion	Average wear not more than 2 mm
4	Tolerance in size (Length + Breadth)	+/-1mm
5	Thickness of Wearing layer	Not Less than 8mm
6	Variation in Thickness of tiles	Variation not to exceed 3 mm
7	Flatness of Tile Surface	Concavity / Convexity not to exceed 1 mm
8	Colours	UV light resistant fast colours from Lanxess only to be used .

The Tactile Tile Must Confirm To IS 13801:1993. The Tile must be manufactured on automatic machines with mechanical vibrations and rubberized molds.

The Tiles must be cured in controlled environment to ensure efflorescence free material

e. **Coloured cement Concrete Flooring -**

The 52 mm thick cement concrete flooring shall be laid on the bicycle areas or wherever shown in drawing of approved colour pigments by Engineer-in-charge. The Cement concrete shall be mixed with approved color oxides and should be laid as per drawings .The Cement Concrete Flooring Shall be laid with the Aluminum strips of Size 40mm*3 mm in pattern as shown in the drawing. Flooring shall be laid on base concrete where so provided. The base concrete shall be provided with the slopes required for the flooring. The flooring shall be commenced preferably within 48 hours of the laying of base concrete. The surface of the base shall be roughened with steel wire brushes without disturbing the concrete. Immediately before

laying the flooring, the base shall be wetted, and a coat of cement slurry @ 2 kg of cement spread over an area of one sqm so as to get a good bond between the base and If the cement concrete flooring is to be laid directly on the RCC slab, the top surface of RCC slab shall be cleaned and the laitance shall be removed and a coat of cement slurry @ 2 kg of cement spread over an area of one sqm so as to get a good bond between the base and concrete floor.

7. GRANITE/ MARBLE /RED SAND STONE WORK -

1. The stone shall be hard, sound , dense and homogenous in texture with crystalline texture as possible . It shall generally be uniform in colour and free from strains , cracks , decay and weathering .
2. The Contractor shall procure and submit the samples of different types of stone samples, for the approval of the Engineer-in-charge prior to the execution of the item.
3. The mockup (one each) shall be prepared in staircase, lift wall and lift lobby, kitchen counter and window sill as provided in architectural drawings for approval of Engineer-in-charge.
4. The entire supply for each type of stone slab shall be procured from one location (in one quarry), and supplied preferably, in one lot to keep variations to the minimum. The Contractor shall also segregate and sort the slabs according to colour, shade, texture and size of grains etc. to keep variation(s) in stones used at any one location to the minimum. Any slab with variation in the colour, shade, texture and size of grains etc., not acceptable to the Engineer-in-Charge, shall not be used in the work and shall be removed and replaced by the Contractor. Nothing extra shall be payable on these accounts. Also, no claim of any kind shall be entertained from the Contractor on this account.
5. The stone slabs shall be pre/post polished (mirror polished) or given any other surface treatment as specified in the item nomenclature, as per the Architectural drawings and as directed by the Engineer-in-Charge.
6. Machine polishing and cutting to required size shall be done with water (as lubricant) only. Sawing shall also be done preferably with water as lubricant but as a special case, the Engineer-in-Charge may permit, at his discretion, oil or kerosene as lubricant subject to all kerosene or oil in the body and surface of tiles / slabs being thoroughly dried in ovens. Tiles / slabs with stains or patches due to the use of oil or otherwise, either before or after installation, shall be rejected and shall be replaced by the Contractor at his own cost. Nothing extra shall be payable on this account.
7. The stonework may be required to be carried out in patterns, design and / or in combination with Kota /granite stones of different colour and shade with or without borders and in combination of different stone slabs / tiles for which nothing extra shall be payable. The stones shall be provided in sizes and shapes as per the architectural drawings and wastages and incidental costs, if any, shall be deemed to be covered in the cost of the relevant items. Nothing extra shall be payable on this account.
8. For the flooring portions curved in plan, the stone slabs (at the edge) shall be cut to the required profile and shape as per the architectural drawings. Nothing extra shall be payable on this account and any consequent wastages and incidental charges on such accounts shall be deemed to be included in the cost of such items.

NOTES:

1. For Vitrified tiles, Rectified tiles, ceramic tiles and ceramic glazed tiles shall be not less than 10% recycled material content to be used as per GRIHA norms for which necessary certificated to be submitted by contractor.

a) Marble Stone -

Raj nagar plain stone flooring with 20 mm ±2mm thick marble stone, as per sample of marble approved by Engineer-in-charge, over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with grey cement slurry, including rubbing and polishing .

The white marble shall be Mirror polished .

The agency shall submit the stone samples of same quarry (raj nagar plain) to Engineer-in-charge and get it approved from the Engineer-in-charge. Only after the approval, the agency shall give the bulk order for the Stone . If the marble submitted for approval is rejected and the agency has procured the stone then nothing shall be paid for his compensation . The marble in patterns along with Kota stone

shall be laid as per the architectural drawings .

The 20 mm ±2mm thick Raj Nagar white marble stone both side pre polished shall have to be provided in shelves of cupboards and fixed in the walls by making necessary chase in the walls with filling the chase with cement mortar 1:3(1Cement :3 Coarse sand) including rounding off the exposed edges at all floor levels etc. complete, all as per architectural drawings.

The 20 mm ±2mm thick Raj Nagar white marble stone both side pre polished shall have to be provided in partition of cupboards in between shelves fixed with necessary adhesive of reputed brand and manufacturer, including rounding off the exposed edges at all floor levels etc. complete, all as per architectural drawings.

b)Granite Stone -

The agency shall fix the 20 mm (±2mm) thick gang saw cut, mirror polished, pre-molded and pre-polished, machine cut for kitchen platforms, vanity counters, facias, water troughs and other 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, molding and polishing to edges to give high gloss finish etc. complete at all levels.

Opening of required size & shape for wash basin/ kitchen sink in kitchen platform, vanity counter, etc., in marble/ granite/ stonework to be provided, including necessary holes for pillar taps etc. and moulding, rubbing and polishing of cut edges etc. complete Granite stone slab of approved shade, with table rubbed,

edges rounded and both side polished, of size 125*60 cm deep and 18 mm thick, fixed in urinal partitions by cutting a chase of appropriate width with chase cutter and embedding the stone in the chase with epoxy grout or with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm nominal size) and finished smooth, as per drawing and direction of Engineer-in-charge.

Granite stone work with edges rounded off for wall lining/lift cladding up to 3 m at all floor levels backing filled with a grout of avg. 12 mm thick cement mortar 1 : 3(1 cement : 3 Coarse sand) including pointing in white cement mortar 1:2 (1 White Cement : 2 marble dust) with admixture of pigment matching the stone shade. The stone from backing and sides shall be secured in RCC/CC/Brick masonry with gun metal cramps fixed with 1:2 cement mortar including drilling necessary holes in stones and embedding the cramps in holes with fasteners of HILTI make etc.

The Black colour (Zed Black) granite or as approved by Engineer-in-charge shall have to be procured by the contractor. The agency shall proceed with the bulk order after getting approval of the sample from Engineer-in-charge.

Granite stone slabs shall be pre polished (mirror polished) or given any other surface treatment as specified in item nomenclature , as per the architectural drawing and as directed by the Engineer-in-charge.

The specifications for dressing, laying, curing, finishing, etc. for the granite stone flooring shall be same as that of works for the Marble flooring, skirting and risers of steps under Flooring Sub Head of the CPWD Specifications. The wall lining / veneer work with granite stone shall be as per the CPWD Specifications for Marble work Sub Head.

c) Red Sand Stone-

The agency shall lay 20 mm(+-2) mm thick Pre-polished Red sand stone of size 1.5 m in length in copings, parapets ,cornices, string courses and plinth courses or Wherever marked in drawing laid over 20 mm (average) thick base of Cement mortar 1:4 (1 cement : 4 coarse sand), including pointing with white cement mortar 1:2 (1 white cement : 2 stone dust) with an admixture of pigment matching the stone shade.

The entire supply for each type of Red Agra stone slab shall be procured from one location (in one quarry), and supplied preferably, in one lot to keep variations to the minimum. The Contractor shall also segregate and sort the slabs according to colour, shade, texture and size of grains etc. to keep variation(s) in stones used at any one location to the minimum. Any slab with variation in the colour, shade, texture and size of grains etc., not acceptable to the Engineer-in-

Charge, shall not be used in the work and shall be removed and replaced by the Contractor. Nothing extra shall be payable on this account.

8. Wood and PVC Works -

All Works will be done in accordance with detailed CPWD specifications 2009, Volume - I & II including as per the provisions of BIS Codes.

All types of door identifications and locations, the contractor has to refer architectural drawings, interior drawings, door detail sheets, hardware schedule, list of approved make and colour palette for finishing of doors as provided with the tender document.

All the Doors, Windows, Ventilators shall be provided with the necessary hardware like Tower bolts, handles, Door stoppers, Al drops etc. The Agency should refer the Hardware schedule for the number of Hardware to be fixed on each Door .

Door seals shall be provided at all door of rooms .

1. Extent and Intent: - The work shall be carried out in the factory and to be installed at site through an approved Special Agency, who shall furnish all material, labor, accessories, equipment, tool and plants and incidentals required for providing and installing Doors, windows, louvers, Ventilators and other items as shown in the drawings. 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, nothing shall be paid extra.
2. General: - Doors ,windows etc. shall be of sizes, section details as shown on the Architectural drawings. The details shown on the drawings indicate generally the sizes of the component parts and general standards. These may be varied slightly to suit the standard adopted by the manufacturers. 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.
3. Shop Drawings: - The contractor shall submit the shop drawings of Door ,windows, Ventilators , based on the architectural drawings to the Engineer- in-Charge for his approval. The shop drawing shall show full size sections of windows etc. thickness of section (i.e. wall thickness) details of construction, sub frame/rough ground profile, anchoring details hardware as well as connection of windows to adjacent work. Samples of all joints and methods of fastening and joining shall be submitted to the Engineer-in-Charge for approval well in advance of commencing the work.
4. Samples: - Samples of Door and Window shall be fabricated, assembled in the factory and submitted to Engineer-in-Charge for his approval only after the approval of Engineer-in-charge the agency shall move ahead for further Fabrication. They shall be of sizes, types etc. as decided by Engineer-in-Charge. All samples shall be provided at the cost of the contractor and shall not be allowed to remove from the site till the completion of work.
5. Sections: - The doors and windows, ventilators and Fire door shall be shall be fabricated as per architectural/ shop drawings. The sections shall be extruded by the manufacturers approved by the Engineer-in- Charge. The permissible tolerance of the extruded sections shall be such as not to impair the proper and smooth function/ operations and appearance of windows.
6. Handling and Stacking: -The 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. The supplied items shall be stored properly.

a. Flush Doors Shutters :

All Wooden flush door shutters shall be ISI marked, 35 mm thick 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 . The shutter shall be fixed to door frame with necessary stain less steel screws etc. complete.

All Flush door shutters shall be synthetic enamel painted of first quality over wooden primer as per colour Scheme shown in drawings or as approved by the Engineer-in-charge.

f. FIBRE GLASS REINFORCED PLASTIC (FRP) DOOR FRAMES-

Door Frames shall be three legged of cross section 90 mm x 45 mm having single rebate of size 32 mm x 15 mm to receive shutter of 30 mm thickness. The frame shall be made of laminate of thickness of 2 mm and shall be filled with wooden blocks of exterior grade MDF or seasoned and treated hard wood inside the laminate in all the three legs of the frame. The frame shall be covered with fibre glass from all sides. M.S. stay shall be provided at the bottom to steady the frame and 3 no's stainless steel hinges of size 100x 58x1.9mm fixed to frame complete.The frame to be molded by either hand lay up or resin transfer molding process. The process shall consist of laying gel coat at 1000 gms./m and laid over with layer of FRP Mat (CSM mat) gelcoat and FRP (CSM Mat) are defined in IS 14856. The CSM mat shall be bonded with Isophthalic resin in the ratio not less than 1:2 (One part of Mat to two parts of Isophthalic resin and fillers & additives) by weight. The edge shall be sealed with gelcoat and FRP mat to obtain smooth finish. Sufficient roving shall be laid in the corner to have smooth curve while laying the CSM mat.

FRP door shall be manufactured as per specifications laid down in IS 14856, nomenclature of items & direction of Engineer-in-Charge.

Tolerance

Tolerance of size of frame to be + 2 mm and on size of rebate to be + 1 mm.

Finish

The surface of the molded frame shall be free from any visible defects such as small pores, crazing, blistering, wrinkling, impurities, defective impregnation, colour blots and aggregate defects, as mentioned in IS 14856. Scattered pin holes duly repaired and finished by applying resin and not noticeable shall be acceptable. Frame laminate shall be flat and shall have smooth and level surface.

Fixing Door Frame

The frames are to be fixed in prepared openings in the walls. All civil work and tiling should be completed before the fixing of the frames. The frames are to be fixed directly on the plastered wall. In case tiling is to be done in the place the frames are to be fitted, a 50 mm strip should be left untiled at the location where the frames are to be fitted. The frames are erected in the prepared opening such that the vertical members of the door frame are embedded 50 mm in the floor. The frame shall be fitted truly in plumb. A minimum of three anchor bolts or screws of size 65/100 mm shall be used to fix each vertical member. One bolt shall be fixed at 200 mm from the top member and one bolt shall be fixed at 200 mm from the floor. The third anchor bolt shall be fixed in the center. The top horizontal member shall be fixed using two 65/100 size anchor bolts or screws at a distance of 200 mm from both the corners.

c) Fiber Glass Reinforced Plastic (F.R.P) shutters:

30 mm thick Fiberglass Reinforced Plastic (FRP) panelled flush door shutter of required colour and approved brand and manufacture , made with fire – retardant grade unsaturated polyster resin moulded to 3 mm thick FRP laminate for forming hollow rails and styles with wooden frame and suitable blocks of seasoned wood inside at required places for fixing of hardware fittings, cast monolithically with 5 mm thick FRP laminate for panels conforming to IS : 14856 including fixing to frames with necessary stainless steel screws.

F.R.P. Shutters shall be manufactured conforming to the specifications as per IS 14856 and nomenclature of item & direction of Engineer-in-Charge. Blocks of any seasoned hardwood of bulk density not less than 450 kg./m at 12 per cent moisture content or any other material of sufficient thickness and length shall be provided inside the shutter at suitable place to hold fittings and fixtures such as AL drops, tower bolt, handle, sliding door bolt, mortice lock etc. Blocks for hinges shall be provided at three locations, unless otherwise specified by the purchaser. One at the centre and other two at 200 mm from the top and the bottom of the shutter. Blocks shall be provided at predetermined places in the shutter so as to fix hinges mortice locks, tower bolts, AL drops, door closures, etc. The finished surface shall be buffed and polished with wax.

Location of Fittings and Accessories -

The lock rail of door shutters shall be so placed that is centre line is at a height 850 + 5 mm from the bottom of the shutter. Door shutter shall be fixed to the frame with three hinges, unless otherwise specified by the purchaser, of the type specified. These locations shall be, one at centre and other two at 200 mm from the top and the bottom of the shutter, where blocks have already

been provided and suitable indication by depressing the profile has been made. Screws for fixing the hinges shall be screwed in with screwdrivers & not hammered. The length of screw should be 8/30 mm.

Hardware's :

All Hardware fittings of toilet doors in required number as per enclosed hardware schedule with the tender document such as tower bolts , handles & sliding door bolts shall be of as follows.

The agency Shall provide and fix aluminum handles of size 100 mm, ISI marked anodized (anodic coating not less than grade AC 10 as per IS: 1868), transparent or dyed to required color or shade, with nuts and screws etc. complete on both faces of FRP shutters.

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The agency Shall provide and fix the aluminum tower bolts, ISI marked, anodized (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete of size 100X10 mm on inside face of FRP shutter .

The agency Shall provide and fix the aluminum sliding door bolts, ISI marked, anodized (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete of size 150X12 mm on inside face of FRP shutter .

Sampling -

The test specimens shall not have been exposed to a temperature below 40 C for 24 hours immediately preceding the test and shall be free from all visible moisture. The specimen shall be inspected and any specimen with visible flaws shall be discarded.

If any test specimen fails because of mechanical reason, such as failure of testing equipment or improper specimen preparation, it shall be discarded, and another specimen taken.

Sampling criteria for conformity shall be in accordance with IS 4020 (Part –I)

Lot in any consignment of shutters shall be of the same grade and type and manufactured under similar conditions of production which shall be grouped together to form a lot.

The number of shutters to be selected at random from a lot shall depend upon its size and shall be in accordance with CPWD .

S.NO	Sample Size	Permissible no of Defects
(1)	(2)	(3)
26 to 50	8	1
51 to 100	13	1
101 to 150	20	1
151 to 300	32	1
301 to 500	50	2
501 to above	80	2

Number of Tests : The samples selected as in column 2 of Table 9.23 shall be as agreed to between the manufacturer & Engineer-in-Charge.

Finish

The surface of the molded frame shall be free from any visible defects such as small pores, crazing, blistering, wrinkling, impurities, defective impregnation, colour blots and aggregate defects, as mentioned in IS 14856. Scattered pin holes duly repaired and finished by applying resin and not noticeable shall be acceptable. Frame laminate shall be flat and shall have smooth and level surface. Laminate shall be finished in color & shade as approved by Engineer-in-Charge.

Fixing of Shutters

FRP door shutter shall be side hung on three butt hinges of size 100 mm, one at the centre and the other two at 200 mm from the top and bottom of the shutter. The flat of the hinges shall be neatly counter sunk into the recesses cut out to the exact dimensions of the hinge flap. The door shall be drilled on the thickness to fit hinges. Screws for fixing the hinges shall be screwed in with screwdriver and not hammered. The length of the screws should be 8 mm/30 mm. The hinges used should be of stainless steel.

Tolerance

The tolerance on the width and the height of the door shall be + 5 mm and the tolerance on the nominal thickness of the door shall be + 2 mm.

d. Fire Door Frame -

The agency Shall fix the Hollow metal fire rated doors as per IS 3614 part-2 for stability and integrity. Pressed Galvanized steel confirming to IS 277 with the following specification. Recommended fire door shall have doors tested at CBRI / NABL Accredited Lab i.e Spectro / International Lab i.e. Exova / TBW etc. for maximum rating of 2hrs tested . Individual Test certificates should also be available for glass used in vision Pannels confirming the required fire ratings /panels being a part of the fire door assembly. Doors Frame should be finished in Thermosetting Powder Coating desired RAL Shades. Door frame shall be double rebate profile of minimum size 143mm X 57 mm made out of 1.60mm (16gauge) thick galvanized steel sheet .Frames shall be Butt jointed and field assembled with bolted. The frames should be finished with Thermosetting Powder Coating in desired RAL Shade. All provision should be mortised, drilled and tapped for receiving appropriate hardware. Frames should be provided with back plate bracket and anchor fasteners for installation on the vertical R.C.C mullions.

e. Fire Door Shutter -

Door leaf shall be minimum 46mm thick fully flush double skin door with vision Panel. Door leaf shall be manufactured from 1.20mm thick galvanized steel sheet. The internal construction of the door should be rigid reinforcement pads for receiving appropriate hardware. The infill material shall be HONEYCOMB and shall be factory prepped for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges should be interlocked with a bending radius of 1.4mm. For pair of doors astragals has to be provided on the meeting stile for both active and inactive leaf. Vision lite wherever applicable should be provided as per manufacturers recommendation with a beading and screw inside. The fire door shutter shall be fixed to frame with 4 no's Stainless steel ball bearing hinges of size 100 x84 x3 mm and necessary S.S. screws etc. The fire doors shall be painted with fire retardant paint of required shade & colour as approved by Engineer-in-charge. All Hardware fittings of fire doors in required number as per enclosed hardware schedule with the tender document such as Door closer, tower bolts & panic bars shall be of as follows.

Hardware's :

1) **Door Closer** -The agency shall fix the Silver Color Coated Concealed Door Closer of KICH Make (Model : DCC611S) or approved equivalent with feature to keep door on Open Position (Hold-Open function between 80 to 120 Degree), at door D1 and door D2 made of High Quality Aluminum Extruded body with adjustable double Speed setting, Rack and pinion should be manufactured from steel alloy duly machined and heat-treated, suitable for right-hand and left hand door application, door width up to 1050 mm and height up to 2400 mm and Thickness up to 50 mm, door weight should be up to 90 Kg .
2) **Concealed Flush Bolt** -Supply and Fixing of Stainless Steel 304 Grade Conceled flush Bolt (300 mm long for 2100 mm height of doors) Becker FS / Dorma/ Geze or approved equivalent make with necessary screws.
3) **Fire Door handle** -Providing and Fixing the SS304 H type Handle of Ozone or approved equivalent of Size 32X475 mm on the Fire Doors with necessary Screws complete as per the instructions of Engineer-in-Charge .
4) **Panic Bar** -Providing and fixing panic bar / latch (Double point) fitted with a single body, Trim Latch & Lock on back side of the Panic Latch of Make: Dorma or approved equivalent with necessary S.S. nut, bolts / screws and other incidental charges complete.

5) **Mortise Handle / Panic Trim** -The Agency Shall provide and Fix the Aluminium powder coated Mortise Handle / Panic trim of Ozone Make (Model: OZ-PB-CRTRIM-F-STD) or approved equivalent. With necessary screws and other incidental charges complete.

6) **Door Stopper** - Providing and Fixing SS 304 Grade Satin Finish 0.65 mm Thickness Twin rubber Door Stopper of Ozone Make (Model : ADB32DS) or approved equivalent and S.S. screws, minimum weight should be 130 gram.

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 fire check door shall rest with the building contractor.

Five (5) percent of the cost of fire check door work shall be retained as security deposit and the amount so withheld would be released after ten years from the date of expiry of maintenance period under the agreement, if the performance of the work done is found satisfactory. 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.

Other Items -

i. **Cupboards –** The agency shall fix the angle 35x35x5 iron frames for cupboards of mild steel T/ angle section, joints mitered and welded, including fixing with 3 no of mild steel butt hinges on both side of frame of size 100x58x1.9 mm, with a priming coat of approved steel primer.

ii. **Cupboard Shutters** – The agency shall Provide and fix factory made 25 mm thick double rebated wooden flush door shutters conforming to IS : 2202 (Part I) non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters . The shutter shall be fixed to cup board frame with necessary stain less steel screws etc. complete, with a priming coat of approved wood primer.

iii. The Cup board shutter and frame shall be synthetic enamel painted of 1st quality of hazelnut of Asian paint over primer.

iv. **Door seal -** The agency shall provide and fix the Aluminum frame door seal completely rust free with Nylon brush to all rooms door. The Door seal shall cover the gap between 0-20 mm. The agency shall cut the Brush as per the gap between door and finished floor and then fix it with the help of Screws. The sample first shall be submitted for approval to the Engineer-in-charge.

v. **Curtain/ Hanger Rod -**The Agency shall fix the curtain/ hanger rod to each room doors, windows and in cupboards. The rod shall be of 25 mm dia Stainless steel (Grade 304) curtain rod with S.S. Brackets with necessary screws including S.S. end caps ,wherever required .

Door/ Cupboard door Hardware:

The Hardware schedule is enclosed with the tender document, contractor has to follow the same, and shall submit the samples of all hardware fittings to the Engineer in charge for approval before proceeding the bulk supply of items.

P/F. of Tower Bolts, Sliding Door Bolts, handles, striker plates, shims, and escutcheons for a complete installation, wherever required. All hardware's to be Stainless Steel satin finish.

i. The agency Shall provide and fix the S.S. 304 Grade Stainless Steel Satin Finish Square Tower bolt KICH Make (TBS38S) or approved equivalent with necessary S.S. Screws of :

a) Overall length (excluding Bracket) 200 mm and inner bolt of □ 10 mm and outer □ 15X15 mm Square pipe.

b) Overall length (excluding Bracket) 150 mm and inner bolt of □ 10 mm and outer □ 15X15 mm Square pipe.

ii. The agency Shall provide and fix the S.S. 304 Grade Stainless Steel Satin Finish door handle of size 125 mm of SUZU Make or approved equivalent with necessary S.S. Screws.

The agency shall fix the Silver Color Coated Concealed Door Closer of KICH Make (Model : DCC611S) or approved equivalent with feature to keep door on Open Position (Hold-Open function between 80 to 120 Degree), at door D1 and door D2 made of High Quality Aluminum Extruded body with adjustable double Speed setting, Rack and pinion should be manufactured from steel alloy duly machined and heat-treated, suitable for right-hand and left hand door application, door width up to 1050 mm and height up to 2400 mm and Thickness up to 50 mm, door weight should be up to 90 Kg .

iii. The agency Shall provide and Fix the S.S. 304 Grade Satin Finish Wall mounted Door Stop Kich make (Model : ADST75S) or approved equivalent with the length of 75 mm including Rubber and necessary SS screws etc at door .

iv. Providing and Fixing SS 304 Grade Satin Finish 0.65 mm Thickness Twin rubber Door Stopper of ARCH Make (Model : ADB32DS) or approved equivalent and S.S. screws, minimum weight should be 130 gram.

v. The agency Shall provide and Fix the SS 304 Grade Satin Finish 1.8 mm Thickness Aldrops of (AAD1610C-304 of Kich) or as equivalent Ø 16 mm X 250 mm including 3 nos.fixing Bracket and 1 no. locking bracket with necessary S.S. Bolts, minimum weight should be 745 gram. .

vi. The Agency Shall provide and Fix the SS Satin Finish 3 mm thickness Cabinet Handle of Kich make (Model : ACH324S) or approved equivalent with the length 4" including necessary S.S. screws of size 6X25 mm.

vii. The Agency shall provide and Fix the S.S. 304 Grade Satin Finish Hasp and staple of SUZU Make (DH097) or approved equivalent With Size 100 mm X 4 mm With necessary Screws.

viii. The Agency shall provide, the AISI S.S. 316 Grade Satin Finish 5 legged Robe Hooks With Plate of KICH Make (Model : RHP5S) or approved equivalent With Size 280mm (L)X 32mm (H) W and fixed on Room wall as per occupancy with S.S. Screws & PVC dash fasteners etc.

f. Terracotta jalli -

The agency shall provide and fix Terracotta jalli of approved make and of size 200*200*60 mm and of approved design/sample . Installation shall be as per manufacturers guidelines . The Terracotta jalli shall be provided at the locations marked in Architectural drawings at shaft areas, stilt and at Terrace.

9. **STEEL WORK :** All Works will be done in accordance with detailed CPWD specifications 2009, Volume - I & II including as per the provisions of BIS Codes.

i. **Extent and Intent: -** The work shall be carried out in the factory and to be installed at site through an approved Special Agency, who shall furnish all material, labor, accessories, equipment, tool and plants and incidentals required for providing and installing Doors, windows, louvers, Ventilators and other items as shown in the drawings. 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, nothing shall be paid extra.

ii. **General: -** Doors, windows etc. shall be of sizes, section details as shown on the Architectural drawings. The details shown on the drawings indicate generally the sizes of the component parts and general standards. These may be varied slightly to suit the standard adopted by the manufacturers. 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.

iii. **Shop Drawings: -** The contractor shall submit the shop drawings of Door ,windows, Ventilators , based on the architectural drawings to the Engineer- in-Charge for his approval. The shop drawing shall show full size sections of windows etc. thickness of section (i.e. wall thickness) details of construction, sub frame/rough ground profile, anchoring details hardware as well as connection of windows to adjacent work. Samples of all joints and methods of

fastening and joining shall be submitted to the Engineer-in-Charge for approval well in advance of commencing the work.

iv. **Samples: -** Samples of Door and Window shall be fabricated, assembled in the factory and submitted to Engineer-in-Charge for his approval only after the approval of Engineer-in-charge the agency shall move ahead for further Fabrication. They shall be of sizes, types etc. as decided by Engineer-in-Charge. All samples shall be provided at the cost of the contractor.

v. **Sections: -**Doors and windows shall be fabricated as per detailed drawings. The sections shall be extruded by the manufacturers approved by the Engineer-in- Charge. The permissible tolerance of the extruded sections shall be such as not to impair the proper and smooth function/ operations and appearance of windows.

7. **Handling and Stacking: -** The materials shall be carried in an approved manner to protect the material against any damage during transportation. The loading and unloading shall
8. be carried out with utmost care. On receipt of material at site, it shall be carefully examined to detect any damaged pieces. The supplied items shall be stored properly.

vi. **Installation:** The Agency shall fix the double rebate pressed steel windows and Doors as per IS- 4351 made by galvanized iron conforming to IS- 277, 1.60mm thick sheet .

vii. The infill shall be of PU foam . The Frame shall be of G.I sheets confirming IS- 277 .

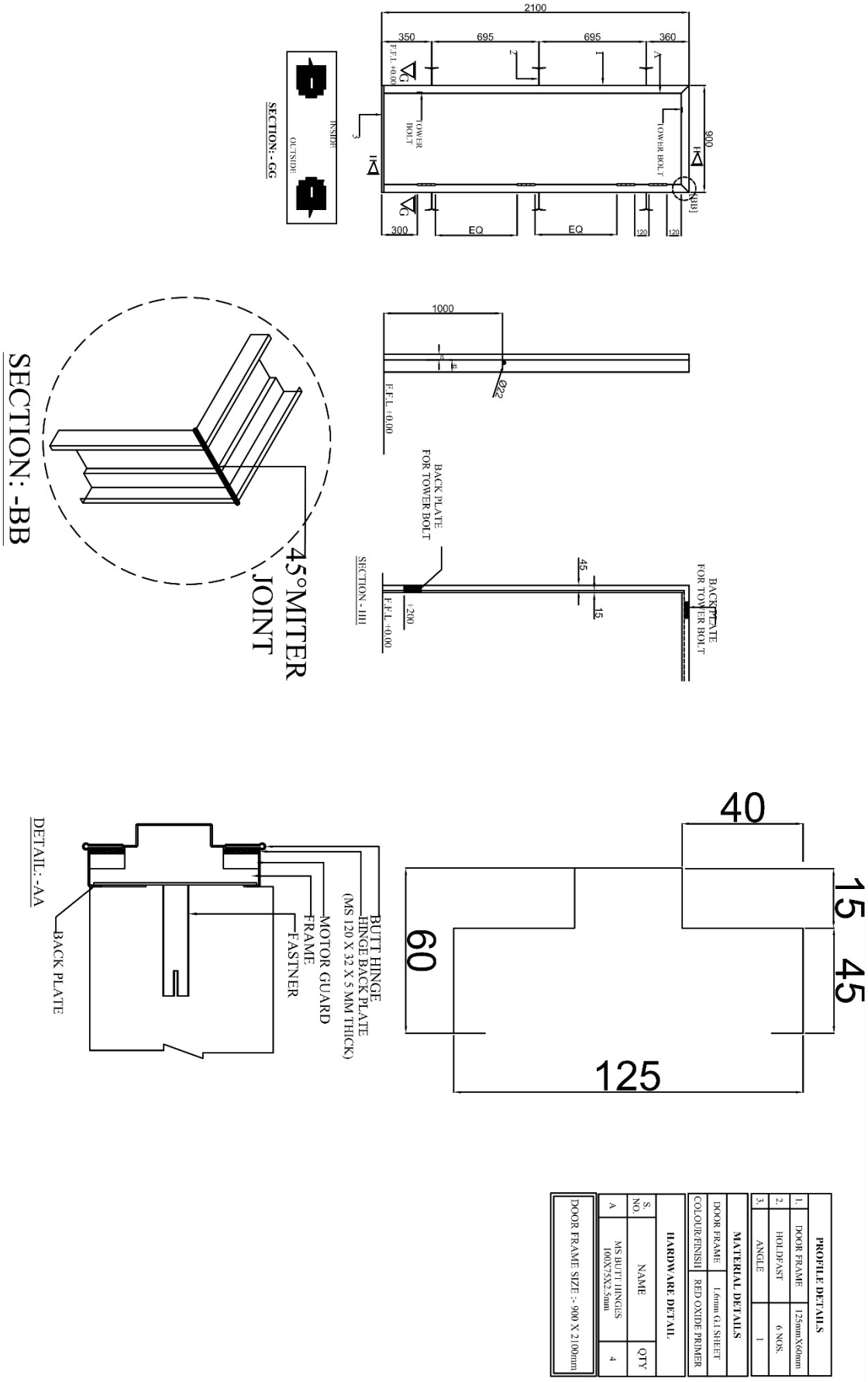
Contractor needs to refer architectural drawing, interior drawings, and door detail sheets for door frames for all types of doors. Door frames shall be fixed with expandable fasteners of HILTI or equivalent make of specified size with necessary plastic sleeves and galvanized M.S. screws including drilling holes complete as per the instruction of Engineer in charge. Size of fastener shall be as per manufacturer's recommendation.

Door frame shall be fixed with fasteners provided by the manufacturer's recommendation.

a. Pressed steel Doors Frames –

The agency shall fix the factory made Pressed steel door frame confirming to IS- 4351 and the size of door frame shall be of Profile D, 125 *60 mm double rebate door frame .The door frame shall be Synthetic enamel painted over Zinc Chromate primer .

Door Frame shall consist of hinge jamb, lock jamb , head and steel base ties at the bottom of the door frame . The Door frames shall be Painted with Synthetic Enamel Paint Asian paint Mild sea 9240 , Hazelnut 8569 Yellow Charm 7935 or as Equivalent as detailed in Colour Scheme.


2100
350
695
695
360
900
300
EQ
EQ
120
120
F.F.L +0.00
TOWER BOLT
TOWER BOLT
INSIDE
OUTSIDE
SECTION: - GG
1000
F.F.L -0.00
BACK PLATE FOR TOWER BOLT
BACK PLATE FOR TOWER BOLT
45
15
F.F.L +0.00
SECTION - HH
45°MITER JOINT
SECTION: -BB
40
15
45
60
125
BUTT HINGE
HINGE BACK PLATE (MS 120 X 32 X 5 MM THICK)
MOTOR GUARD FRAME
FASTNER
BACK PLATE
DETAIL: -AA
PROFILE DETAILS
1. DOOR FRAME 125mmX60mm
2. HOLDFAST 6 NOS.
3. ANGLE 1
MATERIAL DETAILS
DOOR FRAME 1.6mm G.I. SHEET
COLOUR FINISH RED OXIDE PRIMER
HARDWARE DETAIL
S. NO. NAME QTY
A MS BUTT HINGES 100X75X2.5mm 4
DOOR FRAME SIZE :- 900 X 2100mm

The door frame shall be of Galvanized iron sheet of minimum 1.60 mm thick confirming to IS- 277 . including hinges , jambs , locks and Bead and angle threshold of galvanized iron angle of section 50 * 25 mm . if required or base tiles of 1.60 mm pressed GI welded conforming to IS- 277 or rigidly fixed together by mechanical means , including M.S. pressed butt hinges 2.5 mm thick confirming to IS 1341 with mortar guards .

The in-fill material used shall be PU Foam . All edges to be given smooth cut and bend on CNC machines . Finishing shall be done by applying a coat of approved steel primer conforming to IS-2074.

The Lugs, hinges, Lock- Strike plate, Shock absorbers shall be provided and fixed as per the CPWD detailed specifications.

Mortar Guards:

Mortar guards of thickness of main frame sheet shall be provided in

Accordance to provisions of IS- 4351 and as instructed by Engineer-in-charge shall be provided. These shall be welded to the frame at the head of the frame for double shutter doors to make provision for bolts. These shall also be provided to the frame behind the hinges, mortise locks and latches, slots, al-drop and sliding /tower bolts.

Fixing

Frames shall be fixed up right in plumb and plane. To avoid sag or bow in width during fixing or during construction phase, temporary struts across the width preventing sides bulging inwards may be provided. Wall shall be built solid on each side and grouted at each course to ensure solid contact with frame leaving no voids behind the frame. The installation of Door frames shall be with the help of Fasteners of Hilti or as Equivalent , wherever required .

i. Place the frame in position at correct height from finished Floor level .
ii. Plumb to ensure that frame is upright , square and free from twists .
iii. Pressed metal door frame are liable to develop bow in the heights or sag in the widths either during fixing or during subsequent building work . To avoid this , fix temporary struts across the widths preventing sides bulging by the weight of wall or partition .
iv. The infill shall be PU Foam by the Volume.
v. The three lugs shall be provided on each jamb and the lugs shall not be placed more than 750 mm apart .
vi. Do not remove temporary struts till brick work is set .
vii. In Case screwed base tie is provided ,leave it in position until floor is laid when it shall be removed

Finishing

The surface of door frame shall be thoroughly cleaned, free of rust, mill-scale dirt oil etc. either by mechanical means, for example sand or shot blasting or by chemical means such as picking. After pretreatment of the surface one coat of approved primer i.e. red oxide zinc chrome primer conforming to IS - 2074. Two coats of paints as directed by the Engineer-in-charge shall be applied to the exposed surface.

b. Window Frames –

The Agency shall Provide and fix the factory made double rebate pressed steel window frames of profile size 125X65 as per vender drawing, made by Galvanized Iron conforming to IS:277, 1.60 mm thick sheet. There shall be a ventilating window on top. Fixed with 6 mm toughened glass with beadings on all four sides. The infill material used in project shall be PU Foam. The Window frames shall be painted with White Echo L112 of Asian paints or as Equivalent. The installation of Window shall be with the help of Fasteners of Hilti or as Equivalent , wherever required .

Installation -

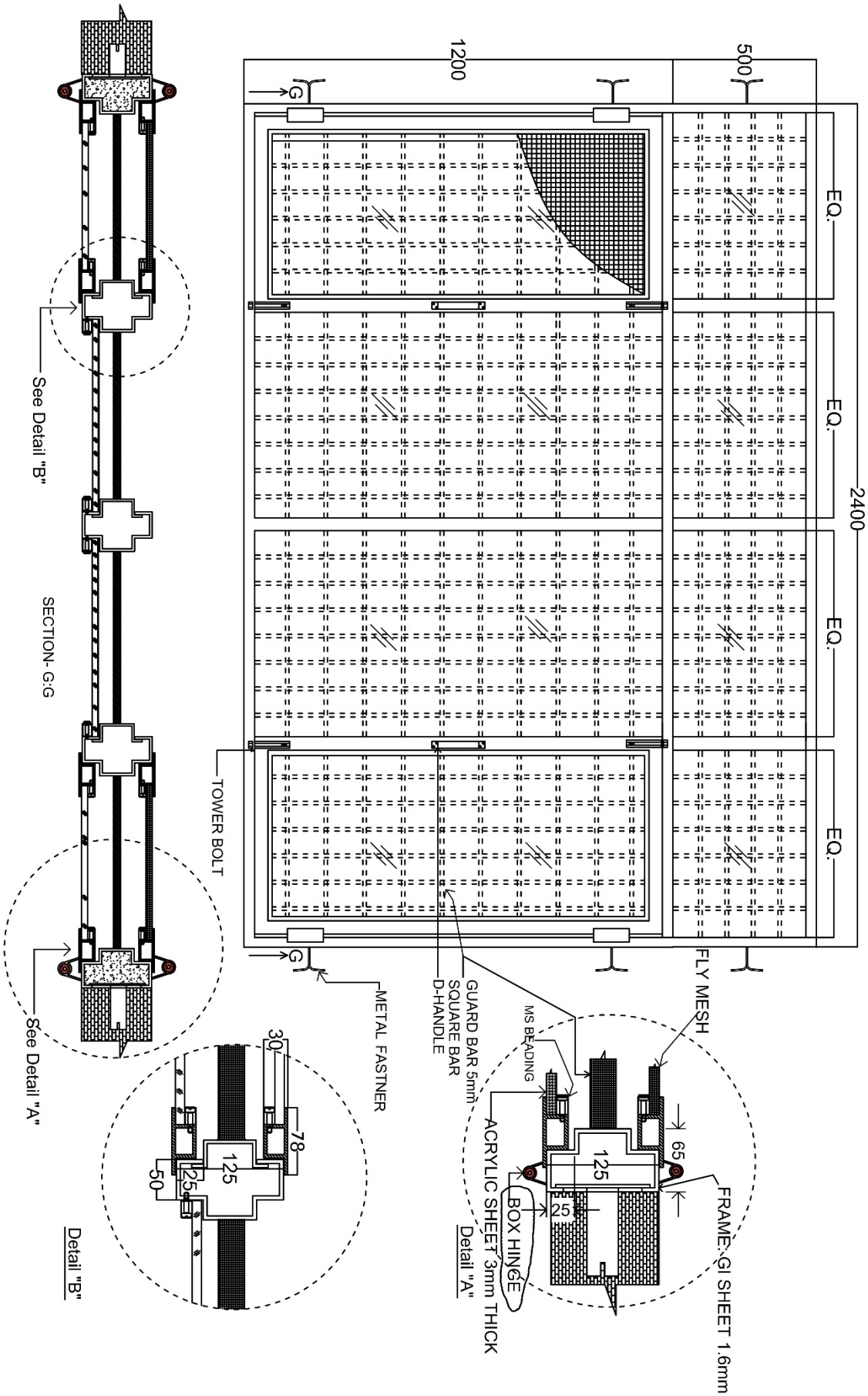
i. Place the frame in position at correct height from finished Floor level .
ii. Plumb to ensure that frame is upright , square and free from twists .
iii. Pressed metal Window frame are liable to develop bow in the heights or sag in the widths either during fixing or during subsequent building work . To avoid this , fix temporary struts across the widths preventing sides bulging by the weight of wall or partition .
iv. The infill shall be of PU foam by volume .
v. The three lugs shall be provided on each jamb and the lugs shall not be placed more than 750 mm apart .
vi. Do not remove temporary struts till brick work is set .
vii. In Case screwed base tie is provided ,leave it in position until floor is laid when it shall be removed .

Wire mesh -

The agency shall fix the Fly proof wire gauze of stainless steel grade (304) of 0.5 mm dia wire and 1.4 mm aperture on both sides riveting over 15X3 M.S flats to window shutters with G.I beading of 10*10*1.6 mm including necessary drilling for fixing of G.I. screws etc complete.

Mild Steel Grill –

The agency shall fix the MS grill made with M.S. Square bars of size 5mmX5mm in required pattern & design as shown in the Architectural drawing duly enamel painted with White Echo L112 of Asian paints over Zinc Primer to windows with necessary welding etc.


500
1200
2400
EQ.
EQ.
EQ.
EQ.
G
G
TOWER BOLT
GUARD BAR 5mm
SQUARE BAR
D-HANDLE
METAL FASTNER
FLY MESH
MS BEADING
ACRYLIC SHEET 3mm THICK
BOX HINGE
FRAME- GI SHEET 1.6mm
65
125
25
Detail "A"
30
78
125
25
50
Detail "B"
See Detail "B"
See Detail "A"
SECTION- G:G

Glazing -

The glass in windows shall be 6 mm toughened glass ET-125 of Saint Gobins or as equivalent of properties Light transmission 28% , External reflection 28% , internal reflection 9% , Solar reflection 0.29% ,shading coefficient 0.34% and U-Value 3.8 W/sqm.K. The agency shall fix the Glass in fixed and open able portion of windows with G.I beading of 10*10*1.6 mm including necessary drilling for fixing of G.I. screws etc complete.

Fittings:

The fitting for windows shall be the welded fittings from factory . Hinges, casement stays, handles, tower bolts, locks and other fittings shall be of approved quality and as per manufacturer shop drawing duly approved by the Engineer-in-charge .

g. Window Shutters -

Providing and fixing GI Tubular frames as per architectural drawing for windows & ventilators with rectangular/ L-Type sections, made of 1.60 mm thick GI. Sheet, joints mitered, welded and grinded finish, with profiles of required size, including fixing to frame with necessary 3 no's welded butt hinges of size 100 x 75 x 3 mm and applying a priming coat of approved steel primer. The Window Shutters shall be painted with the with White Echo L112 of Asian paints or as Equivalent.

The agency shall provide and fix 2 no's on each shutter of windows , the ISI marked oxidized M.S. tower bolt black finish, (Barrel type) of size 100 X10 mm with necessary machine screws etc.

The agency shall provide and fix 1 no. on each shutter of windows, the ISI marked oxidized MS handles of size 100 mm with necessary machine screws etc.

The agency shall provide and fix 1 no. the MS oxidized casement stays (straight peg type) on glazed shutter of windows and ventilators of size 300 mm not weighing less than 200gms with necessary machine screws etc.

h. STRUCTURAL STEEL WORKS :

All the specifications for structural steel works shall be as per CPWD Specifications 2009, Volume - I & II.

The agency shall fix the MS railing in all staircases with 40 mm dia. (ID)hand rail at 2 levels (900/750 mm from finished tread) fixed over 32 mm dia. (ID) baluster at every 3rd step and intermediate runners 3 nos. of 25 mm dia. (ID) including necessary welding etc complete all as per drawing and direction of Engineer-in-charge. All steel tubes shall be of medium duty of approved make only. The railing shall be painted with two or more coats of synthetic enamel paint of approved make and shade over a coat of priming coat of approved steel primer. The baluster shall be fixed with MS plate, other details, including fixing arrangements shall be as per the architectural drawing.

Steel work welded in built up sections/ framed work, including cutting, hoisting, fixing in position using structural steel, and applying a priming coat of approved steel primer and two or more coats of synthetic enamel paint of approved make & shade, as required for gratings, frames, guard bar, ladder, railings, brackets, grills, gates, cycle stands, railing over Over Head Tanks and similar locations, all as per architectural drawings etc complete.

All other incidental works not specified herein mentioned but necessary for the satisfactory completion of the works, shall be deemed to be included and nothing extra shall be payable.

Painting / Finishing for Structural Steel Works:

The entire steel work shall be painted with two or more coat synthetic enamel paint of approved brand and manufacture and required colour over a priming coat of approved zinc chromate steel primer in desired shade and colour approved by Engineer-in-charge.

i. Primer shall contain VOC limit not more than 65 g/lit or acceptable to GRIHA Norms
ii. The primer shall have a DFT (Dry Film Thickness) window of 75 microns to 150 microns achievable in one coat.
iii. DFT (Dry Film Thickness) - 125 microns to be achieved in one coat
iv. The Primer shall meet the GRIHA or LEED v4 Norms.
v. The primer shall be applied by conventional / airless spray only in shop. Brush shall be used only in inaccessible areas.

vi. Application to be carried out by authorized manufacturer applicator

Each coat shall be applied as specified at an interval that ensures the proper hardening or curing of the previous coat and provided the specified dry film thickness without detriment to the surface finish.

10. FALSE CEILING-

i. The work in general shall be carried out as per the CPWD specifications, manufacturer's specifications and as per architectural drawings or as per directions of Engineer-in- Charge.

ii. The False ceiling work includes erecting the Scaffolding and other necessary works included in this process and nothing extra shall be paid in this Account.

iii. The Contractor shall prepare the mock-up at site for approval of material and quality of workmanship by the Engineer-in-Charge. Only after the approval of Mock-up, the Contractor shall start the mass work. If the quality of the workmanship and the material is as per the required standards and approved by the Engineer-in- Charge, the mock up shall be allowed for the work, otherwise, it shall be dismantled by the contractor as directed by the Engineer-in-Charge and taken away from the site of the work at his own cost. The mockup(s) so made shall be kept till completion of respective works for reference.

iv. Once the material and mockup are approved, the entire material (tiles as well as grid system) shall be procured from the approved manufacturer or its authorized dealer.

v. The installation shall be got done through an experienced installer, executing similar works.

vi. The material shall be transported to site well packed. The ceiling material procured shall be free of any surface defect, edge damage and any other such defects. The contractor shall ensure careful handling and storage and prevent any rough handling, rolling of cartons or dropping cartons to prevent any edge damage or breakage. The defective / damaged material shall not be allowed to be used in the work. So, the contactor shall procure additional quantity of material to cover such contingencies. However, nothing extra shall be payable on this account

vii. Adequate care shall be taken before installation as well as afterwards till completion of the work. It shall be protected from rains, excessive humidity, chemical fumes, vibrations, dust etc. Any tile with edge damaged or crack etc. shall not be allowed to be used in the work and shall be replaced by the contractor at his own cost. Similarly, adequate care shall be taken by the contractor while placing or removing and handling the tiles so as not to cause any damage. The ceiling shall be cleaned as per manufacturer's specifications. Abrasive cleaners shall not be used to clean the marks.

viii. The Contractor shall obtain and submit to the Department the manufacturer's test certificate / report for compliance of the material to the relevant standards along with each lot of material supplied for the work.

ix. The suspension system for various types of false ceiling shall be as per manufacturer's specifications. The false ceiling tiles shall be fixed on to coordinated suspension ceiling system with supporting grids system that fully integrates with the ceiling tiles as per manufacturer's specifications. It shall be ensured that the suspension system shall be suitable to take all designed dead, imposed and all incidental loads efficiently and shall not sag. The true line and levels for false ceiling work shall be maintained.

a. Calcium Silicate false ceiling –

The agency shall fix the Calcium silicate tile False ceiling in the guest room toilets at stilt floor.

Providing and Fixing 15 mm thick densified tegular edged eco friendly light weight calcium silicate false ceiling tiles of approved texture of size 595 x 595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanised steel sections (galvanizing @ 120 grams per sqm including both side) consisting of main 'T' runner suitably spaced at joints to get required length and of size 24x38 mm made from 0.33 mm thick (minimum) sheet, spaced 1200 mm center to center, and cross "T" of size 24x28 mm made out of 0.33 mm (Minimum) sheet, 1200 mm long spaced between main'T' at 600 mm center to center to form a grid of 1200x600 mm

and secondary cross 'T' of length 600 mm and size 24 x28 mm made of 0.33 mm thick (Minimum) sheet to be inter locked at middle of the 1200x 600 mm panel to from grid of size 600x600 mm, resting on periphery walls /partitions on a Perimeter wall angle pre-coated steel of size(24x24X3000

mm made of 0.40 mm thick (minimum) sheet with the help of rawl plugs at 450 mm centre to centre with 25 mm long dry wall screws @ 230 mm interval and laying 15 mm thick densified edges calicum silicate ceiling tiles of approved texture in the grid, including, cutting/ making opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc., wherever required. Main 'T' runners to be suspended from ceiling using G.I. slotted cleats of size 25x35x1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm G.I. adjustable rods with
galvanized steel level clips of size 85 x 30 x 0.8 mm, spaced at 1200 mm centre to centre along main 'T', bottom exposed with 24 mm of all Tsections shall be pre-painted with polyester baked paint, for all heights, as per specifications, drawings and as directed by Engineer-in-Charge.

11. Finishing Work –

The work shall be done in accordance with CPWD specifications 2009, Volume - I & II . Wherever directed by the Engineer in Charge, all joints between Mild steel frame work in doors and windows and masonry work at all places shall be expressed by a groove cut in the plaster. All the joints on internal and external surfaces of walls between concrete members and masonry shall be covered by 24-gauge 8 mm size galvanised chicken wire mesh of 150 mm width including necessary laps and U shape galvanised wire nails, complete as per direction of the Engineer-In-Charge. This item covers plastering work at all heights including all material, labour & T&P's nothing extra shall be paid on this account . All fine aggregates (coarse sand) to be used in the plastering work shall conform to grading Zone-IV.

1. Internal & External Plaster :

a. 12 mm thick plaster with C.M.1:4 (1cement: 4 coarse Sand) shall be done on both side of the internal walls .
b. 6 mm thick plaster with C.M. 1:3(1 cement : 3 coarse sand) shall be done on the ceilings and on all RCC exposed surfaces.
c. The External walls shall be plastered with 18 mm cement plaster in two coats under layer 12 mm thick cement plaster 1:5 (1 cement : 5 coarse sand) and a top layer 6 mm thick cement plaster 1:3 (1 cement : 3 coarse sand). Generally coarse sand shall be used for the under coat and top coat shall conform to grading zone IV. The grooves of size 12X6 mm shall be provided in required pattern as shown in elevation drawings with the aluminum/ wooden beading etc. complete.
d. Grooves, drip-moulds 25mm x 12 mm on all RCC projection and chajjas, etc. as per drawings shall be provided wherever required.
e. In all type of cement mortar used for plastering work on internal and external AAC block walls, synthetic polyester triangular fiber of length 6 mm, effective diameter 10-40 micron and specific gravity of 1.34-1.40 shall be mixed with 125 gram of synthetic polyester triangular fiber for 50 kg of cement.
f. Before application of all types of internal and external plastering work over AAC block wall, a glass fiber cloth shall be fixed with neat cement slurry.
g. White Cement based Putty of average thickness 1 mm of approved brand manufacture shall be applied to all internal & external plastered surface before painting to prepare the surface even and smooth.

2. INTERIOR FINSHING:

Contractor needs to refer all interior drawings, look and feel images, room data sheet and Schedule of Finishes/ material palette to identify various items to be carried out in the section and locations.

Contractor will submit samples of each finishing items to Engineer in charge before executing the work for approval.

Superior glass mirrors shall be fixed on wall with necessary fixing arrangements in all common toilets ,Hand wash area, single & double rooms etc. in required numbers as shown in the drawings.

The 6 mm thick mirror of size 550 x 890 mm shall be 6 mm fixed over 6 mm BWP ply of approved make with 25 mm x6 mm moulded pvc beading with round Edges with 50mm radius.

Each room there will be mirror of size 450 x 900 mm fixed over 6 mm BWP ply of approved make with 25 mm x6 mm moulded pvc beading all as per detail drawings.

Painting -

Contractor needs to refer architectural drawing, detail elevations, sections (both interior and Architectural related), room data sheet and material palette attached with tender document for the location and finishing specifications recommended. No deviations in design, pattern, and color shall be permitted without approval of Engineer-in-charge Contractor shall provide samples for each finishing items to Engineer in charge for approvals prior to execute the work.

3. **Exterior Grade Texture Paint**

Exterior walls to be painted with the Texture paints in pattern as shown in drawings. Texture paint shall be Suzuka MGM of ultratech texture paints or approved equivalent.

The agency shall provide and apply surface Granite textured finish protecting coat (SUZUKA – MGM of approved shade and approved pigment size) to external wall surface comprising of water-borne , penetrating , water repellant EM –primer & amp; super durable water based acrylic silicon resin clear and super durable dirt and dust resistant protection coat of FSI clear coat , which shall be highly water repellant , Anti –algea & amp; anti fungal in nature .

Application Procedure –

It includes 1 coat of EI primer , 1 coats of suzuka –MGM , all in approved colour and texture including preparation of surface appropriate primer coat etc . applied as per manufacturing instructions complete & amp project consultant instruction , allow foe scaffolding staging as required . The finish shall e natural colour /non pigmented , water repellent , resistant to condensation formation , cover hairline cracks ceazing , UV & amp ; alkali resistant Ensure good breathability for the substrate all to the satisfaction of the Engineer-in-charge .

4. **Internal Paint (OBD) -**

Oil emulsion (oil bound) washable distemper premi um quality of shade (L-152 cream pie of Asian paint or as approved equivalent) shall be executed on all internal areas or as shown in drawings in two or more coats of finishing paint, with white cement base putty over plastered surface. Shade and colour of paint shall be as per the approval of Engineer-in-charge. The work shall be carried out as per CPWD 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 specifications shall form a part of this document with all latest codes.

5. **Synthetic Enamel Paint –**

All wooden flush door and shutters of wardrobes shall be enamel painted with approved colour as per CPWD specifications 2009 Vol-I & Vol-II .

The Enamel Paint shall be of Asian paint Mild sea-9240, hazelnut-8569,yellow Charm-7935 or as Equivalent.

12. WATER PROOFING WORKS:

General

i. The Contractor shall be responsible for the water proofing design, proper installation and performance of waterproofing systems to make the sub grade and superstructure completely watertight.

ii. The Contractor shall engage a qualified waterproofing specialist sub-contractor, preferably manufacturer authorized applicator to install or supply & install the waterproofing system, all in accordance with the manufacturer's recommendations & approved water proofing details.

iii. For the Quality assurance and quality of workmanship, waterproofing specialist applicator should be proficient in handling and installing water proofing membrane and the applicator shall be approved by CPWD qualification criteria.

iv. Waterproofing specialist applicator should have the proven track record, technical reliability, capability and agreement to supply full technical assistance, expert supervision during installation and performance guarantee. The Contractor shall submit the name of his Specialist waterproofing contractor (waterproofing applicator) for approval along with work experience certificate of satisfactorily completion of similar nature of three works each costing not less than 40% of estimated cost of water proofing work or two works or one work each costing not less then 60% or 80% respectively of estimated cost of water proofing work. The determination of estimated cost of water proofing work under this item shall be done by the Engineer-in-charge on prevailing market rates whose decision shall be final in binding on the contractor.

a. Toilet / Balcony / Dining area/Wet areas Waterproofing System:

Cement slurry mixed with waterproofing cement compound system as per CPWD specifications and as per direction of Engineer in Charge. The DSR 2018 Item corresponding to the work shall be 22.5 having description:

Providing and laying water proofing treatment in sunken portion of WCs, bathroom etc., by applying cement slurry mixed with water proofing cement compound consisting of applying :

i. First layer of slurry of cement @ 0.488 kg/sqm mixed with water proofing cement compound @ 0.253 kg/ sqm. This layer will be allowed to air cure for 4 hours.

ii. Second layer of slurry of cement @ 0.242 kg/sqm mixed with water proofing cement compound @ 0.126 kg/sqm. This layer will be allowed to air cure for 4 hours followed with water curing for 48 hours.

(The rate includes preparation of surface, treatment and sealing of all joints, corners, junctions of pipes and masonry with polymer mixed slurry.)

Protection treatment for Waterproofing System:

All vertical waterproofing membrane treatment to be protected with 12 mm thick plaster of mix 1:4 (1 cement: 4 coarse sand) with approved waterproofing compound admixtures.

All Horizontal waterproofing membrane system to be protected with Cement concrete 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20mm nominal size) in required thickness with approved waterproofing compound admixtures and kept broom finished for finishing the top surface as per Architectural drawings and as directed by Engineer in charge.

b. TERRACE:

Providing and laying integral cement based water proofing treatment (SBR polymer of Dr. Fixit or as equivalent) including preparation of surface as required for treatment of roofs, balconies, terraces etc consisting of following operations:

Applying a slurry coat of neat cement using 2.75 kg/sqm of cement admixed with water proofing compound conforming to IS. 2645 and approved by Engineer-in-charge over the RCC slab including adjoining walls upto 300 mm height including cleaning the surface before treatment.

laying brick bats with mortar using broken bricks/brick bats 25 mm to 115 mm size with 50% of cement mortar 1:5 (1 cement : 5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge over 20 mm thick layer of cement mortar of mix 1:5 (1 cement :5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge to required slope and treating similarly the adjoining walls upto 300 mm height including rounding of junctions of walls and slabs.

i. After two days of proper curing applying a second coat of cement slurry using 2.75 kg/ sqm of cement admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in- charge.
ii. Finishing the surface with 20 mm thick joint less cement mortar of mix 1:4 (1 cement :4 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge including laying glass fiber cloth of approved quality in top layer of plaster and finally finishing the surface with trowel with neat cement slurry and making pattern of 300x300 mm square 3 mm deep.
iii. The whole terrace shall be of neat finish and then flooded with water for a minimum period of two weeks for curing and for final test.

All above operations to be done in order and as directed and specified by the Engineer-in-Charge with average thickness of 120 mm and minimum thickness at khurra as 65 mm.

Providing gola 75x75 mm over chajjas and similar other locations in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 10 mm and down gauge), including finishing with cement mortar 1:3 (1 cement : 3 fine sand) as per standard design.

Making khurras 45x45 cm with average minimum thickness of 5 cm cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) over P.V.C. sheet 1 m x1 m x 400 micron, finished with 12 mm cement plaster 1:3 (1 cement : 3 coarse sand).

13. ALUMINIUM WORKS:

The work shall be done in accordance with CPWD specifications Volume - I & II.

Aluminum work for doors and partitions to be provided as per schedule of finishes and drawings, with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixed with dash fasteners of required dia and size, including filling/ sealing the junctions at top, bottom & 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/ panelling, C.P. brass/ stainless steel screws, aluminium sub frame, all complete as per architectural drawings and the directions of Engineer-in-charge.

a. For fixed portion including Rough ground :
   Anodized aluminum (anodized transparent or dyed to required shade according to IS : 1868, minimum anodic coating AC-15)
b. For shutters of doors, windows & ventilators including providing and fixing ebco make or approved equipment S.S. 304 hinges/pivots/ friction stay of size 355X19 mm and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required for. Anodized aluminium (anodized transparent or dyed to required shade according to IS : 1868, minimum anodic coating AC-15).
c. Aluminum extruded sections anodized aluminium (anodized transparent or dyed to required shade according to IS : 1868, minimum anodic coating AC-15), are used for providing Louvers in aluminum doors, windows in fixed and openable portion for ventilation including providing & fixed ebco make or equipment S.S 304 hinges, and making provisions for fixing of fittings wherever required.

Note:-

1. Filling the gap 5mm depth and 5mm width between aluminium frames and adjacent RCC/ Brick/ ACC work, wherever required by providing weather silicon sealant over backer rod of approved quality as per direction of Engineer-in-charge complete.
2. Float plain glass panes of 6 mm thickness (weight not less than 14.96kg/ sqm) to be provided in all openable and fixed aluminium door window & ventilator and partitions etc. with EPDM rubber/ neoprene gasket etc. complete as per schedule of finishes and directions of Engineer-in-charge.
3. The agency shall provide and fixed the 2 no's SS 316 Grade Pull Handles of KICH Code: PHH or as approved equivalent on the Each face of Aluminium Glazed Door shutter with necessary Screws**.**
4. One Double action hydraulic floor spring with stainless steel cover plate minimum thickness 1.25 of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body/ plate with double spring mechanism and door weight up to 125 kg, shall be fixed for each aluminium glazed door shutter including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc. to be provided as per schedule of hardware, complete as per the direction of Engineer-in-charge.
5. All Aluminum sections should be protected against scratching with polyethene wrap stickers till completion of the building/ handover of the building whichever is later. If any damage or scratches are visible in aluminum sections at handing over, the same shall be rectified by the contractor at his own risk and cost.

   The polyethene wrap stickers are compulsorily to be removed upon completion, before use of the building.

   All aluminum works shall be executed through approved specialized agency. Approval shall be accorded by the Engineer in charge.

Guarantee Bond: Three years guarantee for aluminum work &10 year guarantee for water proofing work in prescribed proforma attached shall be given by the contractor, in token of his overall responsibility. 10% (Ten Percent) of the cost of these items would be retained as guarantee to the performance of the work done. The guarantee against this item of works shall be in addition to the security deposit mentioned elsewhere in the contract form. If any defects or deficiencies are noticed during the guarantee period the same shall be rectified by the contractor within seven days of issue of the written notice by the Engineer-in-charge, failing which the defects/deficiencies would be got removed by the Engineer-in charge from other agency at the risk and cost of the contactor. However this amount of guarantee can be released in full, if bank guarantee of equivalent amount for the required period is produced and deposited with the department.

14. LANDSCAPE-

All work shall be carried out in accordance with architectural drawings as per direction of Engineer-in-charge. The following are the main constituents of Landscape work:

a. Grasscrete pavers: 70 mm thick reinforced cement concrete grass paver block of size 600 * 400 mm made with M30 grade cement concrete shall be laid over 250 mm thick sand bed over compacted earth with soil infills (50% available earth & 50% Ganga Sand) for driveway and pathways (parking) as per drawings.
b. Softscape: 300 mm good earth shall be provided for area as per drawings.
c. Pigmented cement concrete flooring : 52 mm thick brush finished concrete of Cement concrete 1:2:4 (1 cement :2 Coarse sand :4 graded stone 20 mm Nominal size)mixed with pigment of approved colour and with recessed grooves shall be laid as driveways as per drawings.

d. Concrete Flooring : 100 mm thick concrete of grade M35 shall be laid as flooring in the Pathways as shown in Drawings .
e. Paver block: 65 mm thick grey colored shot blasted concrete interlocking paver blocks of size 100mm x 200mm made with M30 grade cement concrete shall be laid over a sand bed of 50mm. Sand bed shall be laid over compacted earth .
f. Brick Paving: Dry brick pitching with 75x115x230 mm bricks of class designation 7.5 (local Ist class) shall be laid as flooring with paper joints over 50 mm thick sand bed as per drawings.
g. Kerb Stone: Exposed precast cement concrete factory made kerbs of size 150mm x 300mm in design mix M25, set in cement mortar 1:3 (I cement : 3 course sand) and finished smooth over 150mm thick PCC 1 : 4 : 8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size)as per drawing/ direction of Engineer-in-charge. Thickness of joints except at sharp curve shall not to more than 5mm. The works including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge.
h. Exposed Brick Masonry: 230mm thick exposed Brick masonry with modular bricks shall be provided as seater using approved block (230x110x75 mm size) in cement mortar 1:6, grove with necessary pointing.
i. Waterproof Plaster: Waterproofing Plaster in cement mortar 1:4 mixed with waterproofing compound SBR Polymer of Dr. Fixit or approved equivalent as per manufactures specification shall be applied as per drawings.
j. Kota Stone: 25 mm Thick River finished kota of size 300 mm X 600mm shall be laid as coping with 10mm edge chamfer laid with paper joints as per drawings.

all other incidental charges required for the successful completion of * works as per design, drawings and details, etc. shall be considered and nothing extra shall be paid. PCC wherever required in Landscape work shall be of 1:3:6 (1 Cement : 3 Coarse Sand : 6 Graded stone aggregate 40 mm nominal size). Compacted Earth shall be compacted to a density of min 90%.

Note: All the supporting annexure and schedules attached along with this NIT are to be read and co-related with the architectural and structural drawings in accordance with latest CPWD specifications in order to make building fully functional in every aspect. The annexure and schedules are not exhaustive and merely convey the major items that are to be executed. Any further requirement of item deemed necessary by the Engineer-in-charge in order to make building functional shall be provided by the contractor and no extra payment shall be made on this account.

Tri Party Agreement: Tri Party Agreement is to be provided by the contractor for all items which are under warranty by the manufacturer like sanitary fittings, Door and Window hardware & fittings, False Ceiling etc.

15. ROADS AND PARKING

150 mm thick Vacuum dewatered cement concrete M25 laid to required slope and camber including consolidation, finishing and tamping complete, over 150 mm thick PCC 1 : 4 : 8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size) over 150mm thick stone soling under roads including packing with smaller stones and consolidation with road roller including spreading and consolidation of blinding material, moorum or stone dust etc. consolidation of sub grade with power road roller of 8 to 12 tone capacity after excavating earth to an average of 22.5 cm depth, dressing to camber and consolidating with road roller including making good the undulations etc. and re-rolling the sub grade. 8 mm Dia Steel Bothways at 200C/C shall be provided as per the structural drawings.

De-vacuumization with vaccume de watering pump shall be done for removing the voids. The whole concrete surface shall be leveled, compacted by ramming and trowelling. Prepared surface shall be allowed to set. Concreting shall be carried out in one operation between the expansion joints and Construction joints without taking a break at Dummy joints .The Expansion joint shall not be less than 23 meters . Excessive trowelling shall be avoided. After the initial set, further compaction shall be done by steel trowelling. Final brushing where required (to achieve desired surface finish) shall be made before the floor top becomes too hard. Curing shall be done as per CPWD Specifications 25mm Mild steel dowel/tie bars including greasing, PVC pipe of approved make and size, etc. to be provided in expansion joint and dummuy joints shall be cut by cutting machines in 5 mm width and 5 mm depth at required center to center distance in concreate road/ pavements including side / panel shuttering etc. All as per CPWD specification, drawing and direction of Engineer-in-charge. The expansion and dummy joints shall be filled up to 5 mm depth with bitumen hot sealing compound grade 'A' after removing dust and dirt particles with help of wire brushes etc.

LIST OF HARDWARE

S.no	Doors	S Butt hinges	SS Butt hinges	SS Ball Bearing hinges	Stainless Steel Tower bolt	Stainless Steel Tower bolt	S.S Concelled Flush Bolt	SS Handles	SS Al Drops	S.S H Type Pull Handle	S.S Pull Handle	SS wall mounted Door stop	Powder coated Mortice Handle / Panic trim	SS Door Stopper	Door Closer	Panic Bars	Floor Spring	Aumini um Tower Bolt	Alumi nium Al dro	Aluminium Handle	SS Hasp n Staple	SS Cabenet Handle
	Size	125*65*2.12	100*75*3mm	100*84*3mm	200*10mm	100*10mm	300 mm	125mm	250*16mm	32*475mm		75 mm						100*10mm	150*12mm	125 mm	100 mm	100 mm
1	GD	-	8	-	2	2	-	-	-		4	-		2	-	-	2	-	-	-	-	-
2	D1	3	-	-	1	1	-	2	1		-	1		1	1	-	-	-	-	-	-	-
3	D2	3	-	-	1	1	-	2	1		-	1		1	1	-	-	-	-	-	-	-
4	D4	3	-	-	1	1	-	2	1		-	1		1	1	-	-	-	-	-	-	-
5	D5	3	-	-	1	1	-	2	1		-	1		1	1	-	-	-	-	-	-	-
6	D6	3	-	-	1	1	-	2	1		-	1		1	1	-	-	-	-	-	-	-
7	D7	-	6	-	-	-	-	2	1		-	-		-	-	-	-	-	-	-	-	-
8	D8	-	3	-	-	-	-	1	1		-	-		-	-	-	-	-	-	-	-	-
9	CB	-	-	-	-	-	-	-	-		-	-		-	-	-	-	-	-	-	1	2
10	Fire Door	-	-	8	-	-	2	-	-	4	-		1	1	1	1	-	-	-	-	-	-
11	TD	-	4	-	-	-	-	-	-		-	-		-	-	-	-	1	1	2	-	-

Schedule of Finishes

S.No.	*Area/ Space*	*Description*		
		Floor / Skirting	*Walls / Column*	*Ceiling*
A	**All Blocks - Stilt Floor**			
1	Entrance Hall , Waiting Area, Cloak Room , Meeting Room, Warden Room, Laundry , Ironing Area	25mm thick Mirror Polished Kota stone with White Marble patterns as per drawing. The Kota shall be Mirror polished .The skirting will be 100 mm high of kota stone.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
2	Rooms	25 mm Thick Terrazzo Tile (chip size 1-3 mm of stone /colored pigments as approved by Engineer-in-charge) of size 300mm*300mm .The skirting shall be 100 mm of Terrazzo Tile .	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement basedputty
3	Bicycle Parking	Colored Cement Concrete Flooring 52 mm thick of Aluminum Strips of approved pattern.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
4	Staircase	25 mm thick Single length Polished kota on Treads with Marble strips as per drawing .The Riser shall be of Marble Stone .The Skirting Shall be of 100 mm thick Kota Stone.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement basedputty
5	Breakout space	25mm thick Mirror Polished Kota stone with White Marble patterns as per drawing. The Kota shall be Mirror polished .The skirting will be 100 mm high of kota stone.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement basedputty
6	Lift Lobby	25mm thick Mirror Polished Kota stone with White Marble patterns as per drawing. The Kota shall be Mirror polished .The skirting willbe 100 mm high of kota stone.	Cladding with 18 mm thick Granite Stone .	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
7	Visitors Toilet	Anti -Skid Vitrified Tile (Ranger beige of kajaria or Equivalent)of size 300*300.	Ceramic Wall tiles of 200*300 mm (Angola Gray of kajaria or Equivalent) upto False ceiling level .	Grid False Ceiling with calcium silicate tile of 595*595and (Cosmos of Aerolite or Equivalent).
8	Corridors	25mm thick Polished Kota stone with White Marble patterns as per drawing. The Kota shall be Mirror polished .The skirting will be 100 mm high of kota stone.	OBD paint (Shade 7948 Cresent of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty and Ranger beige of Kajaria of 300X300 in WC area .	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
B	**All Blocks- 1st -6th Floor**			
1	Single Seater Room	25 mm Thick Terrazzo Tile (chip size 1-3 mm of stone /coloured pigments as approved by Engineer-in-charge) of size 300mm*300mm .The skirting shall be 100 mm of Terrazo Tile .	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
2	Double Seater Room	25 mm Thick Terrazzo Tile (chip size 1-3 mm of stone /coloured pigments as approved by Engineer-in-charge) of size 300mm*300mm .The skirting shall be 100 mm of Terrazo Tile .	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
3	Breakout Space (1st - 6th Floor)	25mm thick Mirror Polished Kota stone with White Marble patterns as per drawing.The Kota shall be Mirror polished .The skirting willbe 100 mm high of kota stone.	OBD paint (Shade 7948 Cresent of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
4	Lift Lobby (All Floors)	25mm thick Mirror Polished Kota stone with White Marble patterns as per drawing.The Kota shall be Mirror polished .The skirting willbe 100 mm high of kota stone.	Cladding with 18 mm thick Granite Stone .	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
5	Staircase	25 mm thick SIngle length Mirror Polished Kota on Treads with Marble strips as per drawing.The Riser shall be of Marble Stone.The Skirting Shall be of 100 mm thick Kota Stone.	OBD paint (Shade 7948 Cresent of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
6	Corridor	25mm thick Polished Kota stone with White Marble patterns as per drawing.The Kota shall be Mirror polished .The skirting will be 100 mm high of kota stone.	OBD paint (Shade 7948 Cresent of Asian Paint or Approved equivalent)over 12 mm thick cement plaster 1:4 and white cement based putty.	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
7	Toilet Area	Anti -Skid Vitrified Tile Sterling Grey of kajaria or Approved equivalent)of size 600*600.The W/C area shall be Tile shall be 300*300 of same Querry. Moaisaic Grey of kajaria behind Toilet mirror above wash basin .	Ceramic Wall tiles of 200*300 mm (Angola Gray of kajaria or Equivalent) .With 100 mm Highliter of Albina Cotto or Approved equivalent)	OBD paint (Shade L-152 Cream pie of Asian Paint or Approved equivalent)over 6 mm thick cement plaster 1:3 and white cement based putty
9	Shaft Area	Terracotta jalli as Approved pattern by Engineer-in-Charge		
10	Bridge	Exposed RCC quality.		
C	**All Blocks Terrace**			
1	Terrace	Brickbat Coba mixed with SBR polymer of Dr. Fixit or Approved equivalent.		
2	Mumty	Brickbat Coba mixed with SBR polymer of Dr. Fixit or Approved equivalent.		
3	Copings	20 mm Thick Red Sand Stone with Chamfer Edges and Drip moulds.		
4	Parapet Walls	Exterior Grade paint (Shade 7948 cresent of Asian Paint or Approved equivalent). The Exterior side shall be painted with (SUZUKA-MGM of approved shade as/Engineer-in-charge).		
D	**External / Other Finish**			
1	External Wall Finish	Texture Paint (SUZUKA-MGM of approved shade as/ Engineer-in-charge) with 12*6 mm Grooves as per Drawing over 18 mm double coat plaster with white cement based putty.		
2	**Door and Windows**			
a	Internal Doors	Preessed GI steel Doors . The Door shutter shall be 35 mm Flush shutter .The Shutters Will be painted with (Mild sea-9240 ,Hazelnut 8569 ,yellow charm 7935) as per Colour		
b	Reception Door	Anadoized Aluminium Glass Door with 6 mm Clear Float Glass		
c	External Windows	Pressed GI steel Windows .The glass shall be clear toughened glass of 6 mm (ET-125 of Saint Gobins or Approved equivalent)and Mosquito mesh with 5 mm Square bars MS Grill as per Drawing		
d	Window Sills	Window Sills shall be painted with OBD paint (shade L-152 Cream pie of Asian Paint or Approved equivalent) over 12 mm plaster over white cement based putty		
e	Chajjas , Fins	Chajjas shall be painted with Texture paint (SUZUKA-MGM of approved shade as/Engineer-in-charge) .		

f	Toilet Doors	FRP Door Frames and FRP Shutters
g	Staircase Door	Metal Fire Doors of 2 hrs rating with vision Panel
h	Shaft / Janitor Door	Anodized Aluminium Lovered Door .
E	**Staircase / Over Head Tank Railings**	MS railing at 2 levels shall be Enamel painted with Asian paint Shade Code 8293Carbon Copy ,Baulster of 32 mm ID with wall thicness 3.2 mm at every 3rd step ,Hand Rail of 40 mm ID with Wall Thickness 3.2 mm and Intermediate runners 3 nos . of ID 25 mm with Wall thickness 2.6 mm.
F	**Boundary wall Grill / Gates**	Black Rose of Berger Luxol Hi Gloss Synthetic Enamel or Approved Equivalent
G	**Plinth Protection**	600 mm wide Cement Concrete 1:3:6
H	**Toilets**	
(i)	Counter Top& Fascia	18 mm thick Black Granite
(ii)	Urinal Partition	18 mm thick Black Granite
I	Insulation	The External walls shall be incorporated with XPS insulation of 50 mm .

LIST OF APPROVED MAKES/AGENCIES

FOR WORKS COVERED UNDER THIS CONTRACT

1) All materials and products used in the work shall conform to the relevant standards/ specifications and shall be of approved make and design. Lists of approved manufacturers / vendors for Plumbing works, Fire fighting, are given herein below. The approval of a manufacturer/ vendor shall be given only after review of the sample/specimen by the Engineer-in-charge. The complete system and installation shall also be in conformity with the "Applicable Codes Standards and Publications".

2) The Engineer- In-charge/consultant reserves the right to select any of the brands indicated in the list of approved make. The tenderer shall quote his rates on the basis of price of best quality product of the brand/make stipulated in the items of works as described in specifications as well as in the list of approved make. The contractor cannot claim anything extra if the Engineer In-charge/ Client changes the make but within the list of approved make.

3) When certain makes are missing in the below list, the make will be decided as per the approval of consultant/Engineer In-charge.

S.NO.	Item / Work	Approved Make /Agency
1.	Cement	ACC , Jaypee Cement , Ultratech , Vikram , Shri Cement , Ambuja , Century Cement & JK Cement
2.	White Cement	Birla White , J.K White .
3.	Steel (Reinforcement Fe 500 D & Structural)	SAIL , Tata Steel LTD . RINL , Jindal Steel & Power Ltd , JSW Ltd.
4.	Flush Doors , Block Board , Plywood	Duroply Industries Ltd . , Green Ply , Century
5.	Pressed steel Door Windows	Sehgal Doors , Everdoors or Approved equivalent
6.	Aluminum Extruded Profiles	Indal , Hindalco , Jindal, Mahavir Aluminum .
7.	Float Glass , Mirrors	Asahi India Glass ltd, Modigaurd ,Saint Gobain
8.	AAC Blocks	Max Blocks ,Biltech , Aerocon , Siporex , Ultratech Magicrete , JKLakshmi Cement Ltd . , Ecolite .
9.	Toughened Glass.	Saint Gobins ,Modigaurd
10.	Hardware (Aluminium , Stainless steel , Brass)	
a.	Mortise lock , Multipurpose Lock	KICH Godrej , IPSA , Golden , Harrison
b.	Floor Spring , Door Closer	KICH Everite , Doorking , Dorma , GEZE , Hafele
c.	Window Turn Handles , Friction Hinges	KICH ,IPSA , Golden ,Dorma , Ebco , Hettich , GEZE .

d.	Stainless steel Handles , SS Tower Bolts , SS Hinges , SS Aldrop , SS Floor Stopper , , Safety chain , Magnetic door catcher , Drawer glides , Floor Stopper , Panic bar/ push Bar	KICH, Hafele , Dorma , GEZE , Hettich , Ozone
e.	MS Tower Bolt, MS Hinges, MS AL drop MS Casement stay	Ashish, Shakti , Surya
f.	Aluminium Tower Bolt, Aluminium Aldrop , Aluminium floor Stopper , Aluminum Casment Stays	Everite, EBCO , R.J Industries, Suzu
g.	Sliding Door Mechanism	Hafele , Dorma , Hettich
h.	Stainless steel Fire rated hardware	Dorma , GEZE , Hafele , Shaktimet - Hormann.
i.	Stainless Steel Hsap And Staple	Suzu , Kich , Hettcih
11.	Laminates	Greenlam , Merino
12.	Venners	Greenlam , Duro , Merino
13.	Rectified Ceramic tiles, Ceramic tiles, Vitrified tiles, Heat resistance tile (Vitrified tiles to be double charged manufactured from mother plant .	First quality of johnson , kajaria , RAK , Restile , Pavlt , Nitco of approved design , Colour and shades .
14.	Premium quality acrylic distemper, acrylic/ plastic emulsion, synthetic enamel paint	ICI, Asian , Nerolac
15.	Cement Primer	Nerolac , BP White (Berger) , Decoprimer WT (Asian) , White primer (ICI)
16.	Steel Primer (Red Oxide Zinc Chromate Primer)	Asian Paints , Nerolac , Berger ,ICI
17.	Cement Admixture /Plasticizers	Fosroc , Sika , Pidilite , Cico , BASF
18.	Dash Fasteners /Anchors fasteners / Cramps	Hilti / Fisher /Bosch / Canon
19.	Thermal insulation /Rockwool / Glass Wool / Minerals Wool / PUF	Twiga , M/s Lloyd Insulators India Limited , Owens Corning , Polyglass
20.	Adhesive for Wood Work	Fevicol , Vamicol ,
21.	Sealant	Dow Corning , Beckar , Sika , Wacker , GE
22.	Crystalline Water Proofing admixture and Compound	Penetron , Kryton , Pidilite , Fosroc
23.	AAC Blocks Adhesive	Pidilite , Ferrous Crete , laticrete
24.	White cement Putty	Birla White , Asian , J.K.
25.	Fire -Retardant Paint	Viper , Nippon Paint .
26.	Waterproofing materials	Weber , Fosroc , Pidiproof , Cico , BASF , Sika
27.	Anti - termite Treatment Chemicals	Bayer , BASF , Dursban , GIbraltor
28.	Bitumen	IOC / Tikky Tar
29.	Tile Adhesive , Epoxy Grout , Silicone Spray , Polysulphide sealant	Laticrete , Roffe , Pidilite
30.	False ceiling Framing System	India Gypsum , Gyproc , Armstrong

31.	Acoustic False ceiling	Ecophon , Armstrong , Twiga
32.	Calcium False ceiling Boards / Tiles	Hilux (Ramco Industries Ltd .) , Aerolite , Gyproc
33.	Fire Curtain	Orient Fire Curtains India Pvt Ltd , Coopers Fire ,.Colt
34.	External Finish Texture paint	Suzuka (Ultratech) SKK (S) Pvt ltd , Acro paint.
35.	Fire Doors	Navair Hormann , Enviortech System Pvt. Ltd ., promat international , Sukri
36.	Hook on Perforated / non perforated aluminium metal ceiling System	Durlum , SAS , DAMPA
37.	Thermal insulation	Twiga , Supreme
38.	MultiWall Clear / bronze Polycarbonate Sheet	Sabic Lexan , Danpalon
39.	Aluminum batten Louver system	UnistoneAlwood , Makintosh
40.	Terracotta tile	British Tile Company , Alfa Tiles

TECHNICAL SPECIFICATIONS
PLUMBING WORKS

GENERAL

The Plumbing Installation work shall be carried out in accordance with Indian Standard Code of Practice. It shall also be in conformity with the current Indian Plumbing rules and regulations and requirements of the Local Authority, so far as these become applicable to the installation. Plumbing work in general shall be carried out as per following CPWD General Specifications amended upto date.

1 PREAMBLE

b. Work under this contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely furnish all the Plumbing and other specialized services as described hereinafter and as Indicated.

c. Without restricting to the generality of the foregoing Sanitary installations shall include the following:

a. Sanitary Fixtures & CP Fittings
b. Soil, Waste, Rain Water and Vent Pipes.
c. Internal and External Water Supply System
d. Domestic water distribution system from Underground water tank.
e. Flushing water distribution system from Terrace Treated Water tanks.
f. External Garden hydrant system including Garden hydrant point in connection from treated effluent.
g. Internal and External Sewerage and Storm water drainage system with excavation for pipe.
h. Rain water harvesting system.

2. TECHNICAL CONDITIONS

A. GENERAL INSTRUCTIONS

All works specified in the specification have to be executed in accordance with:

a. The latest DSR & guidelines of CPWD specifications as maximum wherever possible.

b. The rules and regulations of Local Authority Having Jurisdiction, and as per the statutory regulations applicable.

c. Applicable norms laid down by the relevant sections of latest editions of National Building Code (NBC) and all relevant codes of Bureau of Indian Standards shall be followed as applicable.

d. The codes of the Uniform Plumbing Code of India shall be used as a general guide for good engineering practice, design and workmanship norms.

e. All materials used in the works shall have Bureau of Indian Standards valid certification stamped, marked or cast on the material in an acceptable and approved manner, as specified hereinafter.

f. It is the contractor's responsibility to ensure the competence of design to meet the above requirements.

g. Drawings issued are schematic and indicate the concept. Contractor shall make his shop drawings on basis of Architectural and Interior design drawings issued by the Engineer-In-Charge. Work will be executed only as per approved shop drawings.

h. Contractors shall furnish detailed Shop drawings, hydraulic and other design calculations for approval.

i. Work under this contract shall be carried out strictly in accordance with Specifications.

B LICENSE AND PERMITS

1. Contractor must keep constant liaison with all relevant authorities and shall be responsible for obtaining all approvals relating to water supply, sewerage, storm-water drainage system including rainwater harvesting complete.

2. Contractor shall obtain No Objection Certificate before commencement of work, from the local authorities all related to his work as required for the building.
3. Contractor shall obtain, from the local authorities all related completion certificates with respect to his work as required for occupation of the building.

C. METRIC CONVERSION

All dimensions and sizes of materials and equipment given in this document are commercial metric sizes.

Any weight or sizes given in the specification having changed due to metric conversion, the nearest equivalent sizes accepted by Indian Standards shall be acceptable.

D. REFERENCE POINTS

Contractor shall provide permanent Bench Marks, Flag Tops and other reference points for the proper execution of work and these shall be preserved till the end of the work.

All such reference points shall be in relation to the levels and locations given in the architectural drawings.

E. DRAWINGS ISSUED TO CONTRACTOR

1. Service drawings are diagrammatic but shall be followed as closely as actual construction permits.

2. Architectural drawings shall take precedence over Plumbing or other services drawings as to all dimensions.

3. Contractor shall verify all dimensions at site and bring to the notice of the Engineer-In-Charge, all discrepancies. Engineer-In-Charge decision shall be final.

4. Large size details and manufacturers dimensions for materials to be incorporated shall take precedence over small-scale drawings.

5. All drawings/sketches issued by the IITK for the works are the property of the Engineer-In-Charge and shall not be lent, reproduced or used on any works other than intended without the written permission of the Engineer-In-Charge.

6. All corrections and changes made on the site shall be shown on these reference drawings for final incorporation in the completion drawings. All changes to be made shall be got initialed from the Engineer-In-Charge.

F. SHOP DRAWINGS

a. The Contractor shall submit Shop Drawings in required numbers for Plumbing works as an Advance Copy to the Engineer-In-Charge for approval before start of work. Subsequent to the approval of the shop drawings, the Contractor shall submit Shop Drawings for execution to the Engineer-In-Charge. The Contractor shall also submit the Technical Specifications for all items, including pump curves, single line diagrams etc. as relevant.

b. All Sanitary Engineering drawings issued to the Contractor shall be studied by them. Contractor shall also obtain the necessary architectural, structural and other services drawings, based on which they shall prepare their shop drawings as per site conditions.

c. Shop drawings shall incorporate the following:

d. All Structural supports/hanging/laying and jointing details for all types of pipes as required.

e. Typical details for Toilets & Fixtures required.

f. Plumbing layout plans as required and for any changes in the layout of Plumbing/ Architectural Drawings.

g. Equipment & piping layout for Mechanical and Electrical equipment's as required, SLDs, mounting details of circuit breakers, location of panels, installation of terminals and faucets etc. w.r.t. finishes, surrounding levels & locations.

h. Contractor's fabrication drawings.

i. The Contractor can only commence the work after the approval of above documents by Engineer-In-Charge.

j. Contractors shall ensure that the Shop drawings are approved by the Engineer-In-Charge prior to any execution.

G. COMPLETION DRAWINGS & DOCUMENTS

a. On completion of work contractor shall submit complete set of as Built drawings to the Engineer-In-Charge. These drawings shall have the following information.

i. Run of all pipes with diameters and length on all floors and vertical stacks.
ii. Ground and Invert levels of all plumbing services pipes.
iii. Location of all valves.
iv. Location of all Mechanical equipment with layout and piping connection.

b. Contractor shall provide, in required numbers, Test certificate, Routine Type Test certificates for Motors, Dynamic balancing certificate for Impellers, Calibration certificate for instrument, Operation and Maintenance Manuals, performance data and list of spare parts supplied together with the name and address of the Manufacturers for all Mechanical and Electrical equipment's provided by him in the form of a Book or Manual.

c. All Warranty / Guarantee Cards / certificates in original issued by the manufacturers shall be handed over to the Engineer-In-Charge along with the original supply invoice and other documents.

H. MATERIALS (SUPPLIED BY THE CONTRACTOR)

a. All materials used in the works shall conform to the specifications.

b. As far as possible all materials shall be bearing I.S. certification marks as per approval of the Engineer-In-Charge.

c. All materials shall bear the necessary certification marks, conforming to the specifications / Indicative Items / Drawings requirements.

d. Unless otherwise specified and expressly approved in writing by the Engineer-In-Charge.

I. INSPECTION AND TESTING OF MATERIALS

All materials before being allowed to be brought into the store will be preliminary / visually inspected at the entry gate of the project site before the security personnel. All materials shall be got inspected from the Engineer-In-Charge before receiving. This inspection will be conducted with the help of the quality approval format.

Contractor shall, if requested, to produce manufacturers Test Certificate for the particular batch of materials supplied. The tests carried out shall be as per the relevant Indian Standards.

For examination and testing of materials and works at the site Contractor shall provide all Testing and Gauging Equipment necessary but not limited to the followings:

a. Theodolite
b. Dumpy level
c. Steel tapes
d. Weighing machine
e. Plumb bobs, Spirit levels, Hammers
f. Micrometers
g. Thermometers, Stoves
h. Hydraulic test machine
i. Smoke test machine

All such equipment shall be tested for calibration at any approved laboratory, and the test and calibration certificate shall be submitted to the Engineer-In-Charge.

All Testing Equipment shall be preferably located in special room meant for the purpose.

J. MOCK UP AND TRIAL ASSEMBLY

The installation of Sanitary Fixtures and fittings shall be as per the shop drawings approved by Engineer-In-Charge.

The Contractor shall have to assemble at least each type of Sanitary Fixtures and Fittings in order to determine precisely the required supply and disposal connections.

Relevant instructions from manufacturers shall be followed as applicable. This trial assembly shall be developed to determine the location of puncture holes, holding devices etc. which will be required for final installation of all Sanitary fixtures and fittings. The above assembly shall be subject to final approval by Engineer-In-Charge.

The Fixtures in the trial assembly can be reused for final installation.

K. EXECUTION OF WORK

The work shall be carried out in conformity with the Plumbing drawings and within the requirements of Architectural, HVAC, Electrical, Structural / Green Building and other specialized

services drawings. The Contractor shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction programme.

Contractor shall be responsible for co-ordination with other agencies working on the project relating to their scope of work and shall take approval from the Engineer-In-Charge wherever required.

L. CUTTING & MAKING GOOD

No structural member shall be chased or cut without the written permission of the Engineer-In-Charge.

M. TESTING

a. Piping and drainage works shall be tested as specified under the relevant clauses of the specifications.

b. Tests shall be performed in the presence of the Engineer-In-Charge.

c. All materials and equipment found defective shall be replaced and whole work tested to meet the requirements of the specifications.

d. Contractor shall perform all such tests as may be necessary and required by the local authorities to meet Municipal or other by-laws in force.

e. Contractor shall provide all labour, equipment and materials for the performance of the tests.

f. All appliances, fixtures and fittings shall be tested before and after installation.

g. Water seals of all appliances shall be tested. The Contractor shall block the ends of waste and ventilation pipes and shall conduct air test.

N. SITE CLEARANCE AND CLEANUP

a. The Contractor shall, from time to time clear away all debris and excess materials accumulated at the site.

b. After the Fixtures, equipment and appliances have been installed and commissioned, Contractor shall clean-up the same and remove all plaster, paints stains, stickers and other foreign matter of discoloration leaving the same in a ready to use condition.

c. On completion of all works, Contractor shall demolish all stores, remove all surplus materials and leave the site in a broom clean condition.

O. FINAL INSTALLATION

The Contractor shall install all sanitary fixtures and fittings in their final position in accordance with the approved trial assemblies and as shown on the Drawings. The installation shall be complete with all supply and waste connections. The connection between building and piping system and the sanitary fixtures shall be through proper unions and flanges to facilitate removal / replacement of Sanitary Fixtures without disturbing the built in piping system. All unions and flanges shall match in appearance with other exposed fittings.

Fixtures shall be mounted rigid, plumb and true to alignment. The outlet of water closet pans and similar appliances shall be examined to ensure that outlet ends are butting and the receiving pipes before making the joint. It shall be ensured that the receiving pipes are clear of obstruction. When Fixtures are being mounted, attention shall be paid to the possibility of movement and settlement by other causes. Overflows shall be made to ensure that necessary anchoring devices have been provided for supporting water closets, wash basins, sinks and other appliances.

P. PROTECTION AGAINST DAMAGE

The Contractor shall take every precaution to protect all Sanitary fixtures against damage, misuse, cracking, staining, breakage and pilferage by providing proper wrapping and locking arrangement till the completion of the installation and handling over. At the time of handling over, the Contractor shall clean, disinfect and polish all the fixtures and fittings. Any Fixtures found damped, cracked, clipped, strained or scratched shall be removed and new fixtures and fittings free from defects shall be installed.

Q. GUARANTEE / WARRANTY

a. The contractor shall submit a warranty for all equipment, materials and accessories supplied by him against manufacturing defects, malfunctioning or under capacity functioning.

b. The form of warranty shall be as approved by the Engineer-In-Charge.The warranty shall be valid for a period as specified in SCC.

c. The warranty shall expressly include replacement of all defective or under capacity equipment.

d. Engineer-In-Charge may allow repair of certain equipment if the same is found to meet the requirement for efficient functioning of the system.

e. The warranty shall include replacement of any equipment found to have capacity lesser than the rated capacity as accepted in the contract. The replacement equipment shall be approved by the Engineer-In-Charge.

f. The contractor shall operate all mechanical equipment for a period as mentioned in the SCC.

SANITARY FIXTURES & FITTINGS

- The work in general shall be carried out as per CPWD Specifications with up to date correction slips.
- The rules and regulations of Local Authority Having Jurisdiction, and as per the statutory regulations applicable.
- The codes of the Uniform Plumbing Code of India shall be used as a general guide for good engineering practice, design and workmanship norms.

Scope of Work.

a. Work under this section shall consist of furnishing all labour necessary and required to install sanitary fixtures, fittings and accessories as required by the drawings and specified hereinafter.

b. Without restricting to the generality of the foregoing, the sanitary fixtures shall include fixing all sanitary fixtures, fittings and accessories etc. necessary and required for the installation.

c. Whether specifically mentioned or not all fixtures and appliances shall be provided with all fixing devices, nuts, bolts, screws, hangers as required.

General Requirements

a. All fixtures and fittings shall be provided with all such accessories as are required to complete the item in working condition whether specifically mentioned or not in the specifications and drawings.

b. All fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per architectural/interior designer's requirements. Wherever necessary the fittings shall be centered to dimensions and pattern desired.

c. Fixing screws shall be half round head chromium plated brass with chrome plated washers wherever required.

d. All fittings and fixtures shall be fixed in a neat workmanship like manner true to levels and heights shown on the drawings and in accordance with the manufacturer's recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall not be accepted and the Contractor shall rectify the same. Any consequential damage to the finished works shall also be made good by the Contractor at his own cost.

1. Floor Mount Water Closet

a. Water closets shall be Floor Mount type European style with P/S trap. The EWC shall include white solid plastic seat cover and lid. Item shall also include white vitreous china cistern with dual flush fitting, of flushing capacity 3 litre/ 6 litre. The item shall be complete with cistern fittings, nuts, bolts and gasket etc complete.

b. Each WC seat shall be provided with approved quality of seat, rubber buffers and chromium plated hinges. Seat shall be so fixed that it remains absolutely stationary in vertical position without falling down on the WC.

c. The item shall be Cera model Cruse S1021113 in Snow White or Hindware Model Element 92084 in Star white or Parryware model Verve C0296 in White or as per Engineer in-charge.

d. The EWC cubicle shall also include angle valve Cera model F8040204 or Hindware Model F850077 or Parryware model G3053A1 or as per Engineer in-charge for cistern and health faucet Cera model F8030301 or Hindware Model F160013 or Parryware model T9941A1 or as per Engineer in-charge.

2. Indian Water Closet

a. Indian water closet shall be squatting pan with 100 mm sand cast Iron P or S trap, white P.V.C. flushing cistern, including flush pipe, with manually controlled
device (handle lever) conforming to IS : 7231.

b. Item shall be complete with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required.

c. The WC shall be White Vitreous china Orissa pattern W.C. pan with integral type foot rests Cera model Orissa Pan S3010105 in Snow White with cistern Combiflush B1020101 in Snow white or Hindware Model Element Orissa Pan Eco 20042 in Star white with cistern Sleek Essence Dual Flush in Star white or Parryware model Orissa Pan C0117 in White with cistern Superio E8177 or as per Engineer in-charge.

d. The Indian WC cubicle shall also include angle valve for cistern and health faucet. The same shall be as per make list or as per directions of Engineer-in chrge.

3. Wash Basin

a. Wash basins shall be glazed vitreous china.

b. Each basin shall be provided with cast iron brackets and clips and securely fixed to wall. Placing of basins over the brackets without secure fixing shall not be accepted.

c. Wash basins in all toilets are oval shape suitable for under counter installation. Each basin is provided with CP brass swan neck pillar cock, CP brass waste, 32 mm dia chrome plated brass bottle trap and 15mm dia angle stop cock.

d. The item shall be Cera model Oval S2030104 in Snow White or Hindware Model Zen Under Counter 10049 in Star white or Parryware model Geneve N C0441 in White or as per Engineer in-charge.

e. The pillar cocks shall be Cera model Garnet Pillar Cock Swan Neck F2002104 or Hindware Model Contessa Plus Swan Neck tap F330012CP or Parryware model Pebble Swan Neck Pillar Cock G3068A1 or as per Engineer in-charge. The bottle trap shall be Cera model 1880 or Hindware Model F850072 or Parryware model T3205A1 or as per Engineer in-charge. The waste coupling shall be Cera model F8050101 or Hindware Model F850023 or Parryware model T9911A1 or as per Engineer in-charge. Angle valve shall be as per make list or as per Engineer in-charge.

4. Urinals

a. Urinals shall be flat back half stall type glazed vitreous china.

b. Urinals shall be provided with 15mm dia. chrome plated spreader, 32mm dia stainless steel domical waste and 32 mm cast brass bottle trap with pipe and wall flange and shall be fixed to wall by cast iron brackets as recommended by manufacturer complete. Urinals shall be fixed with chrome plated brass screws.

c. The item shall be Cera model Caravan S4020105 in Snow White or Hindware Smart Urinal 60011 in Star white or Parryware model New Magnum C0583 in White or as per Engineer in-charge. The bottle trap shall be Cera model 1880 or Hindware Model F850072 or Parryware model T3205A1 or as per Engineer in-charge. The waste coupling shall be Cera model F8050101 or Hindware Model F850023 or Parryware model T9911A1 or as per Engineer in-charge.

5.Toilet Paper Holder

a. Toilet paper holder shall be chrome plated and provided in all EWC cubicles.

b. Chrome plated toilet paper holder shall be fixed by screws/ capping having a finish similar to the toilet paper holder in wall / temper partitions with raw plug or nylon sleeves.

c. The item shall be Cera model F5007109 or Prayag Model Cantabile Niagara BA-88 or L&K model DM 0817 or as per Engineer in-charge.

6. Accessories

a. Contractor shall install all SS, chromium plated and porcelain accessories as shown on the drawings or directed by Engineer in charge.

b. All chromium plated accessories shall be fixed with chromium plated brass half round head screws and cup washers in wall with rawl plugs or nylon sleeves and shall include cutting and making good as required or directed by Engineer in charge.

c. Porcelain accessories shall be fixed in walls and set in cement mortar 1:2 (1 cement: 2 coarse sand) and fixed in relation to the tiling work.

7. Shower Cubicle

a. Each shower cubicle shall be provided with 15mm dia long body bib cock, concealed stop cock and Overhead shower.

b. Overhead Shower shall be chrome plated brass rain shower with rubit cleaning system.

c. The long body bib cock shall be Cera model F3002152 or Prayag Model Tranquil 7309 or L&K model FL0047 or as per Engineer in-charge. The concealed stop cock shall be Cera model F3002751 or Prayag Model Neptune PIS-18 or L&K model SP0107B or as per Engineer in-charge. The overhead shower shall be Cera model F7020101 or Prayag Model Viva BS-73 or as per Engineer in-charge.

8. Core Toilet Accessories

Each core toilet shall be provided with the following:

a. The WB area shall be provided with two soap dispensers and two towel rings.

b. Each European WC shall be provided with toilet paper holder.

c. All shower cubicles shall be provided with robe hooks fixed to toilet door with S/S screws.

d. Health faucets 8 mm dia C.P. / S.S. Jet with flexible tube upto 1 metre long with S.S. triangular plate shall be provided in all WC cubicles.

e. All Janitor closets shall be provided with one bib cock.

f. All core toilets shall be provided with two number bib cocks for hot water at location as indicated in drawings.

9. Handicap Toilets on Level 1

A handicap toilet has been provided near toilet blocks on level 1 of all Hostel blocks of HOR 15. The handicap toilet shall comprise of the following accessories in addition to fixtures and fittings:

g. Shower area with foldable shower seat with fixed height for specially abled toilet.

h. Hand Rail for specially abled toilet 600mm long near entrance and near shower area.

i. Grab bar for specially abled toilet, 750mm long, near WC.

10. Guest toilets on Stilt levels

Guest toilets on stilt levels shall also be provided with the following accessories:

a. Robe hook fixed to toilet door with S/S screws

b. Towel shelf fixed to wall with fasteners and S/S screws near shower cubicle.

c. Towel ring fixed to wall with fasteners and S/S screws near wash basin.

d. Soap dispenser fixed to wall with fasteners and S/S screws near wash basin.

e. 15 L pressurized type geyser complete with wall brackets, nuts and bolts fixed to wall through steel fasteners and flexible pipe connections.

The suggested makes and models for fixtures and fittings are provided below:

S.no.	Sanitary Fixture	Cera	Hindware	Parryware
1	**EWC** **Color**	Cruse S1021113 Snow White	Element 92084 Starwhite	Verve C0296 White
2	**Indian WC** **Color**	Orissa Pan S3010105 Snow White	Orissa Pan Eco 20042 Starwhite	Orissa Pan C0117 White
	Cistern **Color**	Combiflush B1020101 Snow White	Sleek Essence Dual Flush Starwhite	Superio E8177 White
3	**Wash Basin** **Color**	Oval S2030104 Snow White	Zen 10049 Starwhite	Geneve N C0441 White
	Pillar Tap	Garnet Pillar Cock Swan Neck F2002104	Contessa Plus Swan Neck tap F330012CP	Pebble Swan Neck Pillar Cock G3068A1
	Waste coupling	F8050101	F850023	T9911A1
	Bottle trap	1880	F850072	T3205A1
4	**Urinal** **Color**	Caravan S4020105 Snow White	Smart Urinal 60011 Starwhite	New Magnum C0583 White
5	**Health Faucet**	F8030301	F160013	T9941A1
6	**Handrail**	B2210108		T6605A1
7	**Grab Bar**	B2210108		T6608A1
8	**Shower seat**	B2210109		

S.no.	Sanitary Fittings	Cera	Prayag	L & K
1	**Angle Valve**	F8040204	Neptune PIS-10	AT 0747
2	**Toilet Paper Holder**	F5007109	Cantabile Niagara BA-88	DM 0817
3	**Bib Cock**	F3002151	Tranquil 7306	SP 0057
4	**Shower rose**	F7020101	Viva BS-73	
5	**Long nose bib cock**	F3002152	Tranquil 7309	FL 0047
6	**Concealed stop cock**	F3002751	Neptune PIS-18	SP0107B
7	**Robe hook**	F5007108	Cantabile Niagara BA-87	DM 0787
8	**Towel Shelf**	F5007102	Cantabile Artisian BA-72	DM 0827
9	**Towel Ring**	F5007105	Cantabile Niagara BA-81	SP 0767
10	**Soap Dispenser**	F5007111	Cantabile Niagara BA-83	

II. INTERNAL DRAINAGE SYSTEM

Scope of Work

1 Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to install all new soil, waste, and vent pipes as required by the drawings and specified hereinafter.

2 Without restricting to the generality of the foregoing, the soil, waste, and vent pipes system shall include the following: -

a) Providing all new pipes, fittings & accessories

b) Vertical and horizontal Soil, Waste and Vent Pipes, Fittings, Joints, Clamps and Connections to Fixtures.

c) Connection of all pipes to sewer water lines as shown on the drawings at site level.

d) Floor and urinal traps, cleanout plugs, inlet fittings heads.

e) Waste pipe connections from all fixtures e.g. Wash basins, urinals, floor drains and equipment.

General Requirements

1. All materials shall be new of the best quality conforming to specifications and subject to the approval of Engineer in charge.
2. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat work man like manner.
3. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in passages etc.
4. Pipes shall be securely fixed to walls by suitable clamps at intervals specified.
5. Access doors for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance.
6. All work shall be executed as shown on the drawings.

1. Waste pipe from Appliances

a. Waste pipe from appliances e.g. Wash basins, urinals and floor drains shall be of galvanized steel. The waste pipes from wash basins shall be 32mm dia, from urinals shall be 40mm dia and from floor drains shall be 50mm dia.

b. All pipes shall be fixed in gradient towards the outfalls of drains. Pipes inside a toilet room shall be in chase unless otherwise shown on drawings.

c. Galvanized Pipes

Pipes shall be galvanized steel tubes conforming to I.S.1239-1990 (medium class) and quality certificates shall be furnished. Pipes shall be provided with all required fittings e.g. tees, couplings, bends, elbows, unions, reducers, nipples, plugs. All G.I. waste pipes shall be terminated at the point of connection with the appliance with an outlet of suitable diameter.

2. Cast Iron Pipes & Fittings

a. Soil, Waste, Vent Anti - siphonage pipes shall be centrifugally cast iron pipes. All pipes shall be straight and smooth and their inside shall be free from irregular bore, blow holes, cracks and other manufacturing defects. Pipes shall be conforming to I.S. 3989-2009.

b. All cast iron soil, waste and vent pipes used under stilt level or where specified in drawings shall be centrifugally cast spun iron class (LA) pipes conforming to IS-1536. These shall be with spigot and socket ends. The fittings for centrifugally cast spun iron pipes conform to IS-1538.

c. Tolerance
Acceptable tolerance for pipes to I.S 3989 shall be as follows:-

a) Wall thickness ±15%
b) Length ±20 mm
c) Weight ±10%

3. Fittings

a. Fittings shall conform to the same Indian Standard as for pipes. Contractor shall use pipes and fittings of matching specifications.

b. Fittings shall be of the required degree of curvature with or without access doors

c. Access door shall be made up with 3 mm thick insertion rubber washer and white lead. The bolts shall be lubricated with grease or white lead for easy removal later. The fixing shall be air and water tight.

4. Fixing

a. All vertical pipes shall be fixed by GI clamps truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (Terminal Guard).

b. G.I. clamps shall be of standard design and fabricated from M.S. flat 40x3mm thick with required Galvanization.

c. Where G.I. clamps are to be fixed on RCC columns or slotted angles, walls or beam they shall be fixed with 40x3mm flat iron "U" type clamps with anchor fasteners of approved design for 6mm nuts and bolts.

d. Structural clamps shall be fabricated from G.I. (Galvanized) Structural members e.g. rods, angles, channels flats as per detailed drawing or as directed. Contractor shall provide all nuts, bolts, welding material and paint the clamps with one coat of red oxide and two or more coats of black Enamel paint of approved colour. Wooden saddles, where required shall be provided.

e. GI Slotted angle/channel supports on walls shall be provided. Angles/channels shall be of sizes as per good engineering practice. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with suitable anchor fasteners. The spacing of support bolts horizontally shall not exceed 1 m.

f. Wherever G.I. clamps are required to be anchored directly to brick walls, concrete slabs, beams or columns for clamping arrangement and making good with cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate 20mm nominal size) as directed by the Engineer-In-Charge.

5. Traps

a. Trap or Floor Traps
Floor traps shall be cast iron, deep seal with an effective seal of 50 mm. The trap and waste pipes shall be set in cement concrete blocks firmly supported on the structural floor. The blocks shall be in 1:2:4 mix (1 cement:2 coarse sand:4 stone aggregate 20 mm nominal size) and extended to 40 mm below finished floor level. Contractor shall provide all necessary shuttering and centering for the blocks. Size of the block shall be 30x30 cm of the required depth.

b. Urinal Traps
Urinal traps shall be cast iron P or S trap with or without vent and set in cement concrete block specified in para above without extra charge.

c. Floor Trap Inlet
Bath room traps and connections shall ensure free and silent flow of discharging water. As per the drawings, Contractor shall provide a special type inlet hopper without or with one, two or three inlet sockets to receive the waste pipe. Joint between waste and hopper inlet socket shall be lead caulked joint. Hopper shall be connected to a C.I. P or S trap with at least 50 mm seal. Floor trap inlet hoppers and the traps shall be set in cement concrete blocks as specified in para above without extra charge.

d. C.P. Gratings

Floor and urinal traps shall be provided with 150 mm round C.P. grating and floor drains shall be provided with 100mm round CP grating, with rim of approved design and shape. Minimum thickness shall be 4-5 mm .

6. Jointing

C.I. Soil, Waste Vent and Rainwater pipes shall be jointed with refined pig lead conforming to I.S.27. All joints for CI soil waste & vent pipes conforming to IS-3989 shall be made with malleable pig lead and spun yarn. Pig lead shall conform to IS:782 for caulking. Spun yarn shall be of clean hemp and of good quality. It shall be soaked in hot coal-tar or bitumen and cooled before use. Sufficient skein of jute rope shall be caulked to leave a minimum space for the pig lead to be poured in. After pouring the lead shall be caulked into the joint with caulking tool and hammer. All surplus lead shall be cut and joint left flush with the rim of the socket neatly.

The quantity of lead to be filled per joint in various sizes of cast iron drainage pipes shall be as follows:

50mm dia	=	0.75 kg
80mm dia	=	0.80 kg
100mm dia	=	0.90 kg
150mm dia	=	1.60 kg

The joints for all CI centrifugally cast (Spun) iron pipes conforming to IS-1536 and fittings conforming to IS-1538 shall be made with pig lead. The quantity of lead per joint in various sizes of these pipes shall be as follows:

50 mm dia	=	1.8 kg
100mm dia	=	2.2 kg
150mm dia	=	3.4 kg
200mm dia	=	5 kg

7. Clean-out Plugs

Contractor shall provide cast brass cleanout plugs as required and indicated on drawings. Cleanout plugs shall be threaded and provided with key holes for opening in brass cap. Cleanout plugs shall be fixed to the pipe by a G.I. socket and lead caulked joint in 100mm dia.

8. Cement Concrete

Cast iron soil and waste pipes under floor in sunken slabs and in wall chases (when cut specially for the pipe) shall be encased in cement concrete 1:2:4 mix (1 cement :2 coarse sand :4 stone aggregate 12 mm size) 75mm in bed and all around. When pipes are running well above the structural slab, the encased pipes shall be supported with suitable cement concrete pillars of required height and size at intervals as directed by Engineer in charge.

9. Painting

a. Soil, Waste, Vent and Rainwater pipes in exposed location, in shafts and pipe spaces shall be painted with two or more coats of white synthetic enamel paint to give an even shade.

b. Where directed, pipes shall be painted in accordance with approved pipe colour code.

c. Waste pipes in chase shall be painted with two coats of anti-corrosive bitumastic paint.

c. C.I. Soil and Waste pipes below ground and covered in cement concrete shall not be painted.

10. Testing

a. Before use at site all C.I. soil pipes shall be tested by filling up with water for at least 10 minutes. After filling, pipes shall be struck with a hammer and inspected for blow holes and cracks. All defective pipes shall be rejected and removed from the site within 48 hours.

b. Pipes shall be tested, after installation, by filling up the stack with water. All opening and connections shall be suitably plugged. The total head in the stack shall however not exceed 3 m.

c. Alternatively Contractor may test all soil and waste stacks by a smoke testing machine. Smoke shall be pumped into the stack after plugging all inlets and connections. The top end shall however be left open. The stack shall then be observed for leakages and all defective pipes and fittings removed or repaired as directed by the Engineer in Charge.

d. A test register shall be maintained and all entries shall be signed and dated by Contractors and representatives of Engineer in Charge.

11. Laundry drainage

a. Laundry shall be provided with 200mm wide drain channels as indicated on drawing for drainage.
b. The drain shall be provided with 200mm wide SS 304 grating in lengths of 1 Metre with SS angle frame made out of 40x40x3mm thick angle with grouting arrangement in concrete. The grating shall be made of SS angle frame of 40x40x3mm with SS Tee of 40x40mm made to size suitable for SS frame. **III. WATER SUPPLY PIPING**

Scope of Work

1) Without restricting to the generality of the foregoing, the water supply system shall include the following:-

- All water lines to different parts of building and making connection from source to underground water tank.
- Pipe protection and painting.
- Control valves, masonry chambers and other appurtenances.
- Connections to all toilets, overhead storage tanks, hot water generators and appliances.
- Excavation and refilling of pipe trenches, wherever required.
- Trenches for taking pipe lines for these services and all required earth work.

2) Work under this section consists of furnishing all labour, materials equipment and appliances necessary and required to completely install the water supply system as required by the drawings and specified hereinafter.
3) The work shall include providing Tee for connection in existing underground site ring main of 150mm dia for 100mm dia take off for fill line to the underground water tank. The scope of work shall include excavation around existing pipe, cutting the existing pipe, providing CI(LA) tee connection complete with reducer and 100mm dia butterfly valve and making valve chamber of 1.2mx1.2mx1.2m in FPS local bricks Class 1 non modular with 600 mm dia MD SFRC manhole cover.

Item shall include 100mm dia CI(LA) pipe upto underground water tank complete with 100mm dia isolation butterfly valve, solenoid valve and level controller. The butterfly valve shall be housed in valve chamber of 1.2mx1.2mx1.2m near the underground water tank made in FPS local bricks Class 1 non modular with 600mm dia MD SFRC manhole cover.

4) The following pipes shall be used for following purposes in the water supply system:

a)	CI(LA) pipe	From campus supply and Water supply ring main from tank
b)	GI pipe	Pipe from ring main to building, pipe in risers, pipe on terrace from overhead tanks and equipment
c)	SS pipe	Water supply pipe chased in toilets
d)	HDPE pipe	Garden hydrant ring mains

5) To facilitate cleaning of overhead tanks without shutdown of core toilets the tank is serving, inter-connecting pipe has been indicated on drawings to serve cores with other block tanks in case of cleaning with valve arrangement for this operation. Same shall be provided as indicated on drawings.
6) Overhead tank filling shall be through automated pumping system controlled with level controller and SS solenoid valves.

General Requirements

1. All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Engineer-in-Charge.

2. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

3. Short or long bends shall be used on all main pipe lines as far as possible. Use of elbows shall be restricted for short connections.

4. As far as possible all bends shall be formed by means of a hydraulic pipe bending machine for pipes upto 65 mm dia.

4. Valves and other appurtenances shall be placed as shown on the drawings.

1. CI(LA) PIPES

All cast iron soil, waste and vent pipes used for water supply piping from site supply to underground water tank and from underground water tank to water supply piping ring main or where specified in drawings shall be centrifugally cast spun iron class (LA) pipes conforming to IS-1536. These shall be with spigot and socket ends. The fittings for centrifugally cast spun iron pipes conform to IS-1538.

The joints for all CI centrifugally cast (Spun) iron pipes conforming to IS-1536 and fittings conforming to IS-1538 shall be made with pig lead. The quantity of lead per joint in various sizes of these pipes shall be as follows:

50 mm dia	=	1.8 kg
100mm dia	=	2.2 kg
150mm dia	=	3.4 kg
200mm dia	=	5 kg

Fittings and Inspection Chambers

Fittings and chambers shall be provided as indicated in drawings.

Anchor Block

Suitable anchor blocks shall be provided at all bends and tees to encounter the excessive thrust developed due to water hammer.

2. G.I. PIPES, FITTINGS & VALVES

a. Water supply pipes for risers, from pumps to risers and at terrace from tanks to risers and other equipment shall be Medium duty galvanized steel tubes conforming to I.S. 1239.

b. Fittings shall be malleable iron galvanized fittings of approved make. All fittings shall have manufacturer's trade mark stamped on it. Fittings for G.I. pipes shall include couplings, bends, tees, reducers, nipples, unions, bushes. Fittings shall be I.S.1879-(Part I to X) 1975.

c. Pipes and fittings shall be jointed with screwed joints. Care shall be taken to remove burr from the end of the pipe after cutting by a round file. Genuine red lead and a few strands of fine hemp shall be applied. All pipes shall be fixed in accordance with layout and alignment shown on the drawings. Care shall be taken to avoid air pockets. G.I. pipes inside toilets shall be fixed in wall chases well above the floor. No pipes shall be run inside a sunken floor as far as possible.

GI Flanges/Unions

a. Contractor shall provide adequate pairs of G.I. flanges or unions screwed to G.I. pipes to enable easy dismantling later, if required. Unions shall be provided near each gunmetal valve, stop cocks, or check valves and on straight runs as necessary at appropriate locations as required and / or directed by the Engineer In charge.

b Flanged connections shall also be provided on all equipment connections as necessary and required or as directed by the Engineer in Charge. Connections shall be made by the correct number and size of the bolts and made with 3 mm thick insertion rubber washer.

Under Ground Pipes

a. All GI pipes laid underground shall be provided suitable treatment for corrosion by way of min. 4mm thick corrosion protection tape which shall be wrapped comprising of coal tar/ asphalt component supported on fabric of organic/ inorganic fibre as per IS:10221 wherever the pipe goes underground.

c. The galvanized iron pipes and fittings shall be laid in trenches. The width and depth the trenches for the different diameters of the pipes shall be as follows:

Dia of Pipe	Width of Trench	Depth of Trench
15mm to 50mm	30 cms	60 cms
65mm to 100mm	45 cms	75 cms

At joints the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line and gradient in accordance with general specifications for earthwork in trenches.

When excavation is done in rock, it shall be cut deep enough to permit the pipes to be laid on a cushion of sand minimum 7.5 cm deep.

Painting

a. All pipes above ground shall be painted with one coat of zinc chromatic primer and two coats of synthetic enamel paint of approved shade and quality.

2. All pipes in chase shall be protected against corrosion by the application of two coats of anti-corrosive bitumastic paint.

3. STAINLESS STEEL PIPING SYSTEM

Stainless steel pipes shall conform to AISI 304 complete with press type fittings for Hot and cold water supply and shall be capable to withstand temperature upto 110^0 centigrade and pressure upto 16 bars made from 304 L grade-Material annealed and pickled stainless steel sheet, with ends deburred at 90^0 and with length of 3 meters.

Pipe shall qualify to 100% eddy current, 100% hydrostatic tested and air-under water tested under 10kgs.

Fittings shall also conform to AISI 304 stainless steel grade in accordance with DVGW regulation such as tees, coupling, elbow, male adapter, connectors etc with Black grooved O-ring of EPDM material which can withstand temperature upto -20^0 to 110^0 C including suitable connection as per site requirement.

Direct contact of stainless steel pipes and fittings to galvanized iron should be avoided by inserting approved type of filler material as per Engineer in Charge requirement.

Flanges, clamps with hanger at a spacing of 2 m centre to centre min or as required etc. necessary adapters for GI/copper and CP fittings, jointing, sundries, cutting holes in walls/floors/slabs & making good complete.

4 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 GENERAL

1. High Density Polyethylene (HDPE PE-100, 10 kgf/sqcm) pipes/fittings shall be used as water pressure pipe for garden hydrant piping system. All material shall be as per IS 4984.
2. All HDPE pipe and fittings shall be from a single manufacturer, who is fully experienced, reputable and qualified in the manufacture of the HDPE pipe to be furnished. The pipe shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications.
3. Pipe shall be free from cosmetic defects (grooves, pits, hollows, etc.). Pipe ends shall cut square and clean.
4. Testing certificates shall be provided by contractor ensuring polyethylene resin being utilized in the manufacture of this product is as specified in IS 4984.
5. Contractor is responsible for compatibility between pipe materials, fittings and appurtenances.
6. The pipe shall have warranty against manufacturing defects of material and workmanship for a period of ten years after the final acceptance of the project. Any defective pipe/fitting material including labour within the warranty period shall be replaced at no expense to the owner.

PART 2FITTINGS

1. All moulded fittings and fabricated fittings shall be fully pressure rated to match the pipe SDR pressure rating to which they are made. All fittings shall be moulded or fabricated by the pipe manufacturer.
2. All fittings shall be installed using butt-fused fittings, thermo-fused fittings/couplings, or flanged adapters and must be approved by the Engineer in Charge.
3. All transition from HDPE pipe to GI or PVC shall be made per the approval of Engineer in charge. A moulded flange connector adapter within a carbon steel back-up ring assembly shall be used for pipe type transitions.
    i. Transition from HDPE to GI fittings and valves shall be approved by Engineer in charge before installation.
    ii. No solid sleeves shall be allowed between such material transitions.

PART 3 EXECUTION

1. The pipe shall be joined with butt, heat fusion joints as outlined in ASTM D2657 and conform to the Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe, Technical Report TR-33/2005, published by the Plastic Pipe Institute (PPI). All joints shall be made in strict compliance with the manufacturer's recommendations. A trained technician shall perform all heat fusion joints.
2. Lengths of pipe shall be assembled into suitable installation lengths by the butt-fusion process. All pipes so joined shall be made from the same class. Pipe shall be furnished in standard laying lengths not to exceed 50 feet and no shorter than 20 feet.

5. TESTING

A. a) All pipes, fittings and valves shall be tested by hydrostatic pressure of 7 kg/sq.cm.

b) Pressure shall be maintained for a period of at least 30 minutes without any drop in the pressure after fixing at site.

c) A test register shall be maintained and all entries shall be signed and dated by Contractor(s) and Engineer in Charge.

B. In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the pumping system. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes or failure of fittings to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

C. After commissioning of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.

6. BALL VALVE

The ball valves shall be of full bore type and of quality approved by the Engineer-in-charge. Ball Valves shall have body material as Forged Brass Chrome plated with Spindle Brass Nickel Plating & Lever handle Steel Chrome plated with green plastic cover. The valve shall have suitable pressure rating. The valve is operated by turning. The rotation from open to close is a quarter turn (90°) which closes in a clock-wise direction.
The entire water supply network within the building shall have ball valves.

7. BUTTERFLY VALVE

Butterfly valves of approved quality for pressure rating of PN-16 with locking arrangement and gearbox with handle operated (for above 150mm dia) shall be provided or as specified. Butterfly valve shall be of wafer type long neck construction single stem design with centre lugs to ensure proper alignment of pipe flanges. Butterfly valves shall have Epoxy Coated cast iron body with integrally moulded EPDM liner of replaceable type. The liner shall be integrally moulded on hard backup ring.

Butterfly valves shall be of specified quality conforming to IS:13095 or BS:5155.
Joints for butterfly valves shall be made with suitable flanges bolts, nuts and washers. The flanges shall be properly aligned with each other so that bolts are exactly perpendicular to the flanges. The flanges shall be evenly tightened for securing with butterfly valves.
Butterfly valves shall be provided as mentioned in specification and as marked on drawings.
Butterfly valves shall be provided on CI(LA) water supply ring, at terrace level in inter-connecting piping of overhead tanks and at pumps.

8. HOT WATER PIPES, TERRACE WATER SUPPLY PIPING AND PIPES SUPPLYING WATER FROM WATER COOLERS TO ALTERNATE FLOORS SHALL BE INSULATED AS UNDER:

a. Pipes shall be thoroughly cleaned with wire brush and rendered free from all foreign matter and grease.
b. Two coats of rubber based adhesive CPRX compound shall be applied on the cleaned pipe surface.
c. The hot water pipes, water supply piping on terrace and water cooler supply piping to alternate floors shall be insulated with nitrile rubber. All joints shall be sealed properly. Fixing and sealing compound shall be CPRX. Aluminium tape with self adhesive material of at least 75 mm width shall be applied on all the insulated joints.

Thickness of the insulation shall be as under:

15-20mm dia	9mm
25-40mm dia	13mm
50-65mm dia	19mm
80-100mm dia	25mm

9. WATER COOLERS:

Water coolers of reputed make such as Bluestar/Voltas shall be provided near core toilets on alternate floors as indicated in Architectural drawings. The water coolers shall be 150L capacity and shall be of Stainless Steel construction. The stainless steel water tank and trough shall be food grade steel. Water Cooler shall be equipped with in-built voltage stabilizer and shall be complete with Electrical connection, water connection and drain connection. The water cooled shall be suitable for operation 230 volts plus/minus 10%, 50 Hz, AC power supply.

10. VALVE CHAMBERS

Valve chambers shall be provided as indicated on drawing for providing valves in water supply line at site level.

a All valve chambers as specified shall be constructed in brick masonry in cement mortar 1:5 (1 cement: 5 coarse sand).

b. All chambers shall be supported on base of cement concrete 150 mm thick 1:5:10 mix.

c. All chambers shall be provided with cement concrete benching in 1:2:4 mix. Benching shall be finished with a floating coat of neat cement. (1 Cement: 2 coarse sand: 4 stone aggregate 20 mm nom. Size)

d. All chambers shall be plastered with 12/15 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) and finished with a floating coat of neat cement inside. Manhole shall be plastered outside as above but with rough plaster.

e. All chambers with depths greater than 1 m shall be provided with 20 mm square or 25 mm round rods catch rings set in cement concrete blocks 25x10x10 cms in 1:2:4 mix 30 cms vertically and staggered. Foot rests shall be coated with coal tar before embedding.

g. All chambers shall be provided with SFRC covers and frames and embedded in reinforced cement concrete slab. Covers shall be Heavy Duty HD 20 Grade.

h.

Valve chambers shall be constructed as specified in Indicative Items but generally shall be of following sizes:

	Length (mm)	Width (mm)	Depth(mm)
For pipes dia. Upto 80 mm	750	750	1000
For pipes dia. 100 mm and above	1200	1200	1200

For Garden Hydrants, 300x300 valve chambers shall be provided at locations as indicated in drawing.

11. PUDDLE FLANGES

Puddle flanges shall be provided as indicated in the water tank drawings.

GI Puddle Flanges

All Domestic and Treated water terrace tank puddle flanges shall be of GI. Only the level controller sleeve in these tanks shall be of MS.

GI Puddle Flanges shall be fabricated out of GI C Class pipe having threads on outer sides with 6 mm thick MS plate welded in the center of the pipe. The entire assembly shall be hot dip galvanized after fabrication. The puddle flanges shall be installed in concrete walls of water tanks for connection to pipes.

MS Puddle Flanges

All Fire Fighting water tanks on terrace and underground water tanks shall have puddle flanges of MS.

MS Puddle Flanges shall be fabricated out of MS C Class pipe with 6 mm thick MS plate welded in the center of the pipe. The entire assembly shall be duly primer coated and painted with synthetic enamel paint. The puddle flanges shall be installed in concrete walls of water tanks for connection to pipes or carrying the pipes through the puddle flanges.

Vents

Underground water tanks shall also be provided with Vents in the form of U-trap comprising of one Tee and two elbows with fly mesh at elbow mouth.

IV. EXTERNAL DRAINAGE SYSTEM (SEWARAGE AND STORMWATER)

1. The Plumbing Installation work shall be carried out in accordance with Indian Standard Code of Practice. It shall also be in conformity with the current Indian Plumbing rules and regulations and requirements of the Local Authority and Fire assurance regulations, so far as these become applicable to the installation. Plumbing work in general shall be carried out as per following CPWD General Specifications amended upto date.

Scope of work

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install the drainage system as required by the drawings and specified hereinafter. Without restricting to the generality of the foregoing, the sewerage and storm water system shall include:-

1.1 Installation of all sewer lines / effluent lines
1.2 Installation of all storm water drainage lines
1.3 Construction of all catch basins, chambers, manholes & other related civil works
1.4 Rain water harvesting system
1.5 Making provision for connecting the proposed sewer line with the sumpwell being proposed for existing sewer lines at site.
1.6 Making provision for connecting the proposed surface storm water line with the existing trunk storm water in the existing catch basin complete with drop connection and PCC raceway for easy directional flow into trunk storm water.
1.7 Providing three number de-silting chambers and three number rainwater harvesting pits for roof top rainwater.
1.8 There are two existing sewer lines on site that require re-routing. The work shall include excavation around the existing RCC sewer line for providing a manhole of 1200x900mm dia for diverting the existing sewer line towards the proposed sump. The scope shall also include laying of 450mm dia HDPE pipeline from the above mentioned manhole to the sump well as indicated in the drawing and as per the directions of Engineer-in-charge. The construction of manholes providing and laying of 450 mm dia. HDPE sewer line, sump well , pump house . electrical panels, cables, pumps etc. all material, labour , T&P for proper commissioning of the sump.

General Requirements

1. All materials shall be new of the best quality conforming to specifications and subject to the approval of the Engineer in Charge.

2. Drainage lines shall be laid to the required gradients and profiles.

3. All drainage work shall be done in accordance with the local municipal bye-laws.

4. Contractor shall obtain necessary approval and permission for the drainage system from the municipal or any other competent authority.

5. Location of all new manholes, catch basins etc. shall be got confirmed by the Contractor from the Engineer in Charge.

1. Alignment and Grade

The sewer and storm water drainage pipes shall be laid to alignment and gradient shown on the drawings but subject to such modifications as may be ordered by the Engineer in Charge from time to time to meet the requirements of the works. No deviations from the lines, depths of cutting or gradients of sewers and storm water lines shown on the plans shall be permitted except by direction in writing of the Engineer in Charge.

2. Excavation

If, due to site conditions/slope/depth, the extra excavation/Cement Concrete/ Reinforced Cement Concrete/Brick work/Plaster/ neat cement finishing or whichever the work is required to finish the work, the contractor is advised to refer to the drawings and quote the rates accordingly. No extra claim on the above shall be entertained.

a. The excavation for sewer and storm water works shall not be taken up unless the permission of the Engineer in Charge for the ground to be tunneled is obtained in writing.
b. All excavation operations manually or by mechanical means shall include excavation and 'getting out' the excavated materials. In case of excavation for trenches, water tanks etc. 'getting out' shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be included with the items of excavation stating lead.
c. During the excavation the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or undercutting shall not be done.
d. In firm soils, the sides of the trenches shall be kept vertical upto a depth of 2 metres from the bottom. For greater depths, the excavation profiles shall be widened by allowing steps of 50 cms on either side after every 2 metres from the bottom. Alternatively, the excavation can be done so as to give slope of 1:4 (1 horizontal : 4 vertical). Where the soil is soft, loose or slushy, the width of steps shall be suitably increased or sides sloped or the soil shored up as directed by the Engineer-in-Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the Engineer-in-Charge regarding the stepping, sloping or shoring to be done for excavation deeper than 2 metres.
e. The excavation shall be done true to levels, slope, shape and pattern indicated by the Engineer-in-Charge.
f. In case of excavation for foundation in trenches or over areas, the bed of excavation shall be to the correct level or slope and consolidated by watering and ramming. If the excavation for foundation is done to a depth greater than that shown in the drawings or as required by the Engineer-in-Charge, the excess depth shall be made good by the contractor at his own cost with the concrete of the mix used for levelling/ bed concrete for foundations. Soft/defective spots at the bed of the foundations shall be dug out and filled with concrete as directed by the Engineer-in-Charge.
g. While carrying out the excavation for drain work care shall be taken to cut the side and bottom to the required shape, slope and gradient. The surface shall then be properly dressed. If the excavation is done to a depth greater than that shown on the drawing or as required by the Engineer-in-Charge, the excess depth shall be made good by the contractor at his own cost with stiff clay puddle at places where the drains are required to be pitched and with ordinary earth, properly watered and rammed, where the drains are not required to be pitched. In case the drain is required is to be pitched, the back filling with clay puddle, if required, shall be done simultaneously as the pitching work proceeds. The brick pitched storm water drains should be avoided as far as possible in filled-up areas and loose soils.
h. In all other cases where the excavation is taken deeper by the contractor, it shall be brought to the required level by the contractor at his own cost by filling in with earth duly watered, consolidated and rammed.
i. In case the excavation is done wider than that shown on the drawings or as required by the Engineer-in-Charge, additional filling wherever required on the account shall be done by the contractor at his own cost.
j. The excavation shall be done manually or by mechanical means as directed by Engineer-in-charge considering feasibility, urgency of work, availability of labour /mechanical equipments and other factors involved. Contractor shall ensure every safety measures for the workers. Neither any deduction will be made nor will any extra payment be made on this account.

II Refilling

After the sewer, storm water or other work has been laid and proved to be water tight, the trench or other excavations shall be refilled. Utmost care shall be taken in doing this so that no damage shall be caused to the sewer and other permanent work. The filling in the haunches and upto 75 cms above the crown of the sewer/storm water shall consist of the finest selected materials placed carefully in 15 cms layers and flooded and consolidated. After this has been laid, the trench and other excavation shall be refilled carefully in 15 cms layers with materials taken from the excavation, each layer being watered to assist in the consolidation unless the Engineer in Charge shall otherwise direct.

III Contractor to restore settlement and damages

The Contractor shall, at his own costs and charges, make good promptly during the whole period the works are in hand, any settlement that may occur in the surfaces of roads, berms, footpaths, gardens, open spaces etc. Whether public or private caused by his trenches or by his other excavations and he shall be liable for any accidents caused thereby. He shall also, at his own expense and charges, repair and make

good any damage done to buildings and other property. If in the opinion of the Engineer in Charge he fails to make good such works with all practicable dispatch, the Engineer in Charge shall be at liberty to get the work done by other means and the expenses thereof shall be paid by the Contractor or deducted from any money that may be or become due to him or recovered from him in any other manner according to the law of the land.

IV Disposal of Surplus Soil

The Contractor shall at his own costs and charges provide places for disposal of all surplus materials not required to be used on the works. As each trench is refilled the surplus soil shall be immediately removed, the surface properly restored and roadways and sides left clear.

3 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 GENERAL

1. High Density Polyethylene (HDPE PE-100, 10 kgf/sqcm) pipes/fittings shall be used as external sewerage and storm water drainage. All material shall be as per IS 4984.
2. All HDPE pipe and fittings shall be from a single manufacturer, who is fully experienced, reputable and qualified in the manufacture of the HDPE pipe to be furnished. The pipe shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications.
3. Pipe shall be free from cosmetic defects (grooves, pits, hollows, etc.). Pipe ends shall cut square and clean.
4. Testing certificates shall be provided by contractor ensuring polyethylene resin being utilized in the manufacture of this product is as specified in IS 4984.
5. The pipe shall have warranty against manufacturing defects of material and workmanship for a period of ten years after the final acceptance of the project. Any defective pipe/fitting material including labour within the warranty period shall be replaced at no expense to the owner.

PART 2 FITTINGS

1. All moulded fittings and fabricated fittings shall be fully pressure rated to match the pipe SDR pressure rating to which they are made. All fittings shall be moulded or fabricated by the pipe manufacturer.
2. All fittings shall be installed using butt-fused fittings, thermo-fused fittings/couplings, or flanged adapters and must be approved by the Engineer.

PART 3 EXECUTION

1. The pipe shall be joined with butt, heat fusion joints as outlined in ASTM D2657 and conform to the Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe, Technical Report TR-33/2005, published by the Plastic Pipe Institute (PPI). All joints shall be made in strict compliance with the manufacturer's recommendations. A trained technician shall perform all heat fusion joints.
2. Lengths of pipe shall be assembled into suitable installation lengths by the butt-fusion process. All pipes so joined shall be made from the same class. Pipe shall be furnished in standard laying lengths not to exceed 50 feet and no shorter than 20 feet.

PART 4 TESTING

i. All lengths of the sewer and drain shall be fully tested for water tightness by means of water pressure maintained for not less than 30 minutes. Testing shall be carried out from manhole. All pipes shall be subjected to a test pressure of at least 1.5 meter head of water. The test pressure shall, however, not exceed 1.5 meter head at any point. The pipes shall be plugged preferably with standard design rubber plugs on both ends. The upper end shall, however, be connected to a pipe for filling with water and getting the required head. The tolerance figure of two liters per centimetre of dia per kilometer may be allowed during a period of ten minutes. Subsidence of the test water may be due to one or more of the following causes:
   - Leakage at joints or from defective pipes

ii. Trapped Air

Any leakage will be visible and the defective part of the work should be cut out and made good. The excessive leakage from a particular pipe or joint shall be watched for and taken as indicating a defect to be made good.

iii. Sewer and Drain Pipelines shall be tested for straightness by:
Inserting a smooth ball 12mm less than the internal diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball should roll down the invert of the pipe and emerge at the lower end. Means of a mirror at one end and a lamp at the other end. If the pipe line is straight the full circle of light will be seen otherwise obstruction of deviation will be apparent.

The Contractor shall give a smoke test to the drains and sewer, if directed by the Engineer-In-Charge.

A test register shall be maintained which shall be signed and dated by Contractor, Engineer-In- Charge.

4. GULLY TRAPS

Gully traps shall be square-mouth S.W. Gully Trap class SP-1 complete with C.I. grating brick masonry chamber with water tight SFRC cover with frame of 300 x300 mm size (inside) of Medium duty as per standard design.

Gully traps shall be fixed in cement concrete 1:5:10 mix (1 cement : 5 coarse sand: 10 stone aggregate 40 mm nominal size) and a brick masonry chamber of size as specified in drawings.

5. CEMENT CONCRETE AND MASONRY WORKS (for manholes and chambers etc.)

a. **Cement Concrete (Plain or Reinforced)**

i) Cement concrete pipes bedding, cradles, foundations and R.C.C. Slabs for all works shall be mixed by a mechanical mixer where quantities of the concrete poured at one time permit. Rate for cement concrete shall be inclusive of all shuttering and centering at all depth and heights.

ii) Concrete work shall be of such thickness and mix as shown on the drawings.

iii) All concrete work shall be cured for a period of at least 7 days. Such work shall be kept moist by means of gunny bags at all times. All pipes trenches and foundations shall be kept dry during the curing period.

b. **Masonry work**

Masonry work for manholes, chambers, channels tanks, and such other works as required shall be constructed from local FPS non modular bricks (1st class) in cement mortar 1:5 mix (1 cement: 5 coarse sand). All joints shall be properly raked to receive plaster.

c. **Cement Concrete for Pipe Support**

i) All pipes shall be supported in bed and all round.

ii) Unless otherwise directed by the Engineer in Charge, cement concrete for bed and all round shall be laid as follows:-
upto 1.5 M depth Stoneware & RCC pipes all round in open ground (1:4:8) (no sub soil water)

iii) Unless otherwise directed by the Engineer-In-Charge cement concrete for bed all around shall be laid as follows

Details for Cement Concrete

Description	Upto 3 M depth
Pipes in open ground (No sub soil water)	All round (1:5:10)
Pipes (all) in sub soil water condition	All round (1:3:6)
Pipes under the building or at road crossing or under public places	All round (1:2:4)

(1=1=1 cement, 2-3-5 coarse sand, 4-6-10 stone aggregate 20 mm nominal size)

iv) R.C.C. pipes or C.I. pipes, may be supported on brick masonry or precast R.C.C or Cast in situ cradles.

v) Pipes in loose soil or above ground shall be supported on brick or RCC anchor blocks.

6. MANHOLES AND CHAMBERS

Manholes shall be of following sizes as indicated on drawings:

- Inside size 90x80 cm and 45 cm deep including SFRC cover with frame (medium duty) 560 mm internal diameter.
- Inside size 120x90 cm and 90 cm deep including SFRC cover with frame (medium duty) 560 mm internal diameter.
- 0.91 m deep with S.F.R.C. cover and frame (heavy duty, HD-20 grade designation) 560 mm internal diameter conforming to I.S. 12592, total weight of cover and frame to be not less than 182 kg., fixed in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) including centering, shuttering all complete.

Chambers shall be of following sizes as indicated on drawings:

- Constructing brick masonry road gully chamber 100x100x60 cm including 560mm dia SFRC precast covers with frame complete as per standard design for roof rainwater.

- Constructing brick masonry road gully chamber 110x50x77.5 cm including 560mm dia SFRC precast covers with frame complete as per standard design for surface rainwater.

a All manholes, chambers and other such works as specified shall be constructed in brick masonry in cement mortar 1:5 (1 cement: 5 coarse sand).

b. All manholes, chambers, etc. shall be supported on base of cement concrete 150 mm thick 1:4:8 mix.

c. All manholes shall be provided with cement concrete benching in 1:2:4 mix. The benching shall have a slope of 10 cms towards the channel. The depth of the channel shall be full diameter of the pipe. Benching shall be finished with a floating coat of neat cement. (1 Cement: 2 coarse sand: 4 stone aggregate 20 mm nom. Size)

d. All manholes shall be plastered with 12/15 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) and finished with a floating coat of neat cement inside. Manhole shall be plastered outside as above but with rough plaster.

e. All manholes with depths greater than 1 m shall be provided with 20 mm square or 25 mm round rods catch rings set in cement concrete blocks 25x10x10 cms in 1:2:4 mix 30 cms vertically and staggered. Foot rests shall be coated with coal tar before embedding.

f. All manholes shall be provided with SFRC covers and frames and embedded in reinforced cement concrete slab. Covers shall be Medium duty.

7. RAINWATER HARVESTING PIT

Rainwater harvesting pits shall be provided as indicated on drawings.
A desilting chamber of 2mx3mx2m shall be provided before entry into the rainwater harvesting pit.
Each rainwater harvesting pit shall be of 4.5mts dia in solid brick construction with plaster on both sides as required at site including cutting as per site conditions, refilling & disposal of surplus earth. The scope includes providing coarse sand, pea gravel, 20mm gravel sand and (40 to 60mm) boulder. It also includes boring of bore hole 450mm upto 20m below ground by means of rig, providing lowering & fixing 160 dia uPVC pipe tested to 6kgs per sq cm & 160 dia uPVC slotted pipe tested to 6kgs per sq cm including cost of joints etc. The cost should also include SFRC cover of 560mm dia. The water shall be brought 5 to 10 feet above the second water table at site.

V. UNDER GROUND TANK TO OVER HEAD TANK WATER SUPPLY SYSTEM

HYDRO PNEUMATIC SYSTEM

Multistage type centrifugal pumps with SS casing, mechanical shaft seals directly couple to TEFC induction motor suitable for 415±10 V, 50 Hz AC power supply, IP 54 enclosure, class F insulation. The motor shall be provided thermal overload. The skid mounted, factory assembled hydro-pneumatic system shall be provided with pressure transmitters, individual frequency convertor for noiseless operation of the pump at varying duty point. The convertor shall be provided with short circuit safety, earthing, over current, under voltage protection. The system shall comprise of multiple pumps, with one stand-by to meet the system discharge requirements.

The control panel shall have terminals for:
1. Remote start stop
2. Motor temperature protection
3. Pump fault
4. Analog output signal for frequency convertor
5. Pressure sensors
6. Motor connection
7. Power supply

The pumps shall be housed in pump room near underground water tanks. The system shall consist of three pumps (2Working+1Standby) of 10cum/h capacity each with 45m head.
The control panel shall alternate the lead lag pump, taking over in case of failure. The system shall be provided by a diaphram type pressure vessel suitable for a back-up of min. one minute.
The system shall be complete with Galvanized Steel (GS) base frame with adjustable vibration isolators, GS manifold with NRVs and isolation ball valves complete with all accessories should be as per specification. The hydro-pneumatic system shall be capable of maintaining a constant

pressure at varied consumption. The hydro-pneumatic system shall be complete with pressure sensor and microprocessor based controller for pressure control by means of frequency variation. The controller should have time control switch to adapt pump operation to actual requirement in peak load situation. The control panel should also have manual operation.

The pump shall have stainless steel impeller with self-lubricating bearing. The shaft seal shall be mechanical type tungsten carbide sealing rings.

The pumping system shall perform the following functions:

a. Shut off the pump at zero demand.
b. Shut off the pump at zero suction.
c. Protect the pump from overvoltage, under-voltage, overload, earth fault.
d. Vary the time of pump speed acceleration and deceleration.
e. Compensate for higher friction losses at high flow rates.
f. Send out a signal for remote monitoring of flow as well as pressure.
g. Conduct automatic test run of pumps at set times.
h. Keep track of run time for pumps.
i. Perform run time equalization of all pumps in system.

Pump Description	**Vertical multistage in line pumps**
1. Casing	Stainless Steel
2. Impeller	Stainless steel
3. Shaft	High Tensile steel
4. Shaft seal	Tungsten carbide seal
5. Packing	Mechanical seals

The motor shall be with following parameters

Type	:	Totally enclosed fan cooled
Insulation	:	class - F
Enclosure	:	IP -54
Ambient temperature	:	50 deg. C
Power input	:	3 Phase, 415 V, 50 Hz, AC power supply.

VI. ELECTRIC HOT WATER GENERATOR

SCOPE

This section sets out the general requirements in respect of storage type hot water generators as per ASME Standards.

The hot water generators shall be provided at terrace level of each block as indicated on drawings. The same shall be of 24kW capacity each.

STORAGE TYPE HOT WATER GENERATOR

The hot water generator shall be vertical / horizontal, shell type, designed, constructed and tested for the specified water flow rates and temperatures. The hot water generator shall be suitable for outdoor application (exposed to open environment).

MATERIAL DESIGN AND CONSTRUCTION

The shell/vessel of the generator shall be suitable for 1000 litre water storage and made of 10 mm thick steel sheet and dish of 12mm thick sheet steel with electric fusion welded seams. The shell be designed for 90 deg C of water circulation, unless specified otherwise in tender. The inner side of the shell shall be lined with minimum 1.5 mm thick stainless steel sheet grade SS:304.

The shell with insulation, shall be mounted inside a cabinet of iron frame with 16 SWG mild sheet steel covers held with locks / bolts and hinges. The cabinet shall be provided with sufficient louvers and rat proofing to ensure ventilation of heater terminals of boiler. Boiler shell shall be installed above the finished floor on iron frame. The iron frame shall be provided with lifting lugs and pedestals.

HEATERS

Electric heaters shall be provided in banks of equal capacity distributed on three phase power. Heaters shall be mounted within seamless incoloy sheathed electrically resistant U-tubes. The heaters shall be easily removable externally, without opening terminal plate or disturbing other components. The heater mounting socket shall be made leak proof. Heaters shall be suitable for 415 $\pm$ 10% volts, 50 cycles, three phase AC supply and shall be in direct contact with water contained in shell.

CONNECTIONS AND ACCESSORIES

The hot water generator shall be provided with following accessories.

a. Inter locking of electric panel cover with incoming switch / limit switch.

b. Flow switch, automatic alarm for low water level and reset type high temperature switch with respective indication lights.

c. Drain point with GM valve.

d. Descaling GM valves.

e. Automatic airvent and automatic high temperature pressure relief valve.

f. Step control thermostat for individual heater bank and master safety thermostat of fixed setting.

g. Insulation of shell with 100 mm thick resin bonded fibreglass and 26 SWG Al. cladding.

h. Flanges for water pipe connections.

Cable for Hot Water Generator has been included in Electrical Scope.

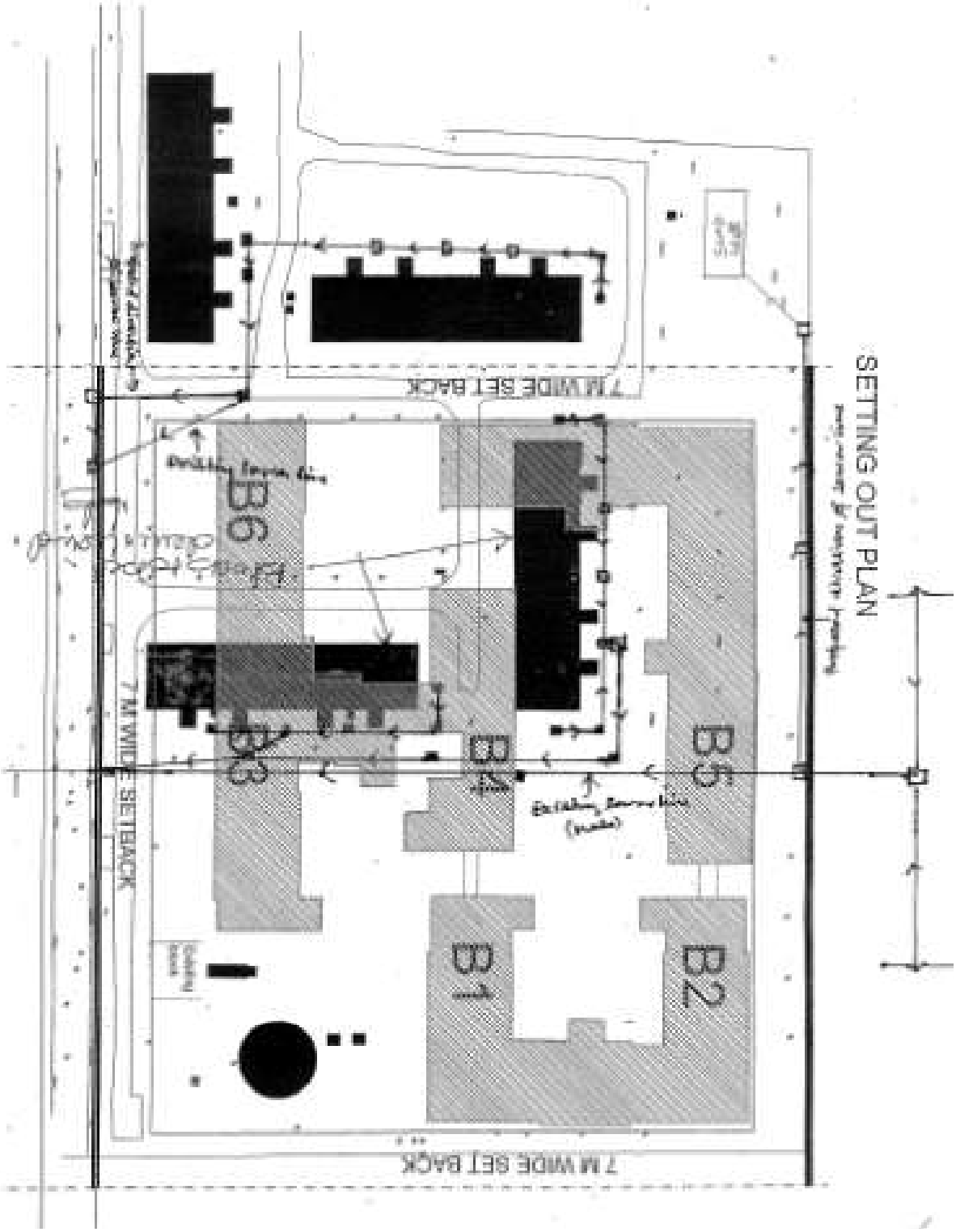
ANNUAL MAINTENANACE OF HOT WATER GENERATOR

The price of above hot water generator shall include annual maintenance period of three years. During this period the contractor shall be responsible for functionality of the hot water generator. The price shall cover the replacement cost of heating elements for the above said period. The contractor shall be fully responsible for up keep of the equipment, periodical checks, keeping the records etc for annual maintenance period of three years.

LIST OF APPROVED MAKES

S.No	Description	MAKES
1	Fixtures	Cera / Hindware / Parryware
2	CP Fittings	Cera / Prayag / L&K
3	GI pipes//fittings	Jindal / Tata // Zoloto / Sant/Unik
4	CI pipes and Fittings	NECO / Kajeco / Kapilansh
5	C. P. Grating for Floor Traps	Chilly / Camry
6	CI Traps	NECO / Kajeco
7	Butterfly Valve	Zoloto/ Sant / Advance / Jainsons
8	Ball valves	Zoloto / Sant / Unik
9	SW Gully Trap- IS 651	Hindustan Pipe Industries/ Jain Spun Pipe Co./ India Humes Pipe
10	HDPE Pipes	Supreme/Astral / Ashirwad /Prince
11	SFRC Manhole covers	KK / PRAGATI / SUPER WIRE
12	Anticorrosive Bitumastic Paint	Nerolac / Asian Paints
13	Synthetic Enamel and Paint Primer	Nerolac / Asian Paints
14	GI Clamps and Supports	Fluid Controls Private Limited/ Ashish International/ Steelite Engineering Limited
15	Strainer	Rapid Control/ Emerald/ Maharaja/ Flowchem Industries
16	Insulation for Hot Water Pipes	SUPERLON/A-FLEX
17	Non return valves	Leader / Advance
18	Pumps	Kirloskar/Grundfos/Ebara
19	Water Coolers	Bluestar/Voltas
20	Hot Water Generators	Rapid Cool/KEPL

ANNEXURE 1


SETTING OUT PLAN
7M WIDE SET BACK
7M WIDE SET BACK
7M WIDE SETBACK
B1
B2
B3
B4
B5
B6

TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING SYSTEM

1. TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING SYSTEM

a. General-Work under this subhead is time-bound and has to be completed within the time limit set in the tender.

b. The scope of work in this subhead shall consist of all labour, materials, equipment and appliances necessary and required to completely do all work relating to the supply, installation, testing & commissioning of Fire Fighting Systems as described herein after and shown on the drawings. The scope of work in general shall include the following.

i. Fire Fighting Pumps & Accessories and related electrical works
ii. Internal Fire Hydrant System.
iii. Hand Appliances

The Fire Fighting work shall be carried out in accordance with Indian Standard Code of Practice. It shall also be in conformity with the current Indian Standard rules and regulations and requirements of the Local Authority and Fire assurance regulations, so far as these become applicable to the installation. Fire Fighting work in general shall be carried out as per following CPWD General Specifications with updated amendments.

Without restricting to the generality of the foregoing, the work shall include the following:

1. Hydrant System Covering the building and consisting of the following:

i. Three numbers Terrace Fire Booster Pump capacity of 900 LPM at 35m head.
ii. Internal Hydrant system where required with single headed landing valves as required accompanied by 1 number swinging type Hose Reel, 2 numbers Internal Rubber lining combined with closely woven polyester fibre Hoses, 1 numbers of Branch Pipe etc. all housed in the Hose Cabinet.

2. Hand appliance.

3. It shall be the responsibility of the contractor to get the approval in stages from the Local fire Service as required. This shall be without any liability to the Engineer-In-Charge.

On successful completion of work, the contractor shall prepare as built drawings which have been so approved by the Fire Service incorporating all changes that might have been effected during execution of the work.

The contractor shall also bring to the notice of the Engineer-In-Charge any deviations from Local Fire Service/Building Bye Laws Norms and requirements in the systems that he shall install as well as architectural features that will affect approval from the Fire Service.

4. Contractor's Experience

i. The contractor/ specialized agency must have sufficient experience in the execution of similar works as specified.
ii. Contractor / specialized agency must submit with the tender a list of similar jobs carried out by him as required along with the name of works, name and address of clients, year of execution, capacity of plant and value of work.

5. Technical Information

i. contractor/ specialized agency shall submit along with the tender copies of detailed specifications, cuts, leaflets, and other technical literature of equipment and accessories offered by him.
ii. contractor/ specialized agency's attention is specially invited to the special conditions and other clauses in the agreement which required the contractor to:-
   a) Submit detailed shop drawings.
   b) Use material of specific makes and brands.
   c) Obtain all approvals from Fire Fighting authorities.
   d) Execute the entire work on a turn-key basis so as to provide a totally operating plant.

6. Inclusions :

Work under this contract includes the following work:-

i. Electrical cables upto incoming starter panels from main panel.

7. Site Accessibility

The pumps are to be located at terrace level of blocks as specified in drawings.

i. The equipment must be carried from the goods receiving station to the site in an extremely careful manner to prevent damage to the equipment building or existing services.

ii. Contractor must visit the site and familiarize himself with above problems to ensure that the equipment offered by him are of dimensions that can be carried and placed in position without any difficulty.

8. Approvals

The contractor shall prepare all submission drawings and obtain all approvals of fire fighting works from fire fighting authorities.

9. Coordination

The Contractor shall be required to coordinate his activities with all other services such as Air Conditioning, Electrical and Civil works etc.

10. Civil Works

All civil works are included in Contractor's scope of work unless otherwise specified. Civil works like chasing in the wall/ceiling or making hole in the RCC floor/ceiling or in brick wall for piping, grouting etc. including making good after completion, small size pedestals or any other minor civil works required in connection with the installation of the system are included in the scope of work of this contract.

The foundation for pumps on terrace shall be also casted by contractor. The Contractor shall furnish all details and relevant data required for design and detailed engineering of all civil works included in this design.

11. System Description

a) The hydrant point shall be directly tapped from the Riser pipes, and shall be furnished with required accessories such as

i. One no. single headed hydrant valve with 80mm dia. flanged inlet and 63mm dia. Gun-metal instantaneous coupling with gun metal cap and chain conforming to IS:5290 (Type A).

ii. Two nos. 63mm dia.x15m long Internal Rubber lining combined with closely woven polyester fibre hose pipe complete with 63mm dia Gun-metal male and female couplings Copper Wire binding etc. conforming to IS:636-1988 (Type A).

iii. One no. 20mm dia.x30m long first-aid hose reel complete with drum, bracket, 20mm dia. globe valve and gun-metal nozzle conforming to (IS:884).

iv. One no. Gun metal short Branch pipe complete with 63mm dia with 20mm (nominal internal diameter) nozzle and suitable for instantaneous connection conforming to IS:903.

The hydrant riser shall be terminated with 25mm dia air release valve with forged ball valve at the highest points to release the trapped air in the pipe work.

The system shall also include three number of 3 way - 150 mm dia M.S. Pipe fire brigade connection of cast iron body with gun metal male instantaneous inlet couplings complete with cap and chain as reqd. for suitable dia MS pipe connection conforming to IS- 904 as indicated on drawings. The same shall be housed in MS box.

2. **GENERAL SPECIFICATIONS**

a. Pipes and Fittings

Pipes for Fire system shall be of black steel and heavy class. Pipes upto 150mm dia shall conform to IS-1239. Pipes with dia 200mm and above (6mm thick) shall confirm to IS-3589. All pipes shall be I.S.I. marked. Fittings for black steel pipes shall be malleable iron suitable for welding or approved type cast iron fittings with tapered screwed threads.

b. Jointing

Joint for black steel pipes and fittings shall be metal-to-metal tapered thread or welded joints. A small amount of red lead may be used for lubrication and rust prevention in threaded joints.

Joints between C.I. or black steel pipes, valves and other apparatus, pumps etc. shall be made with M.S. flanges with appropriate number of bolts. Flanged joints shall be made with 3mm thick insertion rubber gasket.

Note: Joints for pipes and fittings upto 50mm diameter shall be threaded joints using Teflon Tape or equivalent bonding tape on the threads. Joints for pipe and fittings above 50mm diameter shall be welded joints.

c. Pipe Protection

i. All pipes in exposed locations shall be painted with one coat of red oxide primer and two or more coats of synthetic enamel paint of fire red shade.

ii. Pipes in wall chases shall be protected from corrosion by 2 coats of anti-corrosive bituminous paints.

d. Installation of Pipes

All pipes shall be adequately supported from ceiling or walls by structural clamps fabricated from M.S. structural e.g. rods, channels, angles and flats. All clamps shall be painted with one coat of primer and two coats of black enamel paint.

The pipe supports or hangers shall be designed to withstand combined weight of pipe, pipes fittings and fluid in pipe. Pipe supports shall be of steel and coated with rust preventing paint and finished with two coats black enamel paint. The maximum spacing for pipes supports shall be as below:

Pipe (MM)	Spacing (MTR)	Size of support
Up to 25	2.0	6mm
32 to 65	2.4	8mm
75 to 125	2.7	10mm
150 & above	3.0	12mm

Pipes supports shall be spaced at maximum interval of 1.5 mtrs. on either side of heavy fitting and valves. Wherever piping passes through walls, pipes sleeves of diameter larger than that of piping shall be provided. Pipe sleeves shall be of steel or cast iron pipe.

i. Contractor shall provide suitable arrangement on the branch lines feeding different zones/floors so as to allow required flow of water at a pressure of 3.5 kg/sq.cm. for each hydrant.

e. Air release valve

The air release valve shall be in brass construction with nylon ball with in-built non-return valve. The valve shall be automatic type.

f. Valves & Other Accessories

Each valve body shall be marked with cast or stamped lettering giving the following information's:

i. The manufacturer's name or trade mark
ii. The size of the valve
iii. The guaranteed working pressure

Isolating valves on the water supply lines shall be full bore ball valve type for pipe diameters upto 50mm. For 65mm dia and above these shall be butterfly valves.

Full Way Ball Valve

The valves shall be of full bore type and of quality approved by the Engineer-in-charge. The body and ball shall be of copper alloy and stem seat shall be of Teflon.

i. The valve shall be internally threaded to receive pipe connections.
ii. The handle shall be of chrome plated steel with PVC jacket. The handle shall also indicate the direction of 'open' and 'closed' situations. The gap between the ball and the teflon packing shall be sealed to prevent water seeping.
iii. The handle shall also be provided with a lug to keep the movement of the ball valve within 90 degree.

Butterfly Valves

The Butterfly Valve shall be suitable for waterworks. The Valves conforming to IS: 13095 shall be provided. All valves shall be suitable to withstand the pressure in the system and rating shall be PN 1.6. All valves shall be right handed (i.e. handle or key shall be rotated clock wise to close the valve).

i. The direction of opening and closing shall be marked and an open / shut indicator fitted.
ii. The material of valves shall be as under :-

Body – Cast iron
Disc – Ductile Iron
Seat – EPDM / Nitrile rubber
Shaft – Stainless Steel

iii. The Valve shall be fitted between two flanges on either side of pipe flanges. The Valve edge rubber shall be projected outside such that they are wedged within the pipe flanges to prevent leakages.

Non-Return Valves

Non-return valves shall be of Cast Iron body and Stainless Steel seat. They shall have companion flanges. They shall be Dual Plate Type suitable for both horizontal and vertical installation. An arrow mark in the direction of flow shall be marked on the body of the valve. Non-return valves are to be as per IS:5312.

Suction Strainer

Strainers shall be preferably of the approved type with fabricated steel bodies designed to the test pressure of 16 Kg/ cm^2. Strainers shall be fabricated by minimum 1.2 mm thick stainless steel sheet with 3 mm dia. perforation holes. Strainers shall be provided with flanges or threaded sockets as required. They shall be designed so as to

enable blowing out accumulated dirt and facilitate removal and replacement of screen without disconnection of the main pipe.

Pressure Gauges

Pressure gauges shall be of 150mm dia. dial and of appropriate range and be complete with shut off gauge valve etc. duly calibrated before installation. Care shall be taken to protect pressure gauges during pressure testing.

Flexible Connection for Pumps

All suction and delivery lines shall be provided with double flanged reinforced neoprene flexible pipe connectors. Connectors should be suitable for a working pressure of each pump. Length of the connector shall be as per manufacturer's details.

g. Internal Landing Valves

The internal landing valves shall be single headed and conforming to IS:5290. It shall be complete with hand - wheel, quick coupling connection spring loaded type and blank cap.

A cap with chain is provided on the head of the outlet. The hydrant will have an instantaneous pattern female coupling for connecting to Hose Pipe.

The Landing Valve shall be fitted to a Tee connection on the wet riser at the landing.

The Hydrant shall be constructed from gun metal and finished to a smooth polish on screwed ends. The Hydrant shall have screwed inlet of 80mm dia. flanged type with 4 nos. holes. The Hydrant shall have a PVC plug with chain fixed to the main body of the Hydrant. The Hydrant shall be tested to minimum 20 kg / cm² test pressure. The Hydrant shall not leak at any screwed joint.

h. Hose pipes, Branch Pipes and Nozzles

i. **Hose Pipe**: Hose pipe shall be Internal Rubber lining combined with closely woven polyester fibre hose pipe complete with 63mm dia Gun-metal male and female couplings Copper Wire binding etc. conforming to IS:636-1988 (Type A). The hose shall be sufficiently flexible and capable of being rolled. Each run of hose pipe shall be complete with necessary coupling at the ends to match with the landing valve or with another run hose pipe or with Branch pipe. The couplings shall be of instantaneous spring lock type.

ii. **Branch Pipe:** Branch pipe shall be of 63mm dia and be complete with male instantaneous spring lock type coupling for connection to the hose pipe. The branch pipe shall be externally threaded to receive the nozzle.

iii. **Nozzle:** The nozzle shall be of 20mm internal diameter. The screw threads at the inlet connection shall match with the threading on the branch pipe, the inlet end shall have a hexagonal head to facilitate screwing of the nozzle on to the branch pipe with nozzle spanner.

iv. **Hose Cabinet:** The internal hose cabinet shall accommodate the Hose Pipes, Branch Pipe, Nozzle and Hydrant Outlets and shall be fabricated from aluminium 2 hrs rated as specified in Indicative Items. The overall size shall be 2100x1200x900 mm, or as specified in the Architectural details. This shall have lockable centre opening glazed doors/glass front door of min. 6 mm thickness as per the requirement and as per Architectural details. Where the niche for wet riser is provided with shutters, separate hose cabinet as above may be dispensed with. Sample of the fire door shall be approved by Engineer-In-Charge.

v. **Hose Reel**

First aid hose reel equipment shall comprise reel, drum which can swing upto 180 degrees, with hose, guide fixing wall bracket, hose tubing, globe valve, stopcock and nozzle. This shall conform to IS: 884. The hose tubing shall confirm to IS: 444 or IS:12585 (Thermoplastic). The drum shall be fabricated from GI sheet of minimum 18 gauge thickness.The hose tubing shall be 20 mm dia and 36.50 m long. The G.M. nozzle 5mm and shutoff valve shall be of 25 mm size to shut off the water supply to the Hose Reel, or as specified in the Indicative Items. The rubber tubing shall be of approved quality and the nozzle shall be 6 mm dia shut off type.

The fixing bracket shall be of swinging type. Operating instructions shall be engraved on the assembly. This heavy duty mild steel and cast iron brackets shall be conforming to IS:884 - 1969. The first-aid hose reel shall be connected directly to the M.S. pipe riser through a 25mm dia pipe.

MS bracket shall be fixed on the wall to which the first aid hose reel shall be bolted. The bracket shall be of 40x40x5mm thick MS angle to form a square of 400x400 mm approx. This shall be fixed on the wall. After approval of sample by Engineer-In-Charge further units shall be fabricated in factory and all joints shall be finished with grinder and shall be spray painted after single coat of primer.

3. TERRACE PUMP

Scope

This section covers the details or requirements of the terrace fire pump electrically operated

General
The electrical pump set shall be suitable for automatic operation complete with necessary automatic starting etc complete with all accessories. Pump shall be assembled on a bed place, fabricated with mild steel channel.

a. **Drive**
The pump shall be only direct driven by means of a flexible coupling. Coupling guard shall also be provided. The speed shall be 1500/1800 RPM.

b. **Fire Pump**
The fire pump shall be end suction type. It shall have the capacity to deliver 900 LPM as specified, developing adequate head so as to ensure a minimum pressure of 3.5 kg. per sq.cm. at the highest and the farthest outlet. The delivery pressure at the pump outlet shall be not less than 3.5 kg. Per sq.cm. in any case. The pump shall be capable of giving a discharge of not less than 150% of the rated discharge at a head of not less than 65% of the rated head. The shut off head shall be within 120% of the rated head. The shaft shall be of stainless steel. The pump shall be provided with mechanical seal. The pump casing shall be designed to withstand 1.5 times the working pressure.

Bearings of pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water.

4. PORTABLE FIRE EXTINGUISHER

Portable fire extinguishers shall be provided as per drawings and shall conform to IS:15683 and distribution of extinguishers in each building shall be in conformity with IS:2190 - 2010.
The fire extinguishers shall be provided such that they are valid for one year post the handing over date.

a. ABC Type Dry Powder Extinguisher

The Extinguisher shall be filled with ABC Grade 40, Mono Ammonium Phosphate (MAP base) from approved manufacturer.

i. The Capacity of the extinguisher when filled with Dry Chemical Powder (First filling) as per IS:4308, Part-II-8/IS:15683, shall be 6 kg _/-2 %
ii. It shall be operated upright, with a squeeze grip valve to control discharge. The plunger neck shall have a safety city, fitted with a pin, to prevent accidental discharge. It shall be pressurized with Dry Nitrogen, as expelling. The Nitrogen to be charged at a pressure of 15 kg / cm².
iii. Body shall be of mild steel conforming to relevant IS Standards. The neck ring shall be also mild steel and welded to the body. The discharge valve body shall be forged brass or leaded bronze, while the spindle, spring and siphon tube shall be of brass. The nozzle shall be of brass, while the hose shall be of braided nylon. The body shall be cylindrical in shape, with the dish and dome welded to it. Sufficient space for Nitrogen gas shall be provided inside the body, above the powder filling.
iv. The Neck ring shall be externally threaded the threading portion being 1.6 cm. The filler opening in the neck ring shall not less than 50 mm. Discharge nozzles shall be screwed to the hose. The design of the nozzle shall meet the performance requirement, so as to discharge at least 85 % of contents upto a throw of 4 meters, continuously, at least for 15 seconds. The hose, forming part of discharge nozzle, shall be 500 mm long, with 10 mm dia internally for 6 kg capacity and 12 mm for 10 kg capacity. It shall have a pressure gauge fitted to the valve assembly or the cylinder to indicate pressure available inside. The extinguisher shall be treated with anti-corrosive paint, and it shall be labelled with words ABC 2.5 cm long, within a triangle of 5 cm on each face. The extinguisher body and valve assembly shall withstand internal pressure of 30 kg / cm² for a minimum period of 2 minutes. The pressure Gauge shall be imported and suited for the purpose.
v. Suitable arrangement shall be made for mounting of the fire extinguisher on wall next to the internal fire hydrants at all locations indicated in the drawings.

b. Carbon Dioxide Extinguisher
The Carbon Dioxide Extinguisher shall be as per IS: 15683. The capacity shall be 4.5 Kg.
The Body shall be constructed of seamless tube conforming to IS: 7285, and having a convex dome and flat base. Its dia shall be maximum 140 mm, and the overlay height shall not exceed 720 mm.
The discharge mechanism shall be through a control valve conforming to IS: 3224. The internal siphon tube shall be of copper or aluminium conforming to relevant specifications.

Hose pipe shall be high pressure braided Rubber hose with a minimum burst pressure of 140 kg/cm², and shall be approximately 1.0 meters in length having internal dia of 10 mm. The discharge horn shall be of high quality unbreakable plastic with gradually expanding shape, to convert liquid carbon dioxide into gas form. The handgrip of Discharge horn shall be insulated with Rubber of appropriate thickness.

The gas shall be conforming to IS: 307 and shall be stored at about 85 kg/cm². The expansion ratio between stored liquid carbon dioxide to expanded gas shall be 1:9 times and total discharge time shall be minimum 10 sec. and Maximum 25 sec.

The extinguisher shall fulfil the following test pressures :-
Cylinder: 236 kg/cm²
Control Valve: 125 kg/cm²
Burst pressure of Hose: 140 kg/cm² minimum.

It shall be an upright type. The cylinder, including the control valve and high pressure Discharge Hose must comply with relevant Statutory Regulations and be approved by Chief Controller of Explosives, Nagpur and also bear IS marking.

The Extinguisher including components shall be ISI Mark.

IST OF APPROVED MAKES

S.no	Description	Makes
1	Fire Pumps	Kirloskar / Matther Plat / Beacon
2	Motors	ABB / Siemens / NGEF
3	Steel Pipes	Tata / Jindal/ Sail
4	Valves	Zoloto / Sant / Advance
5	Landing Valve	Minimax / Safex / LifeGuard / Fire Shield
6	Nozzle & Coupling	Minimax / Safex / LifeGuard / Fire Shield
7	Fire Extinguishers	Minimax/ Safeguard/ New Age / Fire Shield
8	Pressure Gauges	Fiebig/ H Guru
9	Hose Reel	Padmini /Safeguard /Mitras / Fire Shield
10	Strainers	Venus/Leader/Emarald/ Sant
11	Vibration Eliminator Pads & Connections	Resistoflex
12	Forged Steel Fittings & Flange(For Welded Joints)	DRP-M / Amco metal
13	XLPE Insulated Al Armoured Cable	Havells/CCI/Skytone
14	PVC Insulated Copper Conductor flexible wire	avells / Finolex / National / Kalinga
15	Steel Conduits	BEC / AKG
16	Cable Tray	Slotco / Pilco / Steelways

I.S. CODES AND REFERENCE STANDARDS.

Codes and reference standards referred to in the contract shall be understood to form a part of the contract.

B. Alternative reference standards produced by different standards authorities may be specified in a Section. Standards of any of the specified authorities may be acceptable, however, materials specified in the Section shall be incorporated in the works from only one of the specified standard authorities to ensure compatibility in the performance of the materials.

C. The contractor shall be responsible for adherence to reference standard requirements by subcontractors and suppliers.

D. Where edition date is not specified, consider that reference to manufacturer's and published codes, standards and specifications are made to the latest edition (revision or amendment) approved by the issuing organization current at issue date of the Tender.

E. Reference standards and specifications are quoted in the specification to establish minimum standards. Works of quality or of performance characteristics that exceed these minimum standards will be considered to confirm.

Should regulatory requirements or the contract conflict with specified reference standards or specifications, the more stringent in each case shall govern.

F. Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erection, applying or other matters concerning the materials pertinent to their use in the works and their relationship to materials with which they are incorporated.

G. LIST OF CODES (INDIAN STANDARD CODES)

Standards, specifications, associations, and regulatory bodies are generally referred to throughout the specifications by their abbreviated designations. The materials workmanship shall be in accordance with the requirement of the appropriate CP, I.S code wherever applicable together with any building regulations or byelaws governing the works.

The following list is included for guidance only and the omission of any CP, I.S. codes from the list does not relieve the contractor from compliance therewith:

The more important Codes, Standards and Publications applicable to this section are listed hereinafter:

General

SP : 6 (1)	Structural Steel Sections
IS : 27	Pig Lead
IS : 325	Three Phase Induction Motors
IS : 554	Dimensions for pipe threads where pressure tight joints are required on the threads.
IS : 694	PVC insulated cables for working voltages upto & including 1100 V. IS
: 779	Specification for water meters (domestic type).
IS : 782	Specification for caulking load.
IS : 800	Code of practice for general construction in steel
IS : 1068	Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium.

IS : 1172 Code of Basic requirements for water supply drainage and sanitation.
IS : 1367 (Part 1) Technical supply conditions for threaded steel fasteners: Part 1 introduction and general information.
IS : 1367 (Part 2) Technical supply conditions for threaded steel fasteners: Part 2 product grades and tolerances.
IS : 1554 (Part 1) PVC insulated (heavy duty) electric cables: Part 1 for working voltages upto and including 1100 V.
IS : 1554 (Part 2) PVC insulated (heavy duty) electric cables: Part 2 for working voltages from 3.3 KV upto and including 11 KV.
IS : 1726 Specification for cast iron manhole covers and frames. IS :
1742 Code of practice for building drainage.
IS : 2064 Selection, installation and maintenance of sanitary appliance code of practice.
IS : 2065 Code of practice for water supply in buildings.
IS : 2104 Specification for water meter for boxes (domestic type) IS :
2373 Specification for eater meter (bulk type)
IS : 2379 Colour code for identification of pipe lines.
IS : 2629 Recommended practice for hot dip galvanizing on iron and Steel.

IS : 3114 Code of practice for laying of cast iron pipes
IS : 4111 (Part 1) Code of practice for ancillary structures in sewerage system: Part 1 manholes.
IS : 4127 Code of practice for laying glazed stoneware pipes.
IS : 4853 Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes.
IS : 5329 Code of practice for sanitary pipe work above ground for buildings. IS :
5455 Cast iron steps for manholes.
IS : 6159 Recommended practice for design and fabrication of material, prior to galvanizing.
IS : 7558 Code of practice for domestic hot water installations. IS :
8321 Glossary of terms applicable to plumbing work.
IS : 8419 (Part 1) Requirements for water filtration equipment: Part 1 Filtration medium sand and gravel.
IS : 8419 (Part 2) Requirements for water filtration equipment: Part 2 under drainage system.
IS : 9668 Code of practice for provision and maintenance of water supplies and fire fighting.
IS : 9842 Preformed fibrous pipe insulation.
IS : 9912 Coal tar based coating materials and suitable primers for protecting iron and steel pipe lines.
IS : 10221 Code of practice for coating and wrapping of underground mild steel pipelines.
IS : 10446 Glossary of terms relating to water supply and sanitation. IS :
11149 Rubber Gaskets
IS : 11790 Code of practice for preparation of butt-welding ends for pipes, valves, flanges and fittings.
IS : 12183 (Part 1) Code of practice for plumbing in multistoried buildings : Part 1 water supply.
IS : 12251 Code of practice for drainage of building basements. IS :
5572 Code of practice for sanitary pipe work.

BS : 6700 Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.

BS : 8301	Code of practice for building drainage.
BSEN : 274	Sanitary tap were, waste fittings for basins, bidets and baths. General technical specifications.

2. **Pipes and Fittings**

IS : 458	Specification for precast concrete pipes (with and without reinforcement)
IS : 651	Salt glazed stone ware pipes and fittings.
IS : 1239	Mild steel, tubes, tubular and other wrought steel fittings
IS : 1536	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage.
IS : 1537	Vertically cast iron pressure pipes for water, gas and sewage.
IS : 1538	Cast Iron fittings for pressure pipes for water, gas and sewage.
IS : 1729	Sand Cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 1879	Malleable cast iron pipe fittings.
IS : 1978	Line pipe
IS : 1979	High test line pipe.
IS : 2643	Dimensions for pipe threads for fastening purposes
IS : 3468	Pipe nuts.
IS : 3589	Seamless or electrically welded steel pipes for water, gas and sewage (168.3 mm to 2032 mm outside diameter).
IS : 3989	Centrifugally cast (sun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 4346	Specifications for washers for use with fittings for water services.
IS : 4711	Methods for sampling steel pipes, tubes and fittings.
IS : 6392	Steel pipe flanges
IS : 6418	Cast iron and malleable cast iron flanges for general engineering purposes.
IS : 7181	Specification for horizontally cast iron double flanged pipe for water, gas and sewage.

3. **Valves**

IS : 778	Specification for copper alloy gage, globe and check valves for water works purposes.
IS : 780	Specification for sluice valves for water works purposes (50 mm to 300 mm size).
IS : 1703	Specification copper alloy float valves (horizontal plunger type) for water supply fittings.
IS : 2906	Specification for sluice valves for water works purposes (350 mm to 1200 mm size)
IS : 3950	Specification for surface boxes for sluice valves.
IS : 5312	Specification for swing check type reflux (non return) valves
IS : 12992	Safety relief valves, spring loaded
IS : 13095	Butterfly valves for general purposes.

4. **Pumps & Vessels**

IS : 1520	Specification for horizontal centrifugal pumps for clear cold fresh water.
IS : 2002	Steel plates for pressure vessels for intermediate and high temperature service including boilers.
IS : 8418	Specification for horizontal centrifugal self-priming pumps.

5 Fire Fighting Equipment

NFPA : 12 , 1993	Standards on Carbon Dioxide Extinguishing System
IS : 884	Specification for first aid hose reel for fire fighting.
IS : 901	Specification for couplings, double male and double female, instantaneous pattern for fire fighting.
IS : 902	Suction hose couplings for fire fighting purposes.
IS : 904	Specification for 2-way and 3-way suction collecting heads for fire fighting purposes.
IS : 908	Specification for fire hydrant, stand post type.
IS : 910	Specification for portable chemical foam fire extinguisher.
IS : 2171	Specification for portable fire extinguishers dry powder (cartridge type)
IS : 2190	Selection, installation and maintenance of first aid fire extinguishers – Code of practice.
IS : 2878	Specification for fire extinguishers, carbon dioxide type (portable and trolley mounted).
IS : 3844	Code of practice for installation and maintenance of internal fire hydrants and hose reel on premises.
IS : 5290	Specification for landing valves.
IS 5714	Specification for coupling, branch pipe, nozzle, used in hose reel tubing for fire fighting.
IS : 8423	Specification for controlled percolation type hose for fire fighting.
IS : 10658	Specification for higher capacity dry powder fire extinguisher (trolley mounted).
IS : 3989	Centrifugally cast (sun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 11149	Rubber Gaskets

PERFORMA: G I

GUARANTEE BOND TO BE EXECUTED BY CONTRACTORS FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS

The Agreement made this…… day of……..two thousand and……..Between ……..son of……of…… (hereinafter called the Guarantor of the one part) and THE BORAD OF GOVERNOR'S OF IIT KANPUR (hereinafter called 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 Contractor, inter alia, undertook to render the buildings and structures in the said contract recited completely water and leak-proof.

AND WHEREAS GUARANTOR agreed to give a guarantee to the effect that the said structures will remain water and leak-proof for five 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 leak-proof and the minimum life of such water proofing treatment shall be **ten years** to be reckoned from the date after the maintenance period prescribed in the contract.

Provided that the guarantor will not be responsible for leakage caused by earthquake or structural defects or misuse of roof 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 roof;

(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 cause of leakage 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 the Engineer-in-Charge calling upon him to rectify the defects, failing which the work shall be got done by the Department by some other contractor at the GUARANTOR'S cost and risk. The decision of the Engineer-in-Charge as to the cost, payable by the Guarantor shall be final and binding.

That if GUARANTOR fails to execute the water proofing or commits breach there under then the GUARANTOR will indemnify the Principal and his successors against all loss, damage, cost, expense or otherwise which may be incurred by him by reason of any default on the part of 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 Obligor…… and

By…… and for and on behalf of the BORAD OF GOVERNOR'S OF IIT KANPUR on the day, month and year first above written.

Signed, sealed and delivered by OBLIGOR in the presence of-

1

2.

Signed for and on behalf of BORAD OF GOVERNOR'S OF IIT KANPUR by……. In the presence of-

1

2.

PERFORMA: G2

GUARANTEE BOND FOR ANTITERMITE TREATMENT

(For Guarantee to be executed by contractors for removal of defects of anti termite treatment works after maintenance period)

This agreement made this……day of……two Thousand……..between……M/s… …….. (hereinafter called "the Guarantor of the one part) and the BORAD OF GOVERNOR'S OF IIT KANPUR (hereinafter called "the Government "of the other part.)

Whereas this agreement is supplementary to the contract (hereinafter called "the Contract") Dated…….. made between the Guarantor of the one part and Government of the other part, whereby the Contractor, inter-alia, undertook to render the buildings and structure in the said contract recited, completely termite proof.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said structure will remain termite proof for **Five years** to be reckoned from the date after the maintenance period prescribed in the contract expires.

NOW THE GUARANTOR hereby guarantees that the anti-termite treatment provided by him will render the structures completely termite proof and the minimum life of such anti-termite treatment shall be ten years to be reckoned from the date of after the maintenance period prescribed in the contract expires.

Provided that the Guarantor will not be responsible for damages caused due to structural defects or misuse of premises/area.

a) Misuse of premises shall mean any operation which will disturb the chemical barrier like excavation under floors, breaking of walls at G.L. disturbing the treatment already carried out.

The decision of the Engineer-in-Charge with regard to cause of damage shall be final.

During this period of guarantee the guarantor shall make all the arrangements to do the post constructional anti-termite treatment in all the buildings in case of any termite nuisance being found in the building, to the satisfaction of the Engineer-in-Charge at the cost of guarantor and shall commence the work for such treatment within **seven days** from the date of calling upon him to rectify the defects, by the Engineer-in-Charge, failing which the work shall be got done by the Department by some other contractor at the GUARANTOR'S COST and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the Guarantor fails to execute the anti-termite treatment or commits breaches hereunder then the Guarantor will indemnify the principal and his successors against all loss, damage, cost, expense or otherwise which may be incurred by the Department by reason of any default on the part of the GUARANTOR in performance and observance of this supplemental 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 Obligor---------and by ----------and for and on behalf of the BORAD OF GOVERNOR'S OF IIT KANPUR on the day, month and year first above written. SIGNED, sealed and delivered by OBLIGOR in the presence of:

1.

2.

SIGNED FOR AND ON BEHALF OF BORAD OF GOVERNOR'S OF IIT KANPUR BY ……i

n the presence of:

1.

2.

PERFORMA: G3

TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTSAFTER COMPLETION IN RESPECT OF ALUMINIUM WORK, WINDOWS VENTILA TORS, STRUCTURAL GLAZING & STRUCTURAL STEEL WORKS

The agreement made this……. day of……. Two Thousand and……between ……son of……. (hereinafter called the GURANTOR of the one part) and the BORAD OF GOVERNOR'S OF IIT KANPUR (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 contractor inter alia, undertook to render the work in the said contract recited structurally stable, leak proof and sound material, workmanship, anodizing, colouring, sealing.

AND WHEREAS THE GURANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective anodizing, colouring, sealing and finishing for 5 (Five) years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

NOW THE GUARANTOR hereby guarantee that work executed by him will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective anodizing, colouring, sealing and finishing for two years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

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

IN WITNESS WHEREOF these presents, have been executed by the obligator and ' by for and on behalf of the BORAD OF GOVERNOR'S OF IIT KANPUR 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 BORAD OF GOVERNOR'S OF IIT KANPUR BY …… in the presence of:

1 . …….

2 . ……

PERFORMA: G4

TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER SUPPLY AND SANITARY INSTALLATIONS

The agreement made this..... day of.....Two Thousand and.....between..... son of..... (hereinafter called the GUARANTOR of the one part) and the BORAD OF GOVERNOR'S OF IIT KANPUR (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 contractor inter alia, undertook to render the work in the said contract recited structurally stable workmanship, finishing and use of sound materials.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable and guaranteed against faulty workmanship, finishing, manufacturing defects of materials and leakages, etc.

NOW THE GUARANTOR hereby guarantee that work executed by him will remain structurally stable after expiry of maintenance period prescribed in the contract for the minimum life of 10 (Ten) years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-in-charge with regard to nature and cause of defect shall be final.

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

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

IN WITNESS WHERE OF these presents, have been executed by the obligator.....and..... by.....for and on behalf of the BORAD OF GOVERNOR'S OF IIT KANPUR 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 BORAD OF GOVERNOR'S OF IIT KANPUR BY .....in the presence of:

1..... 2.....

PERFORMA: G5

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

The agreement made this……..day of…… (Two Thousand……. only)
Between……. S/o_____ (hereinafter called the GUARANTOR of the one part) and the BORAD OF GOVERNOR'S OF IIT KANPUR (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 contractor inter alia undertook to render the work under said contract structurally stable to fulfill its intended purpose, sound, free from workmanship defects and use of only specified, certified material only.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable to fulfill its intended purpose, sound, and guarantee against faulty workmanship, material and finishing.

NOW THE GUARANTOR hereby guarantee that work executed by him will remain structurally stable, sound and fulfill its intended purpose for the **minimum life of** Five years to be reckoned from the date of completion of work.

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

During this period of guarantee, the guarantor shall make good all defects to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.
That if the guarantor fails to rectify the defects and commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and / or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator

And……by…… for and on behalf of the

PRESIDENT OF INDIA on the day, month and year first above written.

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

1. 2.

SIGNED FOR AND BEHALF OF THE BORAD OF GOVERNOR'S OF IIT KANPUR BY the presence of :-

1…… 2……

Form of Performance Security (Guarantee)
Bank Guarantee Bond

In consideration of the BORAD OF GOVERNOR'S OF IIT KANPUR *(hereinafter called "The Government') having offered to accept the terms and conditions of the proposed agreement (hereinafter called "the said Contractor(s)') for the work..... (hereinafter called "the said agreement') having agreed to production of an irrevocable Bank Guarantee for Rs..... (Rupees only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.*

1. *We, (hereinafter referred to as "the Bank") hereby undertake to pay to the Government an amount not exceeding Rs. (Rupees..... Only) on demand by the Government.*

2. *We,..... (indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demure, merely on a demand from the Government stating that the amount claimed as required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. (Rupees..... only)*

3. *We, the said bank further undertake to pay the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.*

4. *We,..... (indicate the name of the Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in- Charge on behalf of the Government certified that the terms and conditions of the said agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.*

5. *We,..... (indicate the name of the Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of the Government or any indulgence by the Government to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.*

6. *This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).*

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

8. This guarantee shall be valid up to……. extended on demand by the Government. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs…… (Rupees ……) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged

Dated the……day of……For……(indicate the name of the Bank)

Form of Earnest Money Deposit
Bank Guarantee Bond

WHEREAS, contractor..... (Name of contractor) (hereinafter called "the contractor") has
submitted his tender dated.....(date) for the construction of..... (name
of work) (hereinafter called "the Tender")
KNOW ALL PEOPLE by these presents that we..... (name of bank) having our
registered office at..... (hereinafter called "the Bank') are bound
unto.....(Name and division of Executive Engineer**) (hereinafter called
"the Engineer-in-Charge**') in the sum of Rs. .....(Rs. in words.....) for which payment well and truly to be made to the said Engineer-in-
Charge the Bank binds itself, his successors and assigns by these presents.
SEALED with the Common Seal of the said Bank this..... day of..... 20 THE
CONDITIONS of this obligation are:
(1) If after tender opening the Contractor withdraws, his tender during the period of validity of
tender (including extended validity of tender) specified in the Form of Tender;
(2) If the contractor having been notified of the acceptance of his tender by the Engineer-in-
Charge:
(a) Fails or refuses to execute the Form of Agreement in accordance with the Instructions to contractor, if required;
OR
(b) Fails or refuses to furnish the Performance Guarantee, in accordance with the provisions of tender document and Instructions to contractor,
We undertake to pay to the Engineer-in-Charge either up to the above amount or part thereof upon receipt of his first written demand, without the Engineer-in-Charge having to substantiates his demand, provided that in his demand the Engineer-in-Charge will note that the amount claimed by his is due to him owing to the occurrence of one or any of the above conditions, specking the occurred condition or conditions.
This Guarantee will remain in force up to and including the date* after the deadline for
submission of tender as such deadline is stated in the Instructions to contractor or as it may be extended by the Engineer-in- Charge, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.
DATE ..... SIGNATURE OF THE BANK
WITNESS. ..... SEAL
(SIGNATURE, NAME AND ADDRESS)
*Date to be worked out on the basis of validity period of 4 months from last date of receipt of tender.

**** -Note - The Bank Guarantee shall be in favour of the DIRECTOR IIT Kanpur.**

PART – B4

LIST OF DRAWING

IIT KANPUR-HOR-15				
LIST OF DRAWINGS				
TOTAL NO. OF DRAWINGS		420		
S.No	Title	Drawing No.	Rev	Sheet
CIVIL				
ARCHITECTURAL				
1	GENERAL NOTES & LEGEND	3100_IIT_K/AR/A-00	GFC	A1
2	BUILDING SETTING OUT PLAN	3100_IIT_K/AR/A-01	GFC	A1
3	SITE PLAN	3100_IIT_K/AR/A-02	GFC	A1
4	GRID SETTING OUT PLAN	3100_IIT_K/AR/A-03	GFC	A1
PLANS				
	BLOCK B1 & B2			
5	STILT PLAN	3100_IIT_K/AR_B1&B2/PL-100	GFC	A1
6	FIRST FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-101	GFC	A1
7	SECOND FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-102	GFC	A1
8	THIRD FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-103	GFC	A1
9	FOURTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-104	GFC	A1
10	FIFTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-105	GFC	A1
11	SIXTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-106	GFC	A1
12	TERRACE FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-107	GFC	A1
	BLOCK B3,B4&B6			
13	STILT PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-100	GFC	A1
14	FIRST FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-101	GFC	A1
15	SECOND FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-102	GFC	A1
16	THIRD FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-103	GFC	A1
17	FOURTH FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-104	GFC	A1
18	FIFTH FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-105	GFC	A1
19	SIXTH FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-106	GFC	A1
20	TERRACE FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-107	GFC	A1
	BLOCK B5&B7			
21	STILT PLAN	3100_IIT_K/AR_B5&B7/PL-100	GFC	A1
22	FIRST FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-101	GFC	A1
23	SECOND FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-102	GFC	A1
24	THIRD FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-103	GFC	A1
25	FOURTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-104	GFC	A1
26	FIFTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-105	GFC	A1
27	SIXTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-106	GFC	A1
28	TERRACE FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-107	GFC	A1
	WORKING PLANS			
	BLOCK B1			
29	STILT PLAN	3100_IIT_K/AR_B1/PL-110	GFC	A1
30	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B1/PL-111	GFC	A1
31	TERRACE FLOOR PLAN	3100_IIT_K/AR_B1/PL-112	GFC	A1
	BLOCK B2			
32	STILT PLAN	3100_IIT_K/AR_B2/PL-110	GFC	A1
33	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B2/PL-111	GFC	A1
34	TERRACE FLOOR PLAN	3100_IIT_K/AR_B2/PL-112	GFC	A1
35	KEY PLAN B1&B2	3100_IIT_K/AR_B2/PL-113	GFC	A1
	BLOCK B3			
36	STILT PLAN	3100_IIT_K/AR_B3/PL-110	GFC	A1
37	FIRST TO FIFTH FLOOR PLAN	3100_IIT_K/AR_B3/PL-111	GFC	A1
38	TERRACE FLOOR PLAN	3100_IIT_K/AR_B3/PL-112	GFC	A1
	BLOCK B4			
39	STILT PLAN	3100_IIT_K/AR_B4/PL-110	GFC	A1
40	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B4/PL-111	GFC	A1
41	TERRACE FLOOR PLAN	3100_IIT_K/AR_B4/PL-112	GFC	A1
	BLOCK B6			
42	STILT PLAN	3100_IIT_K/AR_B6/PL-110	GFC	A1
43	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B6/PL-111	GFC	A1
44	TERRACE FLOOR PLAN	3100_IIT_K/AR_B6/PL-112	GFC	A1
45	KEY PLAN B3,B4&B6	3100_IIT_K/AR_B3,B4&B6/PL-113	GFC	
	BLOCK B5&B7			
46	STILT PLAN	3100_IIT_K/AR_B5&B7/PL-110	GFC	A1
47	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-111	GFC	A1
48	TERRACE FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-112	GFC	A1
RCP PLAN - FALSE CEILING ONLY				
	BLOCK B1 & B2			
49	STILT PLAN	3100_IIT_K/AR_B1&B2/PL-120	GFC	A1
50	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-121	GFC	A1
51	TERRACE FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-122	GFC	A1
	BLOCK B3,B4&B6			
52	STILT PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-120	GFC	A1
53	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-121	GFC	A1
54	TERRACE FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-122	GFC	A1
	BLOCK B5&B7			
55	STILT PLAN	3100_IIT_K/AR_B5&B7/PL-120	GFC	A1
56	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-121	GFC	A1
57	TERRACE FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-122	GFC	A1

		GENERAL FLOORING PLAN		
	BLOCK B1 & B2			
58	STILT PLAN	3100_IIT_K/AR_B1&B2/PL-140	GFC	A1
59	GROUND TO FIFTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-141	GFC	A1
60	SIXTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-142	GFC	A1
	BLOCK B3,B4&B6			
61	STILT PLAN	3100_IIT_K/AR_B3,B4&B6/PL-140	GFC	A1
62	FIRST TO FIFTH FLOOR PLAN	3100_IIT_K/AR_B3,B4&B6/PL-141	GFC	A1
63	SIXTH FLOOR	3100_IIT_K/AR_B3,B4&B6/PL-142	GFC	A1
	BLOCK B5.B7			
64	STILT PLAN	3100_IIT_K/AR_B5&B7/PL-140	GFC	A1
65	FIRST TO SIXTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-141	GFC	A1
		ELEVATIONS		
	BLOCK B1 & B2			
66	ELEVATION A	3100_IIT_K/AR_B1&B2/E-200	GFC	A1
67	ELEVATION B	3100_IIT_K/AR_B1&B2/E-201	GFC	A1
68	ELEVATION C	3100_IIT_K/AR_B1&B2/E-202	GFC	A1
69	ELEVATION D	3100_IIT_K/AR_B1&B2/E-203	GFC	A1
	BLOCK B3,B4,B6			
70	ELEVATION A	3100_IIT_K/AR_B3,B4,&B6/E-200	GFC	A1
71	ELEVATION B	3100_IIT_K/AR_B3,B4,&B6/E-201	GFC	A1
72	ELEVATION C	3100_IIT_K/AR_B3,B4,&B6/E-202	GFC	A1
73	ELEVATION D	3100_IIT_K/AR_B3,B4,&B6/E-203	GFC	A1
74	ELEVATION E	3100_IIT_K/AR_B3,B4,&B6/E-204	GFC	A1
75	ELEVATION F	3100_IIT_K/AR_B3,B4,&B6/E-205	GFC	A1
	BLOCK B5.B7			
76	ELEVATION A	3100_IIT_K/AR_B5&B7/PL-200	GFC	A1
77	ELEVATION B	3100_IIT_K/AR_B5&B7/PL-201	GFC	A1
78	ELEVATION C	3100_IIT_K/AR_B5&B7/PL-202	GFC	A1
79	ELEVATION D	3100_IIT_K/AR_B5&B7/PL-203	GFC	A1
		SECTIONS		
	BLOCK B1 & B2			
80	SECTION-1	3100_IIT_K/AR_B1&B2/S-300	GFC	A1
81	SECTION-2	3100_IIT_K/AR_B1&B2/S-301	GFC	A1
82	SECTION-3	3100_IIT_K/AR_B1&B2/S-302	GFC	A1
83	SECTION-4	3100_IIT_K/AR_B1&B2/S-303	GFC	A1
84	SECTION-5	3100_IIT_K/AR_B1&B2/S-304	GFC	A1
	BLOCK B3,B4,B6			
85	SECTION-1	3100_IIT_K/AR_B3,B4,&B6/S-300	GFC	A1
86	SECTION-2	3100_IIT_K/AR_B3,B4,&B6/S-301	GFC	A1
87	SECTION-3	3100_IIT_K/AR_B3,B4,&B6/S-302	GFC	A1
88	SECTION -4	3100_IIT_K/AR_B3,B4,&B6/S-303	GFC	A1
	BLOCK B5.B7			
89	SECTION-1	3100_IIT_K/AR_B5&B7/S-300	GFC	A1
90	SECTION-2	3100_IIT_K/AR_B5&B7/S-301	GFC	A1
	WALL SECTIONS			
	BLOCK B1 and B2			
91	WALL SECTION-1	3100_IIT_K/AR_B1&B2/WS-400	GFC	A1
92	WALL SECTION-2	3100_IIT_K/AR_B1&B2/WS-401	GFC	A1
93	WALL SECTION-3	3100_IIT_K/AR_B1&B2/WS-402	GFC	A1
	BLOCK B3,B4 and B6			
94	WALL SECTION-1	3100_IIT_K/AR_B3,B4,&B6/WS-400	GFC	A1
95	WALL SECTION-2	3100_IIT_K/AR_B3,B4,&B6/WS-401	GFC	A1
	BLOCK B5 and B7			
96	WALL SECTION-1	3100_IIT_K/AR_B5&B7/WS-400	GFC	A1
		TOILET DETAILS		
	Block B1 and B2			
97	TYPICAL TOILET DETAIL B1 - 2nd, 4th, 6th floor	3100_IIT_K/AR/B1 & B2/TOI-500	GFC	A1
98	TYPICAL TOILET DETAIL 02 - B1 and B2 3rd and 5th floor	3100_IIT_K/AR/B1 & B2/TOI-501	GFC	A1
99	COMMON TOILET DETAILS STILT - B1 and B2	3100_IIT_K/AR/B1 & B2/TOI-502	GFC	A1
100	TYPICAL GUEST ROOM TOILET DETAIL STILT - B1 and B2	3100_IIT_K/AR/B1 & B2/TOI-503	GFC	A1
101	TYPICAL DETAIL- B1 and B2 1st Floor	3100_IIT_K/AR/B1 & B2/TOI-504	GFC	A1
	Block B3, B4 and B6			
102	TYPICAL GUEST ROOM TOILET DETAIL STILT - B3	3100_IIT_K/AR/B3/TOI-500	GFC	A1
103	TYPICAL TOILET DETAIL 01 -B3 1st , 3rd & 5th Floor	3100_IIT_K/AR/B3/TOI-501	GFC	A1
104	TYPICAL TOILET DETAIL 02 - B3 2nd & 4th Floor	3100_IIT_K/AR/B3/TOI-502	GFC	A1
105	TYPICAL GUEST ROOM TOILET DETAIL STILT - B4	3100_IIT_K/AR/B4/TOI-503	GFC	A1
106	TYPICAL TOILET DETAIL -B4 (All floors)	3100_IIT_K/AR/B4/TOI-504	GFC	A1

107	TYPICAL TOILET DETAIL- B6 (All floors)	3100_IIT_K/AR/B6/TOI-505	GFC	A1
108	TYPICAL TOILET DETAIL- B3 1st floor	3100_IIT_K/AR/B6/TOI-506	GFC	A1
	Block B5 and B7			
109	TYPICAL TOILET DETAIL -B5 (All floors)	3100_IIT_K/AR/B5/TOI-500	GFC	A1
110	TYPICAL GUEST ROOM TOILET DETAIL STILT - B7	3100_IIT_K/AR/B7/TOI-501	GFC	A1
111	TYPICAL TOILET DETAIL 01 - B7 2nd,4th & 6th floor	3100_IIT_K/AR/B7/TOI-502	GFC	A1
112	TYPICAL TOILET DETAIL B7 3rd & 5th Floor	3100_IIT_K/AR/B7/TOI-503	GFC	A1
113	TYPICAL TOILET DETAIL B7 1st floor	3100_IIT_K/AR/B7/TOI-504	GFC	A1
		DOOR SCHEDULE & DETAILS		
114	DOORS & WINDOWS: SCHEDULE AND DETAILS	3100_IIT_K/AR/DET-600	GFC	A1
115	DOORS & WINDOWS : SCHEDULE AND DETAILS	3100_IIT_K/AR/DET-601	GFC	A1
116	DOORS & WINDOWS : SCHEDULE AND DETAILS	3100_IIT_K/AR/DET-602	GFC	A1
		FAÇADE DETAILS		
117	FACADE : CHAJJA DETAIL 01	3100_IIT_K/AR/DET-701	GFC	A1
118	FACADE : CHAJJA DETAIL 02	3100_IIT_K/AR/DET-702	GFC	A1
119	RAINWATER SHAFT DETAIL	3100_IIT_K/AR/DET-703	GFC	A1
		CORES - STAIRCASES/ LIFT / RAMP ENTRY		
	B1 and B2			
120	STAIRCASE DETAIL - B1 and B2 ST-01	3100_IIT_K/AR/DET-800	GFC	A1
121	STAIRCASE FLOORING DETAIL - B1 and B2 ST-01	3100_IIT_K/AR/DET-801	GFC	A1
122	STAIRCASE DETAIL - B1 and B2 ST-02	3100_IIT_K/AR/DET-802	GFC	A1
123	STAIRCASE FLOORING DETAIL - B1 and B2 ST-02	3100_IIT_K/AR/DET-803	GFC	A1
124	STAIRCASE DETAIL - B1 and B2 ST-03	3100_IIT_K/AR/DET-804	GFC	A1
125	STAIRCASE FLOORING DETAIL - B1 and B2 ST-03	3100_IIT_K/AR/DET-805	GFC	A1
	B3, B4 and B6			
126	STAIRCASE DETAIL - B3, B4 and B6 ST-01	3100_IIT_K/AR/DET-800	GFC	A1
127	STAIRCASE FLOORING DETAIL - B3, B4 and B6 ST-01	3100_IIT_K/AR/DET-801	GFC	A1
128	STAIRCASE DETAIL - B3, B4 and B6 ST-02	3100_IIT_K/AR/DET-802	GFC	A1
129	STAIRCASE FLOORING DETAIL - B3, B4 and B6 ST-02	3100_IIT_K/AR/DET-803	GFC	A1
130	STAIRCASE DETAIL - B3, B4 and B6 ST-03	3100_IIT_K/AR/DET-804	GFC	A1
131	STAIRCASE FLOORING DETAIL - B3, B4 and B6 ST-03	3100_IIT_K/AR/DET-805	GFC	A1
	B5 and B7			
132	STAIRCASE DETAIL - B5 and B7 ST-01	3100_IIT_K/AR/DET-800	GFC	A1
133	STAIRCASE FLOORING DETAIL - B5 and B7 ST-01	3100_IIT_K/AR/DET-801	GFC	A1
134	STAIRCASE DETAIL - B5 and B7 ST-02	3100_IIT_K/AR/DET-802	GFC	A1
135	STAIRCASE FLOORING DETAIL - B5 and B7 ST-02	3100_IIT_K/AR/DET-803	GFC	A1
		METAL WORKS		
136	TYPICAL RAILING DETAILS STAIRCASE	3100_IIT_K/AR/DET-1100	GFC	A1
137	TYPICAL RAILING DETAILS STILT	3100_IIT_K/AR/DET-1101	GFC	A1
138	TYPICAL RAMP RAILING DETAILS	3100_IIT_K/AR/DET-1102	GFC	A1
139	TYPICAL WATER TANK RAILING DETAIL	3100_IIT_K/AR/DET-1103	GFC	A1
		MISCELLANEOUS DETAILS		
140	LIFT WALL DETAIL	3100_IIT_K/AR/DET-1200	GFC	A1
141	BOUNDARY WALL & GATE DESIGN	3100_IIT_K/AR/DET-1201	GFC	A1
142	CUPBOARD DETAILS	3100_IIT_K/AR/DET-1202	GFC	A1
143	SECURITY HUT	3100_IIT_K/AR/DET-1203	GFC	A1
144	PUMP ROOM	3100_IIT_K/AR/DET-1204	GFC	A1
145	ELECTRICAL AND PUMP ROOM	3100_IIT_K/AR/DET-1205	GFC	A1
146	WATER TANK DETAIL	3100_IIT_K/AR/DET-1206	GFC	A1
147	EXPANSION JOINT DETAIL	3100_IIT_K/AR/DET-1207	GFC	A1
148	BRIDGE DETAILS	3100_IIT_K/AR/DET-1208	GFC	A1
149	Sump Details	3100_IIT_K/AR/DET-1209	GFC	A1
150	Screening Chamber	3100_IIT_K/AR/DET-1210	GFC	A1
		INTERIOR LAYOUT PLAN		
151	ROOM LAYOUT DETAILS	3100_IIT_K/AR/I-1300	GFC	A1
		STRUCTURE DRAWINGS		
		General		
152	SCPL/IITK-HOR/S-1-0 (SHEET-1)	GENERAL NOTES AND STANDARD DETAILS	GFC	A1
153	SCPL/IITK-HOR/S-1-0 (SHEET-2)	GENERAL NOTES AND STANDARD DETAILS	GFC	A1
154	SCPL/IITK-HOR/S-1-0 (SHEET-3)	GENERAL NOTES AND STANDARD DETAILS	GFC	A1
155	SCPL/IITK-GH/S-15-1	BORE HOLE LOCATION PLAN	GFC	A1

156	SCPL/IITK-HOR 15-CORRIDOR/S-15-2	CORRIDOR PLAN & DETAIL	GFC	A1
157	SCPL/IITK-HOR 15-SH/S-15-3	SECURITY HUT & MAIN GATE PLAN & DETAIL	GFC	A1
158	SCPL/IITK-ROAD/S-15-4	TYPICAL ROAD PLAN & DETAIL	GFC	A1
159	SCPL/IITK-HOR 15-ELC/S-15-5	ELECTRICAL ROOM PLAN & DETAIL	GFC	A1
160	SCPL/IITK-HOR 15/S-15-6	TYPICAL RCC BAND AAC BLOCK WALL DETAIL FOR	GFC	A1
161	SCPL/IITK-HOR 15-BW/S-15-7	BOUNDARY WALL PLAN & DETAILS	GFC	A1
162	SCPL/IITK-HOR 15-UGT/S-15-8	UNDER GROUND WATER TANK AND PUMP ROOM	GFC	A1
163	SCPL/HOR-15-SUMP/S-15-9	TYPICAL SUMP SCREENING CHAMBER PLAN & DETAILS	GFC	A1
		Block B1&B2		
164	SCPL/IITK-HOR 15-B1&B2/S-3-1 (SHEET 1 OF 3)	FOUNDATION PLAN & DETAILS	GFC	A1
165	SCPL/IITK-HOR 15-B1&B2/S-3-1 (SHEET 2 OF 3)	BOTTOM EXTRA REINF PLAN & DETAIL	GFC	A1
166	SCPL/IITK-HOR 15-B1&B2/S-3-1 (SHEET 3 OF 3)	TOP EXTRA REINF PLAN & DETAIL	GFC	A1
167	SCPL/IITK-HOR 15-B1&B2/S-4-1	COLUMN SCHEDULE (2 SHEET)	GFC	A1
168	SCPL/IITK-HOR 15/B1&B2-S-4-2	COLUMN LAYOUT	GFC	A1
169	SCPL/IITK-HOR 15-B1&B2/S-8-1-0	GROUND FLOOR LVL FRAMING PLAN	GFC	A1
170	SCPL/IITK-HOR 15-B1&B2/S-8-11-0	GROUND FLOOR LVL BEAM DETAIL	GFC	A1
171	SCPL/IITK-HOR 15-B1&B2/S-9-1-1	1ST FLOOR LVL FRAMING PLAN	GFC	A1
172	SCPL/IITK-HOR 15-B1&B2/S-9-11-1	1ST FLOOR LVL BEAM REINF DETAIL	GFC	A1
173	SCPL/IITK-HOR 15-B1&B2/S-9-2-1	1ST FLOOR LVL SLAB REINF DETAIL	GFC	A1
174	SCPL/IITK-HOR 15-B1&B2/S-9-1-2	TYPICAL FLOOR LVL FRAMING PLAN	GFC	A1
175	SCPL/IITK-HOR 15-B1&B2/S-9-11-2	TYPICAL FLOOR LVL BEAM REINF DETAIL	GFC	A1
176	SCPL/IITK-HOR 15-B1&B2/S-9-2-2	TYPICAL FLOOR LVL SLAB REINF DETAIL	GFC	A1
177	SCPL/IITK-HOR 15-B1&B2/S-9-1-3	SIX FLOOR LVL FRAMING PLAN	GFC	A1
178	SCPL/IITK-HOR 15-B1&B2/S-9-11-3	SIX FLOOR LVL BEAM REINF DETAIL (2 SHEET)	GFC	A1
179	SCPL/IITK-HOR 15-B1&B2/S-9-2-3	SIX FLOOR LVL SLAB REINF DETAIL	GFC	A1
180	SCPL/IITK-HOR 15-B1&B2/S-9-1-4	TERRACE LVL FRAMING PLAN	GFC	A1
181	SCPL/IITK-HOR 15-B1&B2/S-9-11-4	TERRACE FLOOR LVL BEAM REINF DETAIL	GFC	A1
182	SCPL/IITK-HOR 15-B1&B2/S-9-2-4	TERRACE FLOOR LVL SLAB REINF DETAIL	GFC	A1
183	SCPL/IITK-HOR 15-B1&B2/S-7-1	STAIR CASE DETAIL-01	GFC	A1
184	SCPL/IITK-HOR 15-B1&B2/S-7-2	STAIR CASE DETAIL-02	GFC	A1
185	SCPL/IITK-HOR 15-B1&B2/S-7-3	STAIR CASE DETAIL-03	GFC	A1
		Block-B3,B4&B6		
186	SCPL/IITK-HOR 15-B3,B4&B6/S-3-1 (SHEET 1 OF 3)	FOUNDATION PLAN	GFC	A1
187	SCPL/IITK-HOR 15-B3,B4&B6/S-3-1 (SHEET 2 OF 3)	BOTTOM EXTRA REINF PLAN & DETAIL	GFC	A1
188	SCPL/IITK-HOR 15-B3,B4&B6/S-3-1 (SHEET 3 OF 3)	TOP EXTRA REINF PLAN & DETAIL	GFC	A1
189	SCPL/IITK-HOR 15-B3,B4&B6/S-3-2	FOUNDATION DETAIL	GFC	A1
190	SCPL/IITK-HOR 15-B3,B4&B6/S-4-1	COLUMN SCHEDULE (3 SHEET)	GFC	A1
191	SCPL/IITK-HOR 15-B3,B4&B6/S-4-2	COLUMN LAYOUT	GFC	A1
192	SCPL/IITK-HOR 15-B3,B4&B6/S-8-1-0	GROUND FLOOR LVL FRAMING PLAN	GFC	A1
193	SCPL/IITK-HOR 15-B3,B4&B6/S-8-11-0	GROUND FLOOR LVL BEAM DETAIL (2 SHEET)	GFC	A1
194	SCPL/IITK-HOR 15-B3,B4&B6/S-9-1-1	1ST FLOOR LVL FRAMING PLAN	GFC	A1
195	SCPL/IITK-HOR 15-B3,B4&B6/S-9-11-1	1ST FLOOR LVL BEAM REINF DETAIL (2 SHEET)	GFC	A1
196	SCPL/IITK-HOR 15-B3,B4&B6/S-9-2-1	1ST FLOOR LVL SLAB REINF DETAIL	GFC	A1
197	SCPL/IITK-HOR 15-B3,B4&B6/S-9-1-2	TYPICAL FLOOR LVL FRAMING PLAN	GFC	A1
198	SCPL/IITK-HOR 15-B3,B4&B6/S-9-11-2	TYPICAL FLOOR LVL BEAM REINF DETAIL (2 SHEET)	GFC	A1
199	SCPL/IITK-HOR 15-B3,B4&B6/S-9-2-2	TYPICAL FLOOR LVL SLAB REINF DETAIL	GFC	A1
200	SCPL/IITK-HOR 15-B3,B4&B6/S-9-1-3	SIX FLOOR LVL FRAMING PLAN	GFC	A1
201	SCPL/IITK-HOR 15-B3,B4&B6/S-9-11-3	SIX FLOOR LVL BEAM REINF DETAIL (2 SHEET)	GFC	A1
202	SCPL/IITK-HOR 15-B3,B4&B6/S-9-2-3	SIX FLOOR LVL SLAB REINF DETAIL	GFC	A1
203	SCPL/IITK-HOR 15-B3,B4&B6/S-9-1-4	TERRACE LVL FRAMING PLAN	GFC	A1
204	SCPL/IITK-HOR 15-B3,B4&B6/S-9-11-4	TERRACE FLOOR LVL BEAM REINF DETAIL	GFC	A1
205	SCPL/IITK-HOR 15-B3,B4&B6/S-9-2-4	TERRACE FLOOR LVL SLAB REINF DETAIL	GFC	A1
206	SCPL/IITK-HOR 15-B3,B4&B6/S-7-1	STAIR CASE DETAIL-01	GFC	A1
207	SCPL/IITK-HOR 15-B3,B4&B6/S-7-2	STAIR CASE DETAIL-02	GFC	A1
208	SCPL/IITK-HOR 15-B3,B4&B6/S-7-3	STAIR CASE DETAIL-03	GFC	A1
		Block-B5,B7		
209	SCPL/IITK-HOR 15-B5&B7/S-3-1 (SHEET 1 OF 3)	FOUNDATION PLAN & DETAILS	GFC	A1
210	SCPL/IITK-HOR 15-B5&B7/3-1 (SHEET 2 OF 3)	BOTTOM EXTRA REINF PLAN & DETAIL	GFC	A1
211	SCPL/IITK-HOR 15-B5&B7/3-1 (SHEET 3 OF 3)	TOP EXTRA REINF PLAN & DETAIL	GFC	A1
212	SCPL/IITK-HOR 15-B5&B7/S-3-2	FOUNDATION DETAIL	GFC	A1
213	SCPL/IITK-HOR 15-B5&B7/S-4-1	COLUMN SCHEDULE (3 SHEET)	GFC	A1
214	SCPL/IITK-HOR 15-B5&B7/S-4-2	COLUMN LAYOUT	GFC	A1
215	SCPL/IITK-HOR 15-B5&B7/S-8-1-0	GROUND FLOOR LVL FRAMING PLAN	GFC	A1
216	SCPL/IITK-HOR 15-B5&B7/8-11-0	GROUND FLOOR LVL BEAM DETAIL	GFC	A1
217	SCPL/IITK-HOR 15-B5&B7/S-9-1-1	1ST FLOOR LVL FRAMING PLAN	GFC	A1
218	SCPL/IITK-HOR 15-B5&B7/S-9-11-1	1ST FLOOR LVL BEAM REINF DETAIL	GFC	A1

219	SCPL/IITK-HOR 15-B5&B7/S-9-2-1	1ST FLOOR LVL SLAB REINF DETAIL	GFC	A1
220	SCPL/IITK-HOR 15-B5&B7/S-9-1-2	TYPICAL FLOOR LVL FRAMING PLAN	GFC	A1
221	SCPL/IITK-HOR 15-B5&B7/S-9-11-2	TYPICAL FLOOR LVL BEAM REINF DETAIL	GFC	A1
222	SCPL/IITK-HOR 15-B5&B7/S-9-2-2	TYPICAL FLOOR LVL SLAB REINF DETAIL	GFC	A1
223	SCPL/IITK-HOR 15-B5&B7/S-9-1-3	TERRACE LVL FRAMING PLAN	GFC	A1
224	SCPL/IITK-HOR 15-B5&B7/S-9-11-3	TERRACE FLOOR LVL BEAM REINF DETAIL (2 SHEET)	GFC	A1
225	SCPL/IITK-HOR 15-B5&B7/S-9-2-3	TERRACE FLOOR LVL SLAB REINF DETAIL	GFC	A1
226	SCPL/IITK-HOR 15-B5&B7/S-7-1	STAIR CASE DETAIL-01	GFC	A1
227	SCPL/IITK-HOR 15-B5&B7/S-7-2	STAIR CASE DETAIL-02	GFC	A1
		PLUMBING DRAWINGS		
228	PLUMBING LAYOUT 1ST FLOOR PLAN-B1-B2	IIT_K/HOR15/B1,B2/PL-01	GFC	A1
229	PLUMBING LAYOUT 2ND/4TH FLOOR PLAN-B1-B2	IIT_K/HOR15/B1, B2/PL-02	GFC	A1
230	PLUMBING LAYOUT 3RD/5TH FLOOR PLAN-B1-B2	IIT_K/HOR15/B1, B2/PL-03	GFC	A1
231	PLUMBING LAYOUT SIXTH FLOOR PLAN - B1- B2	IIT_K/HOR15/B1, B2/PL-04	GFC	A1
232	PLUMBING LAYOUT TERRACE FLOOR PLAN-B1-B2	IIT_K/HOR15/B1, B2/PL-05	GFC	A1
233	PLUMBING LAYOUT 1ST FLOOR PLAN- B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-06	GFC	A1
234	PLUMBING LAYOUT 2ND/4TH FLOOR PLAN- B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-07	GFC	A1
235	PLUMBING LAYOUT 3RD/5TH FLOOR PLAN- B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-08	GFC	A1
236	PLUMBING LAYOUT SIXTH FLOOR PLAN B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-09	GFC	A1
237	PLUMBING LAYOUT TERRACE FLOOR PLAN B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-10	GFC	A1
238	TYPICAL TOILET 1ST FLOOR B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-11	GFC	A1
239	TYPICAL TOILET 2ND/4TH/6TH FLOOR B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-12	GFC	A1
240	TYPICAL TOILET 3RD/5TH FLOOR B3,B4,B6	IIT_K/HOR15/B3,B4,B6/PL-13	GFC	A1
241	PLUMBING LAYOUT 1ST FLOOR PLAN - B5,B7	IIT_K/HOR15/B5,B7/PL-14	GFC	A1
242	PLUMBING LAYOUT TYPICAL 2ND/4TH/6TH FLOOR B5,B7	IIT_K/HOR15/B5,B7/PL-15	GFC	A1
243	PLUMBING LAYOUT TYPICAL 3RD/5TH FLOOR PLAN - B5,B7	IIT_K/HOR15/B5,B7/PL-16	GFC	A1
244	PLUMBING LAYOUT TERRACE FLOOR PLAN- B5, B7	IIT_K/HOR15/B5,B7/PL-17	GFC	A1
245	TYPICAL TOILET 2ND TO 6TH FLOOR PLAN - B5,B7	IIT_K/HOR15/B5,B7/PL-18	GFC	A1
246	EXTERNAL DRAINAGE LAYOUT SITE LEVEL	IIT-K/HOR15/STILT-DR/PL-19A	GFC	A1
247	WATER SUPPLY LAYOUT SITE LEVEL	IIT-K/HOR15/STILT-WS/PL-19B	GFC	A1
248	RAIN WATER LAYOUT SITE LEVEL	IIT-K/HOR15/STILT-RW/PL-19C	GFC	A1
249	WATER SUPPLY SCHEMATIC B1 & B2	IIT_K/HOR15/SCH/B1,B2/PL-20	GFC	A1
250	WATER SUPPLY SCHEMATIC B3, B4 & B6	IIT_K/HOR15/SCH/B3,B4,B6/PL-21	GFC	A1
251	WATER SUPPLY SCHEMATIC B5 & B7	IIT_K/HOR15/SCH/B5,B7/PL-22	GFC	A1
252	OVER HEAD WATER TANK SLEEVE DETAIL	IIT_K/HOR15/OHT TANK/PL-23A	GFC	A1
253	UNDERGROUND WATER TANK SLEEVE DETAIL	IIT_K/HOR15/OHT TANK/PL-23B	GFC	A1
254	STILT FLOOR WATER SUPPLY & DRAINAGE LAYOUT -HOR 15 Site Level	IIT_K/HOR15/STILT -TOiiLETS/PL-19D	GFC	A1
		FIRE FIGHTING DRAWINGS		
255	FIRE FIGTING LAYOUT STILT FLOOR PLAN-ALL BLOCKS	IIT_K/HOR15/FF-01	GFC	A1
256	FIRE FIGTING LAYOUT TYPICAL FLOOR PLAN- B1- B2	IIT_K/HOR15/B1,B2/FF-02	GFC	A1
257	FIRE FIGTING LAYOUT SIXTH FLOOR PLAN- B1- B2	IIT_K/HOR15/B1,B2/FF-03	GFC	A1
258	FIRE FIGTING LAYOUT TERRACE FLOOR PLAN- B1- B2	IIT_K/HOR15/B1,B2/FF-04	GFC	A1
259	FIRE FIGTING LAYOUT TYPICAL FLOOR PLAN- B3- B4 & B6	IIT_K/HOR15/B3,B4,B6/FF-05	GFC	A1
260	FIRE FIGTING LAYOUT FIFTH FLOOR PLAN B3- B4 & B6	IIT_K/HOR15/B3,B4,B6/FF-06	GFC	A1
261	FIRE FIGTING LAYOUT SIXTH FLOOR PLAN B3- B4 & B6	IIT_K/HOR15/B3,B4,B6/FF-07	GFC	A1
262	FIRE FIGTING LAYOUT TERRACE FLOOR PLAN- B3- B4 & B6	IIT_K/HOR15/B3,B4,B6/FF-08	GFC	A1
263	FIRE FIGTING LAYOUT TYPICAL FLOOR PLAN- B5- B7	IIT_K/HOR15/B5,B7/FF-09	GFC	A1
264	FIRE FIGTING LAYOUT TERRACE FLOOR PLAN- B5- B7	IIT_K/HOR15/B5,B7/FF-10	GFC	A1
265	FIRE FIGHTING SCHEMATIC B1 & B2	IIT_K/HOR15/SCH/FF-11	GFC	A1
266	FIRE FIGHTING SCHEMATIC B3, B4 & B6	IIT_K/HOR15/SCH/FF-12	GFC	A1

267	FIRE FIGHTING SCHEMATIC B5 & B7	IIT_K/HOR15/SCH/FF-13	GFC	A1
		LANDSCAPE		
268	LANDSCAPE SITE PLAN	IIT K-TD-MP-01	GFC	A1
269	HARDSCAPE PLAN	IIT K-TD-MP-02	GFC	A1
270	LIGHTING PLAN	IIT K-TD-MP-03	GFC	A1
271	DETAILS	IIT K-TD-MP-04	GFC	A1
272	DETAILS	IIT K-TD-MP-05	GFC	A1
273	GATE DETAILS	IIT K-TD-MP-06	GFC	A1
		ELECTRICAL		
		LIGHTING LAYOUT		
274	ELECTRICAL LIGHTING LAYOUT B1 STILT FLOOR PLAN	IIT-K/HOR 15/B1/EL-L-100	GFC	A1
275	ELECTRICAL LIGHTING LAYOUT B1 FIRST FLOOR PLAN	IIT-K/HOR 15/B1/EL-L-101	GFC	A1
276	ELECTRICAL LIGHTING LAYOUT B1 B7 2ND,4TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B1/EL-L-102	GFC	A1
277	ELECTRICAL LIGHTING LAYOUT B1 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B1/EL-L-103	GFC	A1
278	ELECTRICAL LIGHTING LAYOUT B1 TERRACE PLAN	IIT-K/HOR 15/B1/EL-L-104	GFC	A1
279	ELECTRICAL LIGHTING LAYOUT B2 STILT FLOOR PLAN	IIT-K/HOR 15/B2/EL-L-100	GFC	A1
280	ELECTRICAL LIGHTING LAYOUT B2 FIRST FLOOR PLAN	IIT-K/HOR 15/B2/EL-L-101	GFC	A1
281	ELECTRICAL LIGHTING LAYOUT B2 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B2/EL-L-102	GFC	A1
282	ELECTRICAL LIGHTING LAYOUT B2 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B2/EL-L-103	GFC	A1
283	ELECTRICAL LIGHTING LAYOUT B2 TERRACE PLAN	IIT-K/HOR 15/B2/EL-L-104	GFC	A1
284	ELECTRICAL LIGHTING LAYOUT STILT FLOOR PLAN BLOCK-3	IIT-K/HOR 15/B3/EL-L-100	GFC	A1
285	ELECTRICAL LIGHTING LAYOUT B3 FIRST FLOOR PLAN	IIT-K/HOR 15/B3/EL-L-101	GFC	A1
286	ELECTRICAL LIGHTING LAYOUT B32ND,4TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B3/EL-L-102	GFC	A1
287	ELECTRICAL LIGHTING LAYOUT B3 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B3/EL-L-103	GFC	A1
288	ELECTRICAL LIGHTING LAYOUT B3 TERRACE PLAN	IIT-K/HOR 15/B3/EL-L-104	GFC	A1
289	ELECTRICAL LIGHTING LAYOUT STILT FLOOR PLAN BLOCK-4	IIT-K/HOR 15/B4/EL-L-100	GFC	A1
290	ELECTRICAL LIGHTING LAYOUT B4 FIRST FLOOR PLAN	IIT-K/HOR 15/B4/EL-L-101	GFC	A1
291	ELECTRICAL LIGHTING LAYOUT B4 2ND,4TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B4/EL-L-102	GFC	A1
292	ELECTRICAL LIGHTING LAYOUT B4 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B4/EL-L-103	GFC	A1
293	ELECTRICAL LIGHTING LAYOUT B4 TERRACE PLAN	IIT-K/HOR 15/B4/EL-L-104	GFC	A1
294	ELECTRICAL LIGHTING LAYOUT STILT FLOOR PLAN BLOCK-5	IIT-K/HOR 15/B5/EL-L-100	GFC	A1
295	ELECTRICAL LIGHTING LAYOUT B5 FIRST FLOOR PLAN	IIT-K/HOR 15/B5/EL-L-101	GFC	A1
296	ELECTRICAL LIGHTING LAYOUT B5 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B5/EL-L-102	GFC	A1
297	ELECTRICAL LIGHTING LAYOUT B5 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B5/EL-L-103	GFC	A1
298	ELECTRICAL LIGHTING LAYOUT B5 TERRACE PLAN	IIT-K/HOR 15/B5/EL-L-104	GFC	A1
299	ELECTRICAL LIGHTING LAYOUT STILT FLOOR PLAN BLOCK-6	IIT-K/HOR 15/B6/EL-L-100	GFC	A1
300	ELECTRICAL LIGHTING LAYOUT B6 FIRST FLOOR PLAN	IIT-K/HOR 15/B6/EL-L-101	GFC	A1
301	ELECTRICAL LIGHTING LAYOUT B6 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-L-102	GFC	A1
302	ELECTRICAL LIGHTING LAYOUT B6 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-L-103	GFC	A1
303	ELECTRICAL LIGHTING LAYOUT B6 TERRACE PLAN	IIT-K/HOR 15/B6/EL-L-104	GFC	A1
304	ELECTRICAL LIGHTING LAYOUT STILT FLOOR PLAN	IIT_K/HOR15/B7/EL-L-100	GFC	A1
305	ELECTRICAL LIGHTING LAYOUT B7 FIRST FLOOR PLAN	IIT_K/HOR15/B7/EL-L-101	GFC	A1
306	ELECTRICAL LIGHTING LAYOUT B7 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT_K/HOR15/B7/EL-L-102	GFC	A1
307	ELECTRICAL LIGHTING LAYOUT B7	IIT_K/HOR15/B7/EL-L-103	GFC	A1

	3RD & 5TH TYPICAL FLOOR PLAN			
308	ELECTRICAL LIGHTING LAYOUT B7 TERRACE PLAN	IIT_K/HOR15/B7/EL-L-104	GFC	A1
		POWER LAYOUT		
309	ELECTRICAL POWER LAYOUT B1 STILT FLOOR PLAN	IIT-K/HOR 15/B1/EL-P-100	GFC	A1
310	ELECTRICAL POWER LAYOUT B1 FIRST FLOOR PLAN	IIT-K/HOR 15/B1/EL-P-101	GFC	A1
311	ELECTRICAL POWER LAYOUT B1 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B1/EL-P-102	GFC	A1
312	ELECTRICAL POWER LAYOUT B1 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B1/EL-P-103	GFC	A1
313	ELECTRICAL POWER LAYOUT B2 STILT FLOOR PLAN	IIT-K/HOR 15/B2/EL-P-100	GFC	A1
314	ELECTRICAL POWER LAYOUT B2 FIRST FLOOR PLAN	IIT-K/HOR 15/B2/EL-P-101	GFC	A1
315	ELECTRICAL POWER LAYOUT B2 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B2/EL-P-102	GFC	A1
316	ELECTRICAL POWER LAYOUT B2 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B2/EL-P-103	GFC	A1
317	ELECTRICAL POWER LAYOUT STILT FLOOR PLAN BLOCK-3	IIT-K/HOR 15/B3/EL-P-100	GFC	A1
318	ELECTRICAL POWER LAYOUT B3 FIRST FLOOR PLAN	IIT-K/HOR 15/B3/EL-P-101	GFC	A1
319	ELECTRICAL POWER LAYOUT B3 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B3/EL-P-102	GFC	A1
320	ELECTRICAL POWER LAYOUT B3 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B3/EL-P-103	GFC	A1
321	ELECTRICAL POWER LAYOUT STILT FLOOR PLAN BLOCK-4	IIT-K/HOR 15/B4/EL-P-100	GFC	A1
322	ELECTRICAL POWER LAYOUT B4 FIRST FLOOR PLAN	IIT-K/HOR 15/B4/EL-P-101	GFC	A1
323	ELECTRICAL POWER LAYOUT B4 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B4/EL-P-102	GFC	A1
324	ELECTRICAL POWER LAYOUT B4 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B4/EL-P-103	GFC	A1
325	ELECTRICAL POWER LAYOUT B5 FIRST FLOOR PLAN	IIT-K/HOR 15/B6/EL-P-101	GFC	A1
326	ELECTRICAL POWER LAYOUT B5 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-P-102	GFC	A1
327	ELECTRICAL POWER LAYOUT B5 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-P-103	GFC	A1
328	ELECTRICAL POWER LAYOUT STILT FLOOR PLAN BLOCK-6	IIT-K/HOR 15/B6/EL-P-100	GFC	A1
329	ELECTRICAL POWER LAYOUT B6 FIRST FLOOR PLAN	IIT-K/HOR 15/B6/EL-P-101	GFC	A1
330	ELECTRICAL POWER LAYOUT B6 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-P-102	GFC	A1
331	ELECTRICAL POWER LAYOUT B6 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-P-103	GFC	A1
332	ELECTRICAL POWER LAYOUT STILT FLOOR PLAN	IIT_K/HOR15/B7/EL-P-100	GFC	A1
333	ELECTRICAL POWER LAYOUT B7 FIRST FLOOR PLAN	IIT_K/HOR15/B7/EL-P-101	GFC	A1
334	ELECTRICAL POWER LAYOUT B7 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT_K/HOR15/B7/EL-P-102	GFC	A1
335	ELECTRICAL POWER LAYOUT B7 3RD & 5TH TYPICAL FLOOR PLAN	IIT_K/HOR15/B7/EL-P-103	GFC	A1
		LV, CCTV& FIRE LAYOUT		
336	ELECTRICAL LV,CCTV & FIRE LAYOUT B1 STILT FLOOR PLAN	IIT-K/HOR 15/B1/EL-LV-100	GFC	A1
337	ELECTRICAL LV,CCTV & FIRE LAYOUT B1 FIRST FLOOR PLAN	IIT-K/HOR 15/B1/EL-LV-101	GFC	A1
338	ELECTRICAL LV,CCTV & FIRE LAYOUT B1 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B1/EL-LV-102	GFC	A1
339	ELECTRICAL LV,CCTV & FIRE LAYOUT B1 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B1/EL-LV-103	GFC	A1
340	ELECTRICAL LV,CCTV & FIRE LAYOUT B2 STILT FLOOR PLAN	IIT-K/HOR 15/B2/EL-LV-100	GFC	A1
341	ELECTRICAL LV,CCTV & FIRE LAYOUT B2 FIRST FLOOR PLAN	IIT-K/HOR 15/B2/EL-LV-101	GFC	A1
341	ELECTRICAL LV,CCTV & FIRE LAYOUT B2 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B2/EL-LV-102	GFC	A1
342	ELECTRICAL LV,CCTV & FIRE LAYOUT B2 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B2/EL-LV-103	GFC	A1
343	ELECTRICAL LV,CCTV & FIRE LAYOUT STILT FLOOR PLAN BLOCK-3	IIT-K/HOR 15/B3/EL-LV-100	GFC	A1
344	ELECTRICAL LV,CCTV & FIRE	IIT-K/HOR 15/B3/EL-LV-101	GFC	A1

	LAYOUT B3 FIRST FLOOR PLAN			
345	ELECTRICAL LV,CCTV & FIRE LAYOUT B3 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B3/EL-LV-102	GFC	A1
346	ELECTRICAL LV,CCTV & FIRE LAYOUT B3 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B3/EL-LV-103	GFC	A1
347	ELECTRICAL LV,CCTV & FIRE LAYOUT STILT FLOOR PLAN BLOCK-4	IIT-K/HOR 15/B4/EL-LV-100	GFC	A1
348	ELECTRICAL LV,CCTV & FIRE LAYOUT B4 FIRST FLOOR PLAN	IIT-K/HOR 15/B4/EL-LV-101	GFC	A1
349	ELECTRICAL LV,CCTV & FIRE LAYOUT B4 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B4/EL-LV-102	GFC	A1
350	ELECTRICAL LV,CCTV & FIRE LAYOUT B4 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B4/EL-LV-103	GFC	A1
351	ELECTRICAL LV,CCTV & FIRE LAYOUT B5 STILT FLOOR PLAN	IIT-K/HOR 15/B5/EL-LV-100	GFC	A1
352	ELECTRICAL LV,CCTV & FIRE LAYOUT B5 FIRST FLOOR PLAN	IIT-K/HOR 15/B5/EL-LV-101	GFC	A1
353	ELECTRICAL LV,CCTV & FIRE LAYOUT B5 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B5/EL-LV-102	GFC	A1
354	ELECTRICAL LV,CCTV & FIRE LAYOUT B5 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B5/EL-LV-103	GFC	A1
355	ELECTRICAL LV,CCTV & FIRE LAYOUT STILT FLOOR PLAN BLOCK-6	IIT-K/HOR 15/B6/EL-LV-100	GFC	A1
356	ELECTRICAL LV,CCTV & FIRE LAYOUT B6 FIRST FLOOR PLAN	IIT-K/HOR 15/B6/EL-LV-101	GFC	A1
357	ELECTRICAL LV,CCTV & FIRE LAYOUT B6 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-LV-102	GFC	A1
358	ELECTRICAL LV,CCTV & FIRE LAYOUT B6 3RD & 5TH TYPICAL FLOOR PLAN	IIT-K/HOR 15/B6/EL-LV-103	GFC	A1
359	ELECTRICAL LV,CCTV & FIRE LAYOUT B7 STILT FLOOR PLAN	IIT_K/HOR15/B7/EL-LV-100	GFC	A1
360	ELECTRICAL LV,CCTV & FIRE LAYOUT B7 FIRST FLOOR PLAN	IIT_K/HOR15/B7/EL-LV-101	GFC	A1
361	ELECTRICAL LV,CCTV & FIRE LAYOUT B7 B7 2ND,4TH & 6THTYPICAL FLOOR PLAN	IIT_K/HOR15/B7/EL-LV-102	GFC	A1
362	ELECTRICAL LV,CCTV & FIRE LAYOUT B7 B7 3RD & 5TH TYPICAL FLOOR PLAN	IIT_K/HOR15/B7/EL-LV-103	GFC	A1
		HVAC DRAWINGS		
363	HVAC LAYOUT SITE PLAN	IIT-K/HOR 15/B1 & B2 - HVAC -02	GFC	A1
364	HVAC LAYOUT STILT FLOOR PLAN - B1- B2	IIT-K/HOR 15/B1 & B2 - HVAC -01	GFC	A1
365	HVAC LAYOUT FIRST FLOOR PLAN - B1- B2	IIT-K/HOR 15/B1 & B2 - HVAC -02	GFC	A1
366	HVAC LAYOUT SECOND FLOOR PLAN - B1- B3	IIT-K/HOR 15/B1 & B2 - HVAC -03	GFC	A1
367	HVAC LAYOUT THIRD FLOOR PLAN - B1- B4	IIT-K/HOR 15/B1 & B2 - HVAC -04	GFC	A1
368	HVAC LAYOUT FOURTH FLOOR PLAN - B1- B5	IIT-K/HOR 15/B1 & B2 - HVAC -05	GFC	A1
369	HVAC LAYOUT FIFTH FLOOR PLAN - B1- B6	IIT-K/HOR 15/B1 & B2 - HVAC -06	GFC	A1
370	HVAC LAYOUT SIXTH FLOOR PLAN - B1- B7	IIT-K/HOR 15/B1 & B2 - HVAC -07	GFC	A1
371	CHILLED WATER SCHEMATIC - B 1	IIT-K/HOR 15/B1- SCH/HVAC -08	GFC	A1
372	CHILLED WATER SCHEMATIC - B 2	IIT-K/HOR 15/B1- SCH/HVAC -09	GFC	A1
373	HVAC LAYOUT STILT FLOOR PLAN - B3, B4 AND B6	IIT-K/HOR 15/B3, B4,B6 - HVAC -01	GFC	A1
374	HVAC LAYOUT FIRST FLOOR PLAN - B3, B4 AND B6	IIT-K/HOR 15/B3, B4,B6 - HVAC -02	GFC	A1
375	HVAC LAYOUT SECOND FLOOR PLAN - B3, B4 AND B6	IIT-K/HOR 15/B3, B4,B6 - HVAC -03	GFC	A1
376	HVAC LAYOUT THIRD FLOOR PLAN - B3, B4 AND B6	IIT-K/HOR 15/B3, B4,B6 - HVAC -04	GFC	A1
377	HVAC LAYOUT FOURTH FLOOR PLAN - B3, B4 AND B6	IIT-K/HOR 15/B3, B4,B6 - HVAC -05	GFC	A1
378	HVAC LAYOUT FIFTH FLOOR PLAN - B3, B4 AND B6	IIT-K/HOR 15/B3, B4,B6 - HVAC -06	GFC	A1
379	HVAC LAYOUT SIXTH FLOOR PLAN - B3, B4 AND B6	IIT-K/HOR 15/B3, B4,B6 - HVAC -07	GFC	A1
380	CHILLED WATER SCHEMATIC - B 6	IIT-K/HOR 15/B1- SCH/HVAC -08	GFC	A1
381	CHILLED WATER SCHEMATIC - B 4	IIT-K/HOR 15/B1- SCH/HVAC -09	GFC	A1
382	CHILLED WATER SCHEMATIC - B 3	IIT-K/HOR 15/B1- SCH/HVAC -10	GFC	A1
383	HVAC LAYOUT STILT FLOOR PLAN -	IIT-K/HOR 15/B5,B7 - HVAC -01	GFC	A1

	B5 AND B7			
384	HVAC LAYOUT FIRST FLOOR PLAN - B5 AND B7	IIT-K/HOR 15/B5,B7 - HVAC -02	GFC	A1
385	HVAC LAYOUT SECOND FLOOR PLAN - B5 AND B7	IIT-K/HOR 15/B5,B7 - HVAC -03	GFC	A1
386	HVAC LAYOUT THIRD FLOOR PLAN - B5 AND B7	IIT-K/HOR 15/B5,B7 - HVAC -04	GFC	A1
387	HVAC LAYOUT FOURTH FLOOR PLAN - B5 AND B7	IIT-K/HOR 15/B5,B7 - HVAC -05	GFC	A1
388	HVAC LAYOUT FIFTH FLOOR PLAN - B5 AND B7	IIT-K/HOR 15/B5,B7 - HVAC -06	GFC	A1
389	HVAC LAYOUT SIXTH FLOOR PLAN - B5 AND B7	IIT-K/HOR 15/B5,B7 - HVAC -07	GFC	A1
390	CHILLED WATER SCHEMATIC - B 5	IIT-K/HOR 15/ B5,B7- SCH/HVAC-08	GFC	A1
391	CHILLED WATER SCHEMATIC - B 7	IIT-K/HOR 15/ B5,B7- SCH/HVAC-09	GFC	A1
COORDINATED MEP PLAN				
	BLOCK B1 & B2			
392	STILT PLAN	3100_IIT_K/AR_B1&B2/PL-130	GFC	A1
393	FIRST FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-131	GFC	A1
394	SECOND FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-132	GFC	A1
395	THIRD FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-133	GFC	A1
396	FOURTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-134	GFC	A1
397	FIFTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-135	GFC	A1
398	SIXTH FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-136	GFC	A1
399	TERRACE FLOOR PLAN	3100_IIT_K/AR_B1&B2/PL-137	GFC	A1
400	MUMTY PLAN	3100_IIT_K/AR_B1&B2/PL-138	GFC	A1
	BLOCK B3,B4,B6			
401	STILT PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-130	GFC	A1
402	FIRST FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-131	GFC	A1
403	SECOND FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-132	GFC	A1
404	THIRD FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-133	GFC	A1
405	FOURTH FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-134	GFC	A1
406	FIFTH FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-135	GFC	A1
407	SIXTH FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-136	GFC	A1
408	TERRACE FLOOR PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-137	GFC	A1
409	MUMTY PLAN	3100_IIT_K/AR_B3,B4,&B6/PL-138	GFC	A1
	BLOCK B5.B7			
410	STILT PLAN	3100_IIT_K/AR_B5&B7/PL-130	GFC	A1
411	FIRST FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-131	GFC	A1
412	SECOND FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-132	GFC	A1
413	THIRD FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-133	GFC	A1
414	FOURTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-134	GFC	A1
415	FIFTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-135	GFC	A1
416	SIXTH FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-136	GFC	A1
417	TERRACE FLOOR PLAN	3100_IIT_K/AR_B5&B7/PL-137	GFC	A1
418	MUMTY PLAN	3100_IIT_K/AR_B5&B7/PL-138	GFC	A1
419	SITE CORDINATION	3100_IIT_K/AR_B1-B7/PL-130	GFC	A1
420	TYPICAL SECTIONS FOR CORDINATION	3100_IIT_K/AR_B1-B7/PL-130	GFC	A1

Soil Testing Report

https://drive.google.com/drive/folders/14-rJyZCRfaLZu8h5KycNaL5_4cUaPZG2?usp=sharing

VOLUME – II

PART – C-I
ELECTICAL COMPONENTS

PART C-1

IEI WORKS, FIRE DETECTION & ALARM SYSTEM,AND LIFTS

Eligibility criteria for associate contractor (SH: SITC of IEI Works)

Name of work:- C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

Eligibility condition for Associate agency for work of SITC of IEI Works.

a. The associate agency having valid electrical license.

b. The associate agency should have successfully completed works, as mentioned under during last 7 years ending previous day of last date of submission of tender.

(i) Three similar works each of value not less than Rs. 4398 lakhs

OR

(ii) Two similar works each of value not less than Rs. 6597 lakhs

OR

(iii) One similar work each of value not less than Rs. 8797 lakhs

Similar works means SITC of IEI Works.

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

2. The Composite category contractor shall also be eligible to carry out himself the work without associating any specialized agency provided:
He fulfills the prescribed eligibility criteria respectively for this work. or
He directly procures the equipment of approved make from manufacturer and gets it installed from authorized agency/service provider of the manufacturer or specialized agency as per criteria mentioned in the tender document.

3. The main contractor/agency has to submit detail of such associate agency to Engineer-in-charge (of SITC of SITC of IEI Works.) within one month from date of start of work. The associate agency shall be approved by Engineer-in-charge (SITC of IEI Works.) after the receipt of the details as mentioned in serial no. 4 below. 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 (SITC of IEI Works.). 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 main contractor to change the agency executing such items of work and this shall be binding on the contractor.

4. Associate Agency shall enclose self attested copies of the following documents.

a. The contractor should be registered in any department of CPWD, BSNL, MES, PWD, Railways, Central PSUs/ State PSUs in the appropriate class.

b. Valid Electrical License in appropriate class.

c. The firm should be registered with GST and shall submit the copies of upto date GST filed return.

d. Self attested copies of completion certificate(s) issued by the officer of the client department, not below the rank of Executive Engineer or equivalent, for works executed in Government and in

cases of private works certificates signed by the Consultant / Engineer/ Architect In charge and counter-signed by the owner of the building for whom the work has been carried out, will have to be furnished along with the application. The completion certificate must have the following details:-

I. Stipulated date of start and actual date of completion.
II. Attested copy of the final bill with matching 26AS downloaded from website (TDS) for accessing the Value of & SITC of IEI Works.
III. That the work has been completed satisfactorily.
IV. Full address of the client, officer issuing certificate and location, where work is executed.

MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN

1] M/S [Name of the firm with full address]
Enlistment Status
Valid Upto:
[Henceforth called the main contractor]

And

2] M/S [Name of the firm with full address]
Enlistment Status
Valid Up to:
[Henceforth, called Associated Contractor]

Name of Work : - C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)
[Electrical component only] as per schedule, specifications, terms and conditions of the tender.

We state that M.O.U. between us will be treated as an agreement and has legality as per Indian Contract Act (amended up to date) and the department (IWD) can enforce all the terms and conditions of the agreement for execution of the above work. Both of us shall be responsible for the execution of work as per the agreement to the extent of this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits.
We have agreed as under :

1- The associated contractor shall be liable for disciplinary action if he fails to discharge the action(s) and other legal action as per agreement besides forfeiture of the security deposit.
2- All the material, machinery and equipments, tools and tackles required for execution of the electrical works. As per agreement shall be the responsibility of the associated contractor.
3- The site staff required for the electrical work shall be arranged by the associated contractor as per terms and conditions of the agreement.

SIGNATURE OF MAIN CONTRACTOR	SIGNATURE OF ASSOCIATED CONTRACTOR
Date :	**Date:**
Place:	**Place:**

COUNTERSIGNED
EXECUTIVE ENGINEER (E)

WILLINGNESS CERTIFICATE

Name of Work: C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

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 employee full time technically qualified supervisor for the works. I will attend inspection of officers of the department as and when required.

"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 IWD contracts in future forever."

"I have also read the complete tender conditions and I am aware that PART-A of this tender document is applicable to me also"

Date: **Signature of Contractor**

PROFORMA OF SCHEDULES

(SH:- SITC of IEI Works)

SCHEDULE 'A' SITC of IEI Works

Schedule of Quantities (as per PWD-3)As per separate sheet attached for Electrical Items of Work.

SCHEDULE 'B' Schedule of materials to be issued to the contractor:

S. No.	Description of item	Quantity	Rates in figures & words at which the material will be charged to the contractor	Place of issue
1	2	3	4	5
---------- NIL ----------				

SCHEDULE 'C' Tools and plants to be hired to the contractor

S. No.	Description	Hire charges per day	Place of issue
1	2	3	4
---------- NIL ----------			

SCHEDULE 'D'

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

SCHEDULE 'E'

Reference to General Conditions of contract – As per PART-A.

Name of Work: C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

Estimated cost of work: Electrical Items of Work Rs. 10,99,63,127/-

i) Earnest money: Included in Civil component

ii) Performance Guarantee: Included in Civil component

iii) Security deposit: As per major component

GENERAL RULES & DIRECTIONS :

Officer inviting tender: As per PART-A.

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 — **As per major component**

SCHEDULE 'F'

Definitions:

2(v)	Engineer-in –Charge	Executive Engineer, Elect. Division IWD, IIT Kanpur or successor thereof.
2(vii)	Accepting Authority	As per Major Component.
2(x)	Percentage on cost of materials and labour to cover all overheads and profits	15%
2(xi)	Standard Schedule of Rates:	
	Electrical Items of Work:	PAR-2019, Schedule of rates – 2018 & MR
2(xii)	Department:	Institute Works Department
9(ii)	Standard IWD contract Form:	As per Major Component.

Clause 1	Time allowed for submission of Performance Guarantee, Programme Chart (Time and Progress)	As per Major Component.
	Maximum allowable extension with late fee @ 0.1% per day of Performance Guarantee amount beyond the period provided in (i) above	As per Major Component.
Clause 2	Authority for fixing Compensation under Clause-2	As per Major Component.

	Time allowed for execution of work	As per Major Component.
	Authority to decide: Extension of time	As per Major Component.
	ii) Rescheduling of mile stones	As per Major Component.
Clause 6, 6A	Clause applicable	6A
Clause 7	Gross work to be done together with net payment/Adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment	As per Payment Schedule

Clause 5	Number of days from the date of issue of letter of acceptance for reckoning date of start	As per Major Component.

Clause 7A	**Whether Clause 7A shall be applicable**	**Yes**
Clause 10A	**List of testing equipments to be provided by the contractor at site lab.**	**As per Annexure-1 (SITC of IEI Works)**
Clause 10 B (ii)	**Whether clause 10-B (ii) shall be applicable.**	**NO**
Clause 10 C		**NO**

Clause 10 CA

Clause 10CA	**Nearest Materials (other than cement,**	**Base Price of all the materials covered under clause 10CA :**
Materials Covered under this clause :	**Reinforcement bars and Structural Steel) for which All India Wholesale Price Index to be followed:**	
	NIL	

Clause 10 CC	**Clause 10CC to be applicable in contracts with stipulated period of completion exceeding the period shown in next column**	**Applicable**
	Schedule of component of other Material, labour, POL etc. for price escalation.	
(i)	**Component of Electrical construction Material expressed as percent of total value of component work:**	**Xm…75%**
(ii)	**Component of Lobour: expressed as percent of total value of component work.**	
	NOTE:-Payment under this clause is admissible when contractor submits proof of having paid wages due to every worker through bank or ECS or online transfer to his bank account.	**Y…25%**
(iii)	**Component of P.O.L.:- expressed as percent of total value of component work.**	**Z……NIL….%**

Clause 11

Specification to be followed for execution of work:

For Electrical Items of Work: } **IWD's General Specification for Electrical Works Part-I (Internal)-2013, Part-II (External)-1994, CPWD general specification for heating, Ventilation, & air-conditioning works (HVAC)2017 with correction slips Uptolast date of receipt of tender. (Hereinafter called CPWD specifications also) and NBC 2016.**

Clause 12

Type of work	**Original work**

12.2	Extra/Substituted Item	Applicable

Clause 16 Competent Authority for Deciding reduced rates:

For Electrical Items of Work : EE , IWD, Kanpur or successor thereof.

Clause 17 Defect liability period 36 months from the date of handling over of the complete work.

Clause 18 List of mandatory machinery, tools V. plants to be deployed by the contractor at site. As per Annexure-1 (SITC of IEI Works)

Clause 25

Clause 32 Constitution of Dispute Redressal Committee (DRC)- Same as per Major component

Requirement of Technical Representative(s) and recovery Rate(For this component of sub work only) . The requirement mentioned here is over and above the requirement detailed in part-A

Sl No	Requirement of Technical staff (of this subwork)		Minimum experience in Year	Designation	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 32	
	Qualification	Number			Figures	Words
1	Graduate Engineer or Diploma Engineer	1 (E&M Engineer)	2 (in case of degree In Electrical Engg) Or 5 (in case Of diploma in electrical Engg.)	Project/ Site Engineer	2. Rs. 40,000/-	Rupees Forty Thousand only per month per person

Assistant Engineers retired from Government services who are holding Diploma will be treated at par with Graduate Engineers.	**N.A.** **N.A.**
Clause 38	**N.A.**
6. a) Schedule/ statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates 2013 printed by CPWD	**Nil** **N.A.**
ii) Variations permissible on theoretical quantities	
7. Cement for works with estimated cost put to tender not more than Rs. 5 lakhs.	
For works with estimated cost put to Tender is more than Rs. 5 lakhs	
8. Bitumen all works	
9. All other materials	

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

Sl No	Description of items	Rates in figures and words at which recovery shall be made from the contractor	
		Excess beyond permissible variation	Less use beyond the permissible variation
NIL			

Annexure-1 (Internal Electrical Installation works)

Clause- 10 –A & 18

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

1. Steel/Aluminium Ladder 1.5 m to 8 m.	2 Nos.
2. Chase cutting machines.	2 Nos.
3. Electrical wire drawing equipment.	2 Set.
4. Torque wrench for nut/bolt/screws.	2 Nos.
5. Conduit die set.	2 Set.
6. Pipe vice.	1 No.
7. Bench vice.	1 No.
8. L.T.Meggar 500/1000 volts.	1 No.
9. Tong Tester.	1 No.
10. Multimeter.	1 No.
11. Hydraulically operated & hand operated crimping machine.	1 No.
12. Earth tester.	1 No.
13. Portable Ordinary drilling machine.	2 Nos.
14. Portable Hammer drilling machine.	2 Nos.
15. Overhead conduit puller.	1 No.
16. welding machine	1 No
17. Metal Grinding machine (Hand held)	1 No
18. Drill machine	1 No

Additional conditions for Internal Electrical Installation works for C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

1. Specification :- The work shall be executed as per CPWD General Specifications for Electrical Works Part I Internal – 2013 & Part II – External 1994, CPWD General Specifications for Electrical Works Part IV Sub Station – 2013 with correction slips upto last date of receipt of tender (Hereinafter called CPWD specifications also), Indian Standards amended upto last date of receipt of tenders, NBC 2016, IE Rules, and as per direction of Engineer-in-Charge. However, if the specification detailed herein is not manufactured, the standard practice for reputed manufacturers shall be adopted.
2. Test Certificate :- Test certificate for the work carried out shall also be submitted.
3. The makes of material have been indicated in the list of acceptable makes. No other make will be acceptable. The contractor shall have to prove bonafides of the make of materials by producing necessary documentary evidence. The material to be used in the work shall be got approved from the Engineer-in-Charge before use at site. The Engineer-in-Charge shall reserve the right to instruct the contractor to remove the rejected material and material which, in his opinion, is not as per specifications.
4. Contractor shall preserve the copies of invoices, test certificates, gate passes etc.
5. Materials, equipments, manufacturing process, documents etc for the work may be inspected by the departmental officers/Engineers at various stages (manufacturing, assembling, storage/ godown, transportation, etc) to ensure proper quality of the material. However the final responsibility of quality shall rest with the contractor. All the test reports shall be submitted before the dispatch of equipment. If desired by the engineer-in-charge, inspection at factory or at godown of the manufacturer, as required, shall be arranged by the firm for a mutually agreed date.
6. Agency will be required to procure all materials directly from the manufacturer/ authorized dealers / distributers to ensure genuineness & quality and as per the approved makes only. Proof in this regard shall be submitted by the contractor by the department.
7. No inspection outside the country is permissible. If required so, the same will be deemed to be waived off and necessary test reports shall be submitted before the dispatch of equipment. The contractor shall be fully responsible for such items of materials.
8. Works to be done by the contractor:- Complete work including testing and commissioning etc. as per drawings and additional technical specification for IEI works and ancillary works related to make the item functional and as per manufacturer specification and related document.
9. Structural Alterations to Buildings:-

4. No structural member in the building shall be damaged/ altered, without prior approval from the competent authority through the Engineer-in-charge.
5. Structural provisions like openings, cutouts, if any, provided by the department for the work, shall be used. Where these required modifications or fresh provisions are required to be made, such contingent works shall be carried out by the contractor at his cost after written approval of the Engineer In charge.

c. All such openings in floors provided by the department shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.

e. Drawings:-

a) After award of the work, the contractor will be required to submit the design and shop/execution drawings for the proposed work including layout plan, conduit routes etc. Work will be carried out as per the approved shop/execution drawings.

b) All circuits shall be indicated and numbered in the lay out plan with mentioning their respective distribution board and circuit number from which they are electrically connected.

c) Position of all points with their control switch boards indicating their number shall be marked in wiring lay out plan.

d) All the electrical panel boards, distribution boards duly numbered shall be marked in wiring lay out plan.

e) For fabricated equipments, the contractor will first submit dimensional detailed G.A. drawings for approval before fabrication is taken up in the factory.

f. Defect Liability:- The defect liability period for the work is 36 months from the date of completion of the building. Following conditions are elaborated as follows.

a) Repair/replacement of defective wire cables, switches, sockets, ACB'S, MCB'S, MCCB'S, contactor, relay, meters, batteries, earth pits, etc. within 48 Hrs on receipt of complaint from operational staff.

b) Replacement of items against any manufacturing defects noticed during defect liability period.

g. The bidder shall submit the five year onsite replacement warranty of defective LED luminaries from OEM.

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

i. Workmanship:-

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

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

15. Main Board and Main Distribution Board:- The design and GA drawings of all Main/Distribution panels shall be prepared by panels manufacture and got approved by Engineer in-charge before fabrication. The panels shall be fabricated according to approved GA drawings/ details. Factory inspection

of panels of engineer in-charge shall be planned before dispatch at site. All main panels/Distribution panels shall be provided with MCCB of appropriate capacity as per single line diagram The panels shall be fabricated according to the drawings / details are as approved by the Engineer-in-Charge. All termination of electrical cables in panel / feeder pillars DB's, cable-looping box etc. shall have to be done with proper thimbles / lugs using crimping process. Copper thimbles / reducer shall be used for copper cable, GI earth wire, aluminum thimbles/reducer for aluminum cable and nothing extra will be paid for the same. All multi-stranded/stranded copper wires shall be terminated through copper lugs.

16. All panels, DB's, cable-looping boxes will be numbered and marked with paint / name plate and nothing extra will be payable on this amount.

j. "Modular Switch, Socket, plate, box, Computer outlet, Telephone outlet, accessories" shall be of the same make in one board. The contractor shall have to make the edges around the boxes wherever required shall have to be made by the contractor for which nothing extra shall be paid.

k. All items of interrelated works considered necessary to make the installation complete and operative are deemed to be included shall be provided by the contractor at no extra cost.

l. Wherever ceiling roses are not required to be provided in the light/fan/exhaust fan points, due to site conditions, the contractor shall use suitable three pin connectors for which nothing extra shall be paid.

m. Contractor shall provide polythene / PVC plastic cover for all MDB's/SDB's/DB's, panels, feeder pillars etc. to protect them from rust /damages, during execution of work till the work is actually completed and handed over to the department.

n. The MCB and MCCB should be of the same make as that of DB in all DBs items.

o. 36 months onsite warranty shall be provided to all items except the items of LED fittings and fixtures. For the LED lighting fixtures 60 months onsite replacement warranty shall be provided. Such replacement shall be done within a reasonable period, failing which suitable penalty will be imposed as detailed in part-A of the tender documents.

ADDITIONAL TECHNICAL SPECIFICATION FOR INTERNEL ELECTRICAL INSTALATION WORKES FOR C/o of Hall of Residence for Boys No. 15, consisting 3 Blocks of (Stilt + Five) storied & 4 Blocks of (Stilt + Six) storied including Internal & External Electrification Works, Plumbing, Fire Fighting, Fire Alarm System, Lifts, Water tanks, Landscape, Roads, etc. at IIT Kanpur (U.P.)

1. SCOPE OF WORK

1.1 The general character and the scope of work to be carried out under the contract are illustrated in Drawings. The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the Engineer In charge. The contractor shall furnish all labour, materials and equipment to complete the work as per additional condition for IEI works, drawings and specifications enclosed. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings/Documents as being furnished or installed, but which are necessary and customary to be performed under this contract.

Complete building to be designed but execution shall be done only in finished areas of ground floor and complete area in first floor of building as shown in shaded areas of drawings. In Unfinished areas in the building the contractor will not provide wrings, Light fixtures, fans, power point outlets and final MCB distribution boards.

The brief of the works to be executed by the contractor and the system shall include:

a) Wiring for Normal electric supply & Emergency supply shall be done in metallic steel rigid conduit / Cable tray/ O. H. Raceway system as per drawings.
b) Switches, plug sockets, cover plates and other wiring accessories.
c) Non designed verified CPRI approved Main L.T. panel, Non metered Sub distribution board panel 1 & 2 and UPS output panel 1 & 2 at ground floor, Metered Main distribution panels on each floor and final MCB distribution boards only at ground and first floor as per SLD and DB detail and plan layout drawings.
d) Cables from Main L.T. Panel to all respective floor Metering main distribution panels/ Common areas sub distribution panels on cable trays / surface including installation, cable trays, hangers, supports, cable terminations i/c all fixing accessories.
e) Finishing of available RCC floor level below and around the floor mounted Metered Main L.T. panel, Non metered Sub distribution board panels and UPS output panels suitable to their installation and operation.
f) Cables/Sub main from Metering main distribution panels boards / Common areas sub distribution panel boards to final DBs in ground and first floors on cable trays / surface including installation, cable trays, hangers, supports, cable terminations and i/c fixing accessories
g) Earthling (Grounding) System and Lightning Protection System as per NBC-2016.
h) Cable connections from substations panel to main Building panel and UPS shall not be in scope.
i) LED Lighting Fixtures, Fans and power point outlets in finished areas of ground floor and complete area in first floor of building as shown in shaded areas of drawings .

1.2 RELATED DOCUMENTS

More particularly following documents should be strictly followed.

1. All Drawings.
2. Additional conditions and additional technical specification for IEI works in this tender.

3. CPWD General Specification for Electrical work Part-1 Internal (2013)
4. CPWD General Specification for Electrical work Part-2 External (1994)
5. Relevant Bureau of Indian Standard codes as more particularly stated herein and broadly to all the codes, status and regulations as applicable shall be strictly enforced and adhered to. Manufactures specification
6. National Building Code – 2016
7. National Electrical Code – 2008
8. Indian Electricity Act 2003
9. The Electricity Rule 1956

2. SUB MAINS AND POINT WIRING

2.1 Scope

The scope of this section comprises the supply, installation, testing and commissioning of following as per drawings:

1. Wiring for power and UPS outlets, heavy duty sockets/industrial sockets.
2. Wiring from distribution boards to different switchboards and from there onwards to individual points like light points, Bell Buzzers, Fan points and small exhaust fan points etc for all internal areas.
3. Switchboards, power plugs and its accessories like gang box, front plate, switch etc.
4. Wires and its accessories like conduits, Outlet boxes, junction boxes, pull-through boxes etc.
5. Ceiling rose, Connectors etc. for light points, Fan points, small exhaust fan points etc for all internal areas.
6. Conduit/channel as the case may be, accessories for the same and wiring cables between the switch box and the point outlet, loop protective earthing of each fan/ light fixture.
7. All fixing accessories such as clips, screws, raw plug etc. as required.
8. Metal switch boxes (as specified) for control switches, regulators, sockets etc, recessed or surface type, and phenolic laminated sheet covers over the same.
9. Control switch or MCB, as specified in drawings.
10. Connections to ceiling rose, connector, socket outlet, switch etc.
11. Flexible conduits from ceiling junction box to the fittings shall be provided duly coupled at both ends where false ceiling is coming. This shall be included within the scope of point wiring.)
12. Interconnecting wiring between switches within the switch box on the same circuit.
13. For any other Items drawings shall be refer.

2.2 Specifications

2.2.1 Wires:

The wires shall be PVC Insulated Copper Conductor multi strained FRLS confirming to IS: 694 and amendment up to date.

a. Wires for all electric supply for light/Fan circuit wiring and point wiring (along with internal loop earthing) shall be of as per CPWD Specification.

b. Wires from DB to 6A Socket outlet (along with internal loop earthing) shall be of 2.5 sq.mm size.

c. Wires from DB to 6/16A Socket outlet (along with internal loop earthing) shall be as per CPWD Specification.

d. Wires from DB to socket outlets more than 1 KW, Split AC, Geyser, Industrial sockets and Sheet steel MCB/MCCB box shall be as per drawings.

2.2.2 Thimbles/lugs:

The wires shall be terminated with the help of crimping lugs at both the terminals. The lugs shall be suitable for 1100V and the min temperature rating for these lugs shall be 150 degree Celsius. The lugs shall be pin/Hole type with pin designed in such a fashion to prevent damage to the wire from over tightening and ensure a reliable electrical connection. If Aluminum cable is used, aluminum lugs shall be used, for copper cables, copper lugs shall be used and if cable termination is of aluminum conductor and main bus bar is copper than tinned copper or bi-metallic lugs shall be used.

2.2.3 Metallic conduits, Fittings and accessories:

Wiring for Light/ Fan/Call Bell/Exhaust Fan point and circuit wiring and power wiring shall be done in Metallic rigid steel conduit confirming to IS 9537 with conduit fittings confirming to IS 14768 and conduit accessories confirming to IS 3837 amendment up to date.

2.2.4 Modular GI Box:

The switch box for mounting modular switches and sockets shall be made out from pre galvanized sheet. The modular GI box having wall thickness not less than 1.2mm for boxes up to size of 20 cm X 30 cm and above this size of 1.6 mm thick shall be used.

2.2.5 Modular Base and cover plate:

The front plate shall have smooth surface from both the side and shall be properly matching the fixing alignment. Perfect alignment shall be maintained while fixing of the back boxes. The color shall be as per the engineer in-charge.

2.2.6 Switch - Socket Outlets:

The switch sockets shall be modular type of reputed make mentioned in preferred approved make list.

2.2.7 Blanking Plate:

Spare space in modular switch box shall be covered by blanking plate.

2.2.8 Electronic fan regulator:

Step Type two module modular Electronic regulators should be used.

3. DISTRIBUTION BOARD:

3.1 The distribution board shall be made out of CRCA sheet steel with powder coated double metallic door with minimum IP: 42 protection compliance to IS: 8623-1 and 3 and IEC 61439-1 & 3 and amendment up to the last date of receipt of tendor.

4. CABLES TRAYS AND

RACEWAYS: 4.1 CABLE TRAY

Cable tray system shall comprise of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from

the ceiling with M.S. suspenders including bolts& nuts, painting suspenders including bends, Tee joints, Cross member and reducers etc as required.

4.2 RACEWAY

1. Material Pre galvanized sheet raceway trunking system with openable cover confirming to EN 50 085 - 2 – 2 shall be used.

2. Metal raceways combines with Junction Boxes, back Boxes for wiring devices, fixing and coupler accessories shall be of same manufacture of raceway selected.
3. Standard Thickness: 1.5mm for Body and Cover / 1 mm for divider.

4. LIGHTNING PROTECTION AND EARTHING SYSTEM:

The buildings specified are to be provided Class-II mesh type lightning protection system with Type-B Earthing protection confirming to national building code 2016, Part-8, Section-2. In case NBC does not elaborate a particular parameter, IEC-62305 may be referred.

5. LED LIGHTING FIXTURES:

The contractor shall submit LM 79 report of the LED Luminaries & LM 80 report from LED manufacture before fixture supplied at site. The make of LED used shall be CGL/Philips/Havells/ Wipro / Decon.

All lighting fixtures shall comply the following specifications.

Lumens ≥ certain value as specified in drawings.
Efficacy ≥ 100 for indoor lighting fixtures and > 120 for highway and outdoor luminaries.
CRI ≥ 80 for indoor lighting and 70 for external lighting.
Power Factor ≥ 0.95
THD ≤ 10 %
Surge Protection 2.50KV for indoor and 5 KV for outdoor lighting fixtures.
Operating voltage 150-270 volt.
Useful life of LED's 50000 hours @ L70.

7. MAIN LT Panels/DISTRIBUTION PANELS:

Distribution Panels and Final Distribution Boards shall be covered under this section. Panels/Boards shall be suitable for operation on 3 Phase 4 wire system 415 volts/single phase 2 wire system 240 volts, 50 cycles, with neutral grounded at transformer. All Distribution panels shall be CPRI tested design and manufactured by an approved manufacturer. Distribution panels shall comply with the latest Relevant Indian Standards, National building code-2016 and Electricity Rules and Regulations and general construction as per IS-8623-1993 as amended up to date and degree of protection shall be IP 42 as per 13947 Part- I.

7.1 Construction Features:

Distribution panels shall be fabricated out and shall be with hinged doors and folded covers, Neoprene gasket, padlocking arrangement and bolted back. All removable/ hinged doors and

covers shall be grounded by flexible standard connectors. Distribution panel shall be suitable for the climatic conditions as specified in Special Conditions. Joints of any kind in sheet

metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of Distribution panels. Distribution panels shall be of adequate size with a provision of spare switchgear as indicated on the Single Line Diagram. Knockout holes of appropriate size and number shall be provided in the Distribution panels in conformity with the location of cable/conduit connections. Removable sheet steel plates shall be provided at the top to make holes for additional cable entry at site if required.

Every cabinet shall be provided with Trifoliate or engraved metal name plates. All panels shall be provided with circuit diagram engraved on PVC sheet.

7.1.1 Bus Bar Connections:

Bus bar and interconnections shall be of high conductivity electrolytic grade aluminum/electric grade copper complying with requirement of IS : 5082 – 1981 and of rectangular cross section suitable for carrying the rated full load current and short circuit current and shall be extendable on either side. Bus bars and interconnections shall be insulated with heat shrinkable sleeve of 1.1 KV grade and shall be colour coded. Bus bars shall be supported on glass fiber reinforced thermosetting plastic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber and all connections shall be done by bolting. Additional cross sectional area to be added to the bus bar to compensate for the holes. All connections between bus bars and breakers shall be through solid copper / aluminum strips of proper size to carry full rated current and insulated with insulating sleeves. Maximum allowable temperature for the Bus bar to be restricted to 85 deg C.

7.1.2 Temperature - Rise Limit:

Unless otherwise specified, in the case of external surface of enclosures of bus bar compartment which shall be accessible but do not need to be touched during normal operation, an increase in the temperature rise limits of 25° C above ambient temperature shall be permissible for metal surface and of 15° C above ambient temperature for insulating surfaces as per IS 8623(Part-2) 1993.

Cable Compartments

Cable compartment of adequate size shall be provided in the Distribution panels for easy clamping of all incoming and outgoing cables entering from the top/bottom. Adequate supports shall be provided in cable compartment to support cables.LT Switchgears:

7.2. Standards and Codes:

The latest amended up to last date of submission of bid 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 Indian Electricity Act 2003 and Indian Electricity Rules 1956 as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC Standards shall be applicable.

7.3. Air Circuit Breaker:

The ACB shall conform to the requirements of IS/IEC 60947-2 and shall be type tested & certified for compliance to standards from–CPRI, ERDA/ any accredited international lab.

The circuit breaker shall be suitable for 433 V, 3 phase, 50 Hz supply system. Air Circuit Breakers shall be with molded housing flush front, draw out type and shall be provided with a trip free manual operating mechanism or as indicated in drawings and bill of quantities with mechanical "ON" "OFF" “TRIP” “CIRCUIT HEALTHY” “SPRINK CHARGE “indications.

ACB should be able to carry Rated current as required in the SLD at the yearly maximum ambient temperature applicable for 50 degree centigrade and as per site condition whichever is higher.

ACB should have an operational designed voltage of 690 V for Ics=100% Icu for Icw=1 Sec.

The ACB shall be 3/4 pole with modular construction, draw out, manually or electrically operated version as specified in SLD. The circuit breakers shall be for continuous rating and service short Circuit Breaking capacity (ICS) shall be as specified on the single line diagram and should be equal to the Ultimate breaking capacity (ICU) and short circuit withstand values(ICW).

Circuit breakers shall be designed to ‘close’ and `trip' without opening the circuit breaker compartment door. The operating handle and the mechanical trip push button shall be at the front of the breakers panel. Mechanical Contact wear indicator shall be mounted directly on the moving contacts to indicate the degree of erosion of the contacts. The ACB shall be provided with a door interlock i.e. door should not be open when circuit breaker is closed and breaker should not be closed when door is open.

All current carrying parts shall be silver plated and suitable arcing contacts with proper arc chutes shall be provided to protect the main contacts. The ACB shall have double insulation (Class-II) with moving and fixed contacts totally enclosed for enhanced safety and in accessibility to live parts. All electrical closing breakers shall be with electrical motor wound stored energy spring closing mechanism with mechanical indicator to provide ON/OFF status of the ACB.

The auxiliary contacts blocks shall be so located as to be accessible from the front. The auxiliary contacts in the trip circuits shall open after the main contacts open. Minimum 4 NO and 4 NC auxiliary contacts or as per BOQ requirement w.r.t Manufacturer shall be provided on each breaker. Rated insulation voltage shall be 1000 volts AC.

7.3.1 Cradle:

The cradle shall be so designed and constructed as to permit smooth withdrawal and insertion of the breaker into it. The movements shall be free from jerks, easy to operate and shall be on Pin & Cam type/steel balls/rollers and not on flat surfaces.
There shall be 3 distinct and separate position of the circuit breaker on the cradle. Racking Interlock in Connected / Test / Disconnected Position.

Connected Position: Main isolating contacts & control contacts of the breaker are Engaged
Test Position : Main isolating contacts are isolated but control contacts are still engaged
Isolated Position: Both main isolating & control contacts of the breaker are isolated
There shall be provision for locking the breaker in any or all of the first three positions.

The following safety features shall be incorporated:-

a) Withdrawal or engagement of Circuit breaker shall not be possible unless it is in open condition.
b) Operation of Circuit breaker shall not be possible unless it is fully in service, test or drawn out position.
c) All modules shall be provided with safety shutters operated automatically by movement of the carriage to cover exposed live parts when the module is withdrawn.
d) All Switchgear module front covers shall have provision for locking.
e) Switchgear operating handles shall be provided with arrangement for locking in 'OFF' position.
f) Actual Contact Inspection should be possible by removing Breaker from the panel – with mechanism connected to moving contacts of ACB.

7.3.2 Protections:

The breaker should be equipped within built battery backup microprocessor LCD display based release to offer accurate and versatile protection with complete flexibility and shall offer complete over current protection to the electrical system in the following five zones:

Long time protection.
Short time protection with intentional delay. Instantaneous protection.
Ground fault protection.
Neutral protection for 4 pole ACBs.

The protection release shall have following features and settings:

a. True RMS Sensing
The release shall sample the current at the rate of 16 times per cycle to monitor the actual load current waveform flowing in the system and shall monitor the true RMS value of the load current.

b. Thermal Memory
When the breaker shall reclose after tripping on overload, then the thermal stresses caused by the overload if not dissipated completely, shall get stored in the memory of the release and this thermal memory shall ensure reduced tripping time in case of subsequent overloads. Realistic Hot/Cold curves shall take into account the integrated heating effects to offer closer protection to the system.

c. Defined time-current characteristics:

A variety of pick-up and time delay settings shall be available to define the current thresholds and the delays to be set independently for different protection zones thereby achieving a close-to-ideal protection curve.

d. Trip Indication

Individual fault indication for each type of fault should be provided by LEDs for faster fault diagnosis. ACB should display last 20 trip history with date time stamping.

e. The release shall meet the EMI / EMC requirements.

f. The setting range of release shall confirm to IEC- 60947 and its applicable sub-parts. All ACBs shall have over temperature protection of release.

All Incomer ACBs shall have temperature rise monitoring at cradle terminals and display thru protection release, LED/LCD display showing all Power & Energy Parameters (Currents, %loading, Voltages, Frequency, PF, Power & Energy (active, reactive & apparent) etc. All incomer ACBs shall have following additional protections other than mentioned above:-

Under and over voltage
Under and over frequency
Restricted Earth Fault protection
Trip Circuit supervision with PS class CT's.
Undercurrent, (for DG set only)
Reverse power (for DG set only)
Phase sequence reversal
Load shedding and reconnection thru programmable contacts.

Release should have LCD display for Power parameters.

Release should be able to capture short circuit current on which ACB has tripped. The trip and alarm shall be stored in memory with the date & time stamping along with type of fault and alarm.
Release should be self-powered.
Integral Test facility to test healthiness of release and the trip circuitry shall be provided on the Release.

Programmable digital contact shall be provided with possibility to configure for pre alarm like over load, over temperature etc, and trip functions like OL/SC/EF/OT etc.

7.3.3 Safety Features:

The safety shutter shall prevent inadvertent contact with isolating contacts when breaker is withdrawn from the Cradle.

The incoming panel accommodating ACB shall be provided with indicating lamps for ON-OFF positions, digital voltmeter and ammeter of size not less than 96 mm x 96 mm, selector switches, MCB for protection circuit and measuring instrument circuits.

Draw out breakers should not close unless in distinct service/Test/Isolated positions.
The insulation material used shall conform to Glow wire test as per IEC60695.
The ACB shall provide in built electrical and mechanical anti-pumping.

7.4. Molded Case Circuit Breaker (MCCB):

7.4.1 General:

Molded-Case Circuit Breakers (MCCB) shall comply with IEC 60947-1 & 2 standards.

Earth Leakage Relay (30-3000mA) with CBCT shall be used for all outgoings MCCB.

Earth Fault shall be provided for all incoming MCCB.

MCCB shall be of category A with a rated service breaking capacity (Ics) equal to the ultimate breaking capacity (ICU) on all the ratings.

MCCB shall have designed operational voltage upto690 V AC (50/60 Hz).

MCCB shall have a rated insulation voltage of 690 V AC (50/60 Hz)

Indication lamp ON, OFF, TRIP shall be provided incomer MCCBs and ACB.

MCCB must be available in Microprocessor (250A and above) / Thermal Magnetic (Up to 200 Amp.) type release.

All MCCB should be fully rated up to 50 Deg C.

All thermal magnetic MCCBs up to 160A shall be adjustable thermal and fixed magnetic type and 200A shall be adjustable thermal and adjustable magnetic type (Ir = 0.8 x In to 1.0).

For microprocessor shall have following characteristics:-

MCCBs shall be permissible for mounting in all 3 axes (Vertical Wall, Laterally Rotated Wall and Ceiling & Floor mounting) without any adverse effect on electrical performance. It shall have line load reversibility.

7.4.2 Construction and operation:

For maximum safety, the power contacts shall be insulated in an enclosure made of a thermosetting material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries.

MCCBs shall be actuated by a toggle or handle that clearly indicates the three positions: ON, OFF and TRIPPED.

The operating mechanism shall be designed such that the toggle or handle can only be in OFF position (O) if the power contacts are all actually separated & in OFF position, the toggle or handle shall indicate the isolation position.

MCCBs shall be equipped with a “push to trip” button in front to test operation and the opening of the poles.

The MCCB should be have a trip-free mechanism that ensures the trip process is not prevented even if the operating mechanism is blocked or manually held in the "ON” position.

The Microprocessor Release MCCBs should be equipped with non-saturable type CTs for reliable & accurate protection.

All microprocessor based MCCBs should have display with battery back-up.

All microprocessor based MCCBs should have precise current setting in one step.

7.4.3 Current Limit & Selectivity:

MCCBs shall be Current Limiting type.

MCCBs, the current ratings of which are identical with the ratings of their trip units, shall ensure selectivity in rated current interval 1:1.6

-MCCBs shall be equipped with a test facility of the Release by a hand-held device.

7.4.5 Accessories:

MCCBs shall have uniform Internal Accessories platform across the range

MCCBs Door Mounted Extendible Rotary Handle shall have an option of Illumination Kit to indicate three stable mechanism positions (ON, OFF and TRIPPED).

MCCBs with TMTU Release should have provision for separate Short Circuit Signal facility.

MCCBs shall be snap fit type to enable safe on-site installation of auxiliaries, voltage releases, signal contacts etc.

MCCBs should have symbols engraved in the lid of the accessories compartment to indicate possible mounting position of internal accessories.

The addition of a motor module or manual rotary handle etc. shall not block device settings.

MCCB shall be equipped with Phase barrier, tinned copper spreaders.

7.4.6 Communications:

All incomers ACBs & MCCBs in main LT panel and distribution panel shall be BMS compatible in open protocol.

7.5. Moulded Case Circuit Breaker (MCB):

Miniature Circuit Breaker shall comply with IS/IEC 60898-1:2002 & EN 60947-2 or IEC-60947-2. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be C curves. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values.MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

7.6. Meters:

7.6.1 The digital meters shall conform in all respects to International standards –IEC 62053-21-22 or the relevant Indian standards, RoHs compliance with latest amendments thereof.

All voltmeters and indicating lamps shall be through Control MCB's.
Meters and indicating instruments shall be flush type.
All CT's connection for meters shall be through Test Terminal Block (TTB).
CT ratio and burdens shall be according to connected instrument and load.

7.6.2 Digital Multi-Function meter shall be provided in all incomers in main LT panels and distribution panels as shown in SLD, having following characteristics:-

Digital Electronic multi-function meter with RS-485 port with THD with individual harmonics up-to 31st order and THDi to measure and display the following electrical parameters:-
Total active energy(KWH/MWH),
Maximum demand(KVA/MVA)(KW/MW),
Maximum demand reset count,
Instantaneous power factor,
High/Low recording of VLL, VNL, A, Hz, PF, Var, with time stamp.

K factor V & A to keep check on the losses due to harmonic load current and their effects of transformer heating.
Load Manager with Demand monitoring and RTC based demand manager.
Export/Import Net monitoring of Wh, VAH, VArh, inductive/capacitive load hours.
Auto Scaling Capability in variance of Kilo, Mega, Giga.

Positive energy accumulation even with CT polarity reversal with reverse lock programmable.
Byte order option-Field Programmable float/Little Endian/Big Endian data formats.

7.6.3 Energy meter shall be provided in all outgoings in main LT panels and Metering main distribution panels having following characteristics:-

Monitors electrical parameters : Amps, W/VA, LLV, LNV, Hz, PF
Integrated Parameters :KWh /KVah, PF/Watt anyone programmable.
Old Energy register for back-up of last cleared energy values.
True RMS measurement with simulations sampling of current and voltage.
Color coded analog load bar indicators
CT Reversal : Auto correction of energy integration in Star (WYE) mode
Password protection for tamer proofing.
Site Selectable CT/PT.

Pulse output for integration into a process through PLC/DCS for online energy management.
Auto& Manual Scaling Capability in variance of Kilo, Mega, Giga

Seamless integration into any mod bus compatible SCADA- Energy Management System (EMS)

7.6.4 General Requirements:

CT polarity correction should be possible through Energy Meter for each phase.
Import/ Export measurement for KWH/ KVARH is required.

The current inputs shall be configurable at site for measuring x/5/1 A current transformers

The meters shall be suitable for operation with AC auxiliary power and shall have wide tolerance band of 70V to 300V, 40-70Hz

The multifunction meters shall have backlit LCD display with power saving mode/ adjustable contrast.

7.7. Current Transformer:

Current transformers shall be provided for Distribution panels carrying current in excess of 60 amps. All phase shall be provided with current transformers of suitable VA burden with 5/ 1 amps secondary for operation of associated metering. The CTs shall confirm to relevant Indian Standards. The design and construction shall be dry type, epoxy resin cast robust to

withstand thermal and dynamic stresses during short circuits. Secondary terminals of CTs shall be brought out suitable to a terminal block which shall be easily accessible for testing and terminal connections. The protection CTs shall be of accuracy class 5P10 and measurement CTs shall be of accuracy class as per SLD.

7.8 Residual Current Circuit Breaker (RCCB)

7.8.1 SYSTEM of Operation:

Residual Current Circuit Breaker shall confirm to IEC 61008.RCCB shall work on the principle of core balance transformer. The incoming shall pass through the torroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a predetermined critical value. RCCB shall be current operated independent of the line voltage; current sensitivity shall be of 30 mA at 240/415 volts AC and shall have a minimum of 20,000 electrical operations.
RCCBs should have a rated conditional short-circuit current of 10 kA.

7.8.2 MECHANICAL Operation:

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing /opening of all the three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.

7.8.3 Neutral Advance Feature:

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact first before the phases; and at the time of opening, the neutral shall breaks last after allowing the phases to open first. This is an important safety feature, which is also required by regulations.

7.8.4 Testing Provision:

A test device shall be incorporated to check the integrity of the earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB / RCCB.

7.9 bus bar and internal wiring

Incomer switchgear shall be TP breaker appropriate rating (minimum 1.8 times the normal current to take care of inrush switching current). Suitable contactor for each step shall be used and must be capable of capacitor switching duty at each step for short circuit protection.

Busbars shall be suitably colour coded and must be mounted on appropriate insulator supports. Power cables used shall have superior mechanical, electrical

and thermal properties, and shall have the capability to continuously operate at very high temperatures up to 125 deg C.

Internal wiring between main bus-bars, breaker, contactor and capacitors shall be made with 1100 V grade, PVC insulated, copper conductor cable of appropriate size, by using suitable copper crimping terminal ends etc.

Wiring of the control circuit shall be done by using 1.5 sq.mm, 1100 V grade, PVC insulated, multi-stranded copper control wire.

Suitable bus links for input supply cable termination shall be provided.

7.10 Control Circuit & General Protection:

The control circuit shall be duly protected by using suitable rating MCB.
An emergency stop push button shall be provided to trip the entire system (22.5 mm dia, mushroom type, press to stop and turn to reset).
Inspection terminal strip, number ferruling, labeling etc. shall be provided.
440 V caution board on the panel shall be provided.

8. 00 ***Cable laying:***

8.01 Cables shall generally be installed in cable trays except for some short runs in buried formation or in conduit / pipe for protection or crossing. Multi core power cable laid on trays & riser shall be neatly dressed & clamped with fabricated 25 x 3 mm G.S flat or cable tray at an interval of maximum 1 meter for vertical / inclined run & 1.50 meter for horizontal run. Control cables may be laid in single layer with touching formation. Power & control cables shall be claimed in separate group. Power & control cables shall be no be laid in a common tray excepting in very special case where a gap of 150 mm shall be maintained between power & control cables.

8.02 H.T & L.T power cables shall be laid in cable trays in single layer & with spacing equal to the diameter of cable.

8.03 Control cable can be laid upto a maximum of three layers in each tray.

8.04 Both power & control cables shall be clamped to the trays rungs by means of clamp made up to 25 x 3 mm fabricated G.S flat at an interval of 1500 mm for horizontal run & 1000 mm for vertical / inclined cable run.

*8.*05 The cable trays shall be run with a vertical spacing of 300 mm cable trenches. A minimum of 300 mm clearance shall be provided between the top of tray & beams, cold piping, 500 mm clearance for hot piping / object to facilitate installation of cables in tray.

8.06 Adequate pull boxes shall be provided in conduit run to facilitate. Cable pulling in long runs & also to ensure that there will be no more than 270 degree bend between the pull points.

8.07 Cable tray shall be installed to accommodate cable manufacture's recommended maximum pulling tension & minimum bending radius.

8.08 All opening in the floor & wall for cable access shall be sealed after installation of the cable system with non-inflammable materials.

8.09 All floor/ wall for cable entry to the electrical equipment & accessories shall be sealed with non- inflammable material, after completion of cable installation. Thickness of such materials shall be equal to the thickness of floor / wall.

9.00 ***Cable power & control:***

9.01The tender shall install & connect all power & control cable required for complete installation with in his scope of work. Type and size of power& control cable shall be as specified & as supplied under a separate sub section for power and control cable.

9.02 In general all power and control cable shall be run in cable trays in cable trenches. Isolated runs of control cables shall be run in rigid conduit.

9.03 Jointing of power cable should be avoided as per as possible. However, if any splicing of control cable is required to carry out interlock it will be done junction boxes not in the conduit or in the trays. Such junction boxes shall be in scope of tenderer.

9.04 The contractor shall not installs cables with different voltage in the same cable tray.

9.05 During cable installation care shall be taken so that actually binding radius of each cable is not less than the one recommended by the cable manufacturer.

9.06 For cable buried directly underground their shall be a stone free sand cushion both above and below the cable run being held by brick wall support on two (2) sides. The excavated portion above the top sand cushion shall be covered by concrete precast slab supported on the side walls & finally filled up with standard back fill.

9.07 Cables shall be pulled into the trenches in strict accordance with the cable manufacture's instruction.
9.08 Tender shall furnish & install suitable solderless crimping type cable lugs at the termination of all wires & cables if not already furnished with the equipment.

9.09 All exposed conduits & armoured cables shall be tagged with numbers that appear in the conduit & cable schedules as prepared by the tenderer. All conduits & armoured cable shall be tagged at their entrance and / or exist from any piece of apparatus, junction box or pull box. Aluminum tags shall be used with the number engraved / punched on the tag. Tag shall suitable secured to the conduit or armoured cable.

The cable tags shall also be provided at all bends and at interval of 30 M on straight run of cable in order to facilitate the identification.

9.10 Laying termination & connection of all control cables for interlock, protection, indication & annunciation.

The tender shall prepare cable schedule & interconnection diagram & submit the same for approval of the Authority. Cable laying shall be started with the approval cable schedule & interconnection diagrams. Separate cables for each type of following services/ functions as applicable shall be used & laid along the run for each feeders.

a) Power - designate as 'P'
b) Control protection interlock, meeting, indication & annunciation designate as "C".

10.00.00 ***Filed Testing:***

10.01.00 Filed testing shall be required for all the equipment & accessories furnished, installed or connected by the tenderer to ensure proper installation, setting, connection & in accordance with the plans, specification and manufacturer's recommendations.

Testing shall be conducted in presence of Owner's engineer with prior notice at least 2 weeks before commencement of any test.

10.02.00 Filed testing work shall be done as per the latest edition of the relevant standards. All tests recommended by the equipment manufacturer shall be conducted. The tenderer shall submit the list of all filed tests to be conducted for all equipment & accessories for review / approval by the owner.

10.03.00 Testing shall include any additional tests suggested by the owner that the deems necessary because of filed condition to determine that equipment, materials & system meet requirements of the specification.

10.04.00 The tender shall depute qualified personal to conduit all testing & shall provide all labour and testing equipment required for & incidental to testing.

10.05.00 The tender shall be responsible for any damage to equipment & material due to improper test procedure or test apparatus & shall replace to original condition of any damaged equipment or material.

10.06.00 The tender shall maintain in quadruplicate a written record of all tests showing date, personal making the tests, equipment or material tested performed & result. Two copies of test records shall be given to the authority.

11.00.00 ***Commissioning:***

After the satisfactory test are performed the equipment & material shall be put non trial operation by the tenderer. After successful trial operation, the equipment shall be put on performance tests initially at no load condition & finally with different loading conditions.

12.00.00 Land escaping works:

The pole should be as per drawing with 40 watt post top lantern LED lights.

13.00.00 Drawings/ Data required prior to commencement of electrical works:

13.01.00 The following drawings shall be provided by the Architect/ Engineer-In-Charge of the works:-
13.01.01 Conduit layout for lights, fans, socket outlets, telephone outlets, networks & fire alarm system and sub mains showing size of conduit, no. of wires and size of wires in each run, location and size of accessories like junction boxes, ceiling boxes for hooks, draw boxes and switch boxed etc.

13.01.02 Cable routing drawings showing details of size, type and no. of cables and mode of installation.

13.02.00 following drawing shall be furnished by the contractor for the approval of the Engineer-In-Charge.

13.02.01 G.A and schematic drawing of MV switchgear/ distribution / plant/AHU/FCU/Fire Alarm panel showing material and size of sheet steel / bus bars / inter connections and make and ratings of switchgear i/c details of protection, metering, indicating and inter lock etc.

13.03.00 Completion Drawings:

13.03.01 On completion of work and before issuance of completion certificate, the contractor submit completion drawings in the form of three complete set of originals (reproducible)
13.03.02 As built G.A and schematic drawings of MV panels, distribution boards, fire alarm panels, etc., showing material size of sheet steel / bus bars/ connections and make and rating of switchgear i/c details of protection, meter indicating and interlock etc.

13.03.03 Technical literature, test certificate and operation and maintenance manuals required.

13.04.00 Works Inspection and Testing of Equipment:

13.04.01 Prior to dispatch of equipment the Institute reserves the right to inspect the same at the manufacturer's work and the contractor shall provide and secure every reasonable access and facility at the manufactures works for inspection, for witness of all acceptance and routing tests and per relevant Indian Standards. Contractor shall give a reasonable notice of about 15 days for the purpose of test, and witness of all major equipment.

13.04.02 Pre- commissioning test: All routine tests shall be carried out on the electrical equipment External Service Connection: 3 1/2x 400 sq.mm XLPE cable 1.1 KV from substation No. 1 to main panel at Hall-15 switch room as per load requirement of panel.

External Lighting

- External Lighting to be provided with LED light fittings minimum IP 65 of required wattage, placed on GI Octogonal poles at suitable height & spacing along the Road and Boundary Wall.
- Gates are to be provided with appropriate Illumination as per Architectural Considerations.
- Lighting poles for street lights shall be of GI Octogonal poles as per applicable standard.
- The steel poles shall be coated with bituminous preservative paint on the inside as well as embedded outside surface. Exposed outside surface of steel poles shall be painted with one coat of red lead oxide primer. After completion of installation two coats of aluminium paint shall be applied.
- The bracket of street light shall be of the same make of street light pole

Weather Proof Outdoor Junction Box for street lighting poles

- The terminals shall be supplied for branching and terminating the lighting cables. The junction boxes shall be dust and vermin proof shall be complete with removable cover plate.
- Suitable rubber gaskets shall be provided on the doors of the junction boxes. The junction boxes shall have a locking facility, suitable to be opened by a common panel key for all the junction boxes.
- The provision shall be made to run 1.1 kV cable from ground to integral junction box for termination & looping.

ACCEPTABLE MAKES FOR INTERNAL ELECTRICAL INSTALLATION WORKS

S.No.	ITEMS	MAKES
1	MS Conduit (ISI marked)	BEC/AKG/NIC/Steel craft/ M-Key, SK (E.R.W)
2	PVC Conduit and accessories	Polycab/AKG/Asian
3	PVC/XLPE insulated aluminium/Copper conductor armoured/Unarmoured MV Cable upto 1100 V	Havells/Finolex/KEI/Grandlay/ Gloster
4	FRLS PVC insulated copper conductor stranded flexible wire i/c control cables	Havells/Finolex/KEI/Grandlay/RR Kabel/ Gloster
5	Cable Raceway floor/wall mounted and accessories	Schenider/Legrand/Cooper
6	Modular Switch & Socket	Legrand (Myrus)/M.K. (Element)/Schneider (Zencelo India)/Havells/ ABB
7	Metal clad Industrial Socket	Legrand/Siemens/Schneider/ABB
8	Cat-6 Cable	Beldon/Siemon/Legrand/Penduit (Pannet)
9	Cable Glands	Dowells/Commet/Gripwell/Raychem
10	Crimp Patch Cord	Beldon/Siemon/Legrand/Penuit (Pannet)
11	Protection Device (MCB/RCCB/DB/ELCB)	Siemens (Betagard),/Hager/Schneider / Legrand / ABB
12	MCCBs	Siemens (3VA)/L&T /Schneider/ Legrand / ABB
13	Power contactor	Siemens /L&T / Schneider / Legrand / ABB
14	Surge Protection Devices	Siemens/L&T/Schneider / Legrand
15	Panel Accessories	Siemens /L&T/Schneider / Legrand/Tecnic / ABB/ Neptune
16	Selector Switch	Salzer/Seimens /BCH/ Kacee
17	Auxiliary Relays	Siemens/L&T/Schneider/Legrand/ABB

18	LED/Metal Halide/Fluorescent Internal Lighting Fixture	Philips/ Wipro/Havells/Crompton/Decon
19	External Lighting Fixture	Philips/ Wipro/Havells/Crompton
20	Emergency Lighting/ Exit Sign boards	Philips/Havells/Lighting Technologies/Trilux/Prolite
21	Ceiling Fan (ISI marked & BEE rated 5 star)	Havells/Almonard/Orient/Usha/Bajaj
22	Paint	Nerolac/Asian/Berger
23	Advance Lighting Protection System (Early Streamer Emission Type)	LPI (Australia)-by allied power/SGI (Duval Messien/satellite (France)- by SGI/Bradlay (USA)- by JMV/Erico (USA)-by security shoppe/ABB
24	GI Pipe	Tata/Jindal/SAIL
25	Main LT Panels/ MCC Panel	(Main LT panel / MCC Panel board should be IEC 61439 part-1 and II manufacturer has to produces the relevant test certificate as per IEC code for the same failing which panel shall be rejected). Tricolite, Delhi /Siemens / Schneider/ Milestone/ Neptune
26	Air Circuit Breaker	Siemens / Schneider /L&T /Legrand/ ABB
27	Surge Voltage Protection	Siemens /Schneider/L&T/Legrand/ABB
28	Earth fault module	Siemens/Schneider/L&T/Legrand
29	Protection relays	Siemens/Areva/L&T/Legrand
30	C.Ts and PTs	Kappa/AE/Matrix
31	Digital Meters	Siemens (PAC)/ Schneider/ (conzerv) / Secure Enersol / L&T/ Neptune
32	Change Over Switch	L&T/Havells /Socomec/ABB
33	Indicating lamps	ESBEE/Schneider/Siemens/Vaishno/Neptune
34	Power capacitors	Epcos/ Neptune / Legrand /ABB/ L&T
35	Automatic Power factor correction relay/controller	Epcos/Siemens (PAC) /Schneider (Conzerv)/L&T/Neptune

36	Sealed Maintenance Free Batteries	Exide/Panasonic/Hitachi/Shinkobe
37	Battery charger	Caldyne/Chhabi Electricals/Statcon/Max Power
38	Cable Trays (Factory Fabricated/Overhead & Floor Raceways	Legrand/MEM/OBO/ Milestone/ Neptune
39	HDPE underground cable duct	Rex Polyextrusion/Tirpura/Plasomatics/Duraline
40	Insulation Mats	DL Miller & Co. Ltd.?Premier Polyfilm Ltd./RMG Polyvinyl India Ltd/Jyoti
41	Smoke/Heat detectors	Apollo/ System Sensor/ Agni
42	Manual Call point	PRD/System-Tek/ Simplex/ System Sensor/Agni
43	Response indicators	PRD/System-Tek/ Simplex/ System Sensor/Agni
44	Fire Exit Signs	System-Tek/ Simplex/ Agni
45	Fire Control Panel	System-Tek/ Morley /Agni
46	Speaker / Hooter	System-Tek/ Philips /Agni
47	Occupancy Sensors/ Movement Sensor	Legrand/ Philips/ Wipro
48	Flush type switch /socket	Anchor/ Kinjal/ SSK/ Havells Reo
49	Fuse switches unit / switch fuse unit /HRC fuse	L&T / Siemens/ Havells
50	Exhaust fan	Almonard/ Alstom/ Crompton/ Havells
51	XLPE insulated HT cables	Gloster /KEI/Havells
52	Cable lug	Ascon (Heavy gauge) Jainson Dowells
53	Lamp Holder (Brass)	Kay/SSK/Kinjal
54	Telephone wires/Telephone Cable / jelly filled telephone cables	Finolex /Delton/Havell's /R.R. Kabel
55	Telephone tag blocks	Krone/ Pouyet
56	Telephone outlet	MK Electric /Legrand (Mosaic)/Crabtree (Piccadilly)

57	GI raceways	Milestone Engineering /Legrand/MDS/Neptune Systems Pvt. Ltd./MK
58	PVC raceways	Legrand/ MK
59	Electronic ballast	Philips /Wipro/Bajaj/Decon/Crompton/Havells
60	DLP plastic trunking	Legrand/MK
61	Geysers	Recold /Venus /Usha Lexus /Sphere hot
62	Tower Light	Ligman/Simes/Bega
63	HT/LT transformers	ABB/Schneider /CGL (Crompton Greaves Ltd.)
64	HT SF-6 circuit breakers/VCB	Siemens /ABB/CGL/Schneider
65	Programmable Logic Controller(PLC)	Siemens/Allen-Bradley/Schneider
66	Earthing (Chemical Earthing) Plate Earthing	JMV/As per IWD Norms
67	Octagonal Pole	Bajaj / Crompton / Phillips
68	11 kV HT panel Incoming relay	CGL/Schneider/ABB/ Siemens
69	Control Relay Panel	CGL/Schneider/ABB
70	Lightning Arrestor	ABB/Alltec/JMV
71	Temp. Gauge	Guru
72	Gate Valve	Leader/Sant
73	Electrical Backup	Spare hot/ Racold
74	PVC Tank	Syntex/ Polycon
75	Thermostat	ISI Marked
76	Flat Collector Plate	Solocrome/ Tata BP/ Racold
77	S.S Sheet	Jindal / National
78	HT/LT cable joints (Straight through/outdoor/indoor)	3M/ Denson/ M Seal/Raychem/ Cabseal

79	Alternator	STAMFORD/Crompton Greaves
80	DG Set	Sterling & Wilson /Caterpillar/Commins Power / eneration/ Kirlosker
81	Makes of accessories of HT / LT Panel / Transformers	As per standard practice of manufacturer.
82	Bus Trunking	L&T/ Schneider as per standard practice of OEM manufacturer / channel partner
83	HT Panel 11 KV	ABB/Schneider /CGL (Crompton Greaves Ltd.)
84	Bus Duct	Neptune/ Milestone/Tricolite

Note: - Any item not mentioned herein shall be ISI marked and shall be as approved by the engineer-in-charge

FIRE DETECTION & ALARM SYSTEM

INTELLIGENT AND ADDRESSABLE FIRE DETECTION & ALARM SYSTEM

1. SCOPE OF WORK

a. This specification outlines the requirements for an intelligent, addressable fire detection and alarm system.

b. The work described in this specification consists of all labour, materials, equipment and services necessary and required to complete , test and commission the fire detection and alarm system. Any material not specifically mentioned in this specification or not shown on drawings but required for proper performance and operation shall be provided and installed for a complete and operational system, by the contractor at no extra cost.

c. The contractor shall furnish, and install complete and ready for intended use and operation, an intelligent, addressable fire detection and alarm system including Fire panel (s), initiating devices (manual pull stations, addressable smoke, heat detectors etc.) indicating devices (hooters, bells, visual warning signals, etc.) and supervisory devices, annunciators, wiring apparatus and accessories.

d. The installation and locations of equipment and devices in the building shall be governed by the specifications and drawings with due regard to actual site conditions, manufacturers' recommendations, ambient factors affecting the equipment and other operations in the vicinity. If any departure from the specifications or drawings is necessary, approval shall be obtained from the Engineer-in-Charge before work is started thereon.

e. Materials and equipment shall be new, first grade, standard, current models of the manufacturer and shall be suitable for this system. Where two or more pieces of equipment performing the same function are required, they shall be exact duplicates produced by the same manufacturer.
All materials, devices, and equipment shall be compatible with the circuits or systems in which they are utilized.

g. The Contractor shall submit specific catalogue cuts for each of the item specified in BOQ for approval from Engineer in charge before procurement.

3. REQUIREMENTS

a. This installation shall be made in accordance with the drawings, specification, local codes and local fire authorities having jurisdiction over this project.

b. Reference Standards

i) The design, supply, installation, testing and commissioning of the entire fire detection and alarm system shall conform to BS:5839 or NFPA 71 and 72. The Detectors shall conform to relevant codes for Fire Alarm System.

ii) The system installed shall comply with the following codes/publications:

a) IS 2175
b) IS 2189
c) IS 11360
d) IS 732
e) UL "UNDERWRITERS" laboratory/NFPA/FM/VDS/FOC for addressable detector, fire panel.
f) EN 54

g) BS 5445

C. TESTS AT SITE

i) All commissioning tests at site will be in line with BS : 5839 or NFPA 71 and 72.

ii) Following test shall be conducted :-

i. Loop Checking

ii. Checking of smoke detectors, Heat detectors etc. by simulation.

iii. Functional tests for fire alarm panel.

iv. The Mock trial of the complete Fire Detection and Alarm system.

e. TESTS AT MANUFACTURER'S WORK

i). Tests certificates will be furnished for approval of all Fire alarm devices and system devices.

ii) All routine tests as per relevant codes for the Fire Alarm Panel, shall be conducted and results furnished to the Engineer-in-Charge.

5. POWER SUPPLY

a. The control panel shall derive 230 Volts power from main supply. A standby power supply shall be immediately available in the event of failure of normal supply and shall automatically be connected so as to maintain the equipment in condition such that fire alarm originating from the operation of Detector can be given. The standby battery as secondary supply shall be such that when charged by associated battery charging equipment it can operate independently for a period of 12 hours. It shall have enough power supply to cope with additional load resulting in alarm originated from two separate zones for the one hour. Batteries shall be of Lead Acid type and sealed Maintenance free.

b. Suitable arrangements shall be incorporated to prevent secondary batteries from discharging through the charging equipment in the event of its breakdown or a failure in the supply.

c. In addition to the batteries, a battery charger suitable for operation on the auxiliary power available in the plant as specified above shall be supplied. The capacity of the charge shall be such that the same can boost charge the battery (within 8 hrs) while supplying the rated load of the fire detection and annunciation system. Facilities shall be provided to limit the voltage supplied to fire detection and alarm system to their rated values during the time of boost charging. The charger shall normally supply the battery trickle charging current and the DC load of the fire detection and alarm system. In case the AC supply on the input side of the charger fails the necessary power for the complete fire detection and alarm system shall be supplied by the battery.

d. Visible and audible annunciation for troubles or failure in the power supply system like "charger Failure", "Battery Low Voltage", etc. shall be provided.

e. Battery earth/fault indication/annunciation shall be included in the panel.

6. FIRE ALARM SYSTEM DEVICES

6.1 General

i. Each device shall be assigned a unique address via easily understood decade (01 to 99) switch. Address selection via binary switches or by jumpers is not acceptable. Devices which take their address from their position in the circuit are unacceptable because if devices are later added, existing addresses, descriptors and commands need to be reprogrammed.

ii. Devices shall receive power and communication from the same pair of conductors. For fault isolating modules a separate power wiring which shall be fault tolerant shall be provided.

iii. Each device shall contain screw terminals with rising plates for positive termination suitable for 1.5 sq.mm. copper conductor wire.

6.2 Addressable Manual Stations

i. Manual stations shall be of rugged die cast construction designed for semi-flush mounting. Plastic stations will not be acceptable. Stations shall be of the break-glass design and must be opened to be reset. Closing the box after opening it shall automatically perform the reset function. It shall be possible, for testing purposes, to initiate an alarm without breaking the glass. All stations shall be furnished with a spare glass break rod.

ii. Provisions shall be made such that the address cannot be changed merely from opening the station.

6.3 Addressable Analog Detectors

i. All fire sensors shall mount on a common base to facilitate the changing of sensor type if building conditions change. The base shall be incompatible with conventional detectors to preclude the mounting of a non-intelligent device.

ii. If the Fire Alarm Panel determines that the sensor is in alarm, the Fire Alarm Panel shall command the sensor LED to remain on to indicate alarm.

iii. Each sensor shall be capable of being tested for alarm via command from the Fire Alarm Panel.

iv. Each sensor shall respond to Fire panel scan for information with its type identification to preclude inadvertent substitution of another sensor type. The Fire Alarm panel shall operate with the installed type but shall initiate a mismatch (trouble) condition until the proper type is installed or the programmed sensor type changed.

Each sensor shall respond to Fire Alarm Panel scan for information with an analog representation of measured fire related phenomena (smoke density, particles of combustion, temperature). Such response proves end-to-end sensor including the operation of the sensor electronics. Systems which only monitor the presence of a conventional detector in an addressable base shall not be acceptable.

v. The Detector shall meet the requirements of either EN 54 or shall be listed with UL. It shall be possible to test the Detector's working both from the Panel as well as locally by means as designed by the Contractor and approved by the Engineer-in-Charge. The approved coverage per Detector for unhampered areas shall not be less than 50 sq. M. The detector shall be capable of being reset automatically after any alarm condition.

6.4 Addressable Analog Heat Detectors

i. The Detector shall be Analog, Addressable Detector with its own manually set digital code and be able to give a single digitised output to the Fire Alarm Panel regarding its condition. The Detector shall employ the thermistor principle for heat sensing and the fixed temperature setting shall be at 60 degrees Centigrade. It shall be able to communicate with the Fire Alarm Panel by the Pulses emitted from the Panel.

ii. The Base of the Detector shall be interchangeable with other Smoke Detectors and the construction shall be of flame retardant material. LEDs shall be provided to indicate locally alarm condition.

iii. It shall be able to withstand temperature variations from 0o C to 50o C. Further, relative Humidity (non Condensing type) upto 95% shall not hamper its performance.

iv. It shall have in built safety device to monitor the removal and pilferage of the Detector. The Detector also must have facility for remote indication. The quiescent current flow must not exceed 50 milli amps. and alarm condition current shall be maximum 60 milli amps.

6.5 Alarm Hooters

Alarm hooters shall be suitable for indoor, or outdoor, application with the appropriate 4 x 4 in. electrical box. All hooters shall be 24 V DC operated. The minimum sound level shall be 90 db at 10 feet. Hooters shall be surface semi-flush mounted.

6.6 Monitor Module

i. The monitor module shall provide an addressable input for N.O. or N.C. contact devices such as manual stations, waterflow switches, sprinkler supervisory devices, etc.

ii. It shall provide a supervised initiating circuit. An open-circuit fault shall be annunciated at the Fire Alarm panel (Subsequent alarm shall be reported.)

iii. The device shall contain an LED which blinks upon being scanned by the Fire Alarm panel. Upon determination of an alarm condition of an alarm condition, the LED shall be latched on.

6.7 ADDRESSABLE CONTROL MODULE

a) Addressable Control Module shall be provided to operate dry contacts for switching ON OFF Pressurisation fans, AHU' s etc. in case of fire etc.

b) It shall have a built in type identification to automatically identify this device to the control panel.

c) It shall have internal circuitry & relay powered directly by two-wire loop.

6.8 Fault Isolator Device

i. The Fault Isolator Device shall detect and isolate a short-circuited segment of a fault-tolerant loop.

ii. The device shall automatically determine a return to normal condition of the loop and restore the isolated segment.

The fault isolator device shall be placed every [20] devices to limit the number lost in the event of a short-circuit.

7 FIRE ALARM PANEL

Fire Alarm panel shall be provided with 80 character backlit Liquid Crystal Display (LCD) Annunciator, function key pad, and printer as specified below. Necessary software and hardware shall be furnished at the location shown on the drawings.

7.1 Automatic Functions

The alarm shall be displayed at the FP on an LCD display. The FP printer shall print out the same information displayed on the LCD display.

7.2 Manual Functions

At any time, the operator shall have the following manual capabilities at the FP by means of switches located behind a key locked cover:

a) Initiate an alarm summary display on the FP LCD display. This display shall step through all currently active alarm in the system.

b) Initiate a summary printout of all currently active alarms on the FP printer.

c) Initiate an "all point summary" printout on the FP printer recording the status of each system point (initiating circuits, indicating circuits, etc.)

At any time the operator shall have the following manual capabilities at the FP under password control. Operator privileges and ID numbers of up to four digits shall be assignable only by the main operator or designated alternate. Actions taken by operators shall automatically be printed on the FP printer with operator initials, time and date.

d) Command output points to different mode. Such commands shall be printed with selected descriptors

ON/OFF, ON/OFF/AUTO, OPEN/CLOSE, DAY/NIGHT, etc.

e) Modify system parameters. Full alphanumeric key pad shall be provided for operators to modify the following parameters:-

change sensor alarm and prealarm thresholds
update date and time
change point descriptions
change action messages

f) Select a system status report for printing on the FP printer. The following real time reports shall be provided:-

all point log
alarm summary
trouble summary
status summary
sensitivity log
disabled points log
isolated points log
disconnected points log
logical group points log

The sensitivity log shall print the analog value of each addressable analog sensor.

g. Select printing of a trend log which, when enabled, shall print the last 24 analog values for every addressable analog sensor taken at predetermined intervals selected by operator. Systems which limit the number of addressable analog sensors which can be trended are not acceptable.

h. Select a sequence of preprogrammed commands which shall be automatically executed, in sequence, via a single command. Provide a minimum of 255 commands which can be divide among a minimum of seven sequences.

f. Perform a walktest function such that a single operator can periodically check out all initiating devices on a loop. In walktest mode all initiators on the selected loop shall automatically be isolated. As each device is placed into an alarm or trouble condition the FP shall print the condition and automatically reset the device. No audible signals shall be initiated from the loop to prevent disruption of building occupants. If a loop is inadvertently left in the walktest mode it shall automatically reset to normal after a five minute idle time is exceeded.

7.3 System Supervision

a) In the normal supervisory condition, only the green "POWER" LED, and green "RUN" LED shall be illuminated. The LCD display shall display "System Normal" and the current time and date.

b) The LCD display shall indicate the loss of power condition and the printer shall record same. Following restoration to normal AC power, the trouble indicators shall be automatically reset, and the printer shall record the return to normal condition.

c) The LCD display shall indicate the loop in trouble and the printer shall record same. Operation of a momentary "Silence" switch shall silence the audible trouble signal, but the visual "Trouble" LEDs shall remain on until the malfunction has been corrected and the system reset. The FP printer shall record this action.

The FP shall contain an integral backlit LCD display of two lines of 40 characters each, and a 40 character width printer. Both display and printer shall be viewable through the FP door.

7.4. Programming

The LCD display and printer programming shall be accomplished on-site by means of a lap-top personal computer which shall plug into the FP. Modules requiring off-site programming are not acceptable. Programming functions shall include alarm/trouble type assignment, point descriptor assignment, etc. Data file for the LCD display and printer shall be stored in EEPROM.

7.5 Networking

An additional output drive card must be provided to facilitate networking between two or more panels.

8. Approval of Fire Detection and Alarm System

The Contractor has to get the drawings for Fire Detection and Alarm System approved from the local fire authorities. On completion of the work, the Contractor has get the installation approved and obtain a certificate from the local fire authorities and handover the same to the Construction Manager. The contractor shall be responsible for obtaining the required approval from Tariff advisory committee and other statutory authorities.

9. Testing & Commissioning

9.1 PHOTOTHERMAL SMOKE AND HEAT DETECTOR :

9.1.1 The testing shall be carried out for each loop initially with one detector in a loop and subsequently two or more disassociated detectors in each loop with time gap between the detectors for alarm acknowledge and Reset.

9.1.2. An identified smoke detector will be subjected to smoke aspiration from burning paper or cigarette puffs, held at 0.3 m distance from the detector. The panel should indicate through piezo sounder and hooter that alarm signal has

been transmitted throughout the system. This test shall be carried out in different loops as well as two loops simultaneously. This part of the detector test shall be repeated again after 24 hours gap.

9.1.3 The same test in the same sequence shall be carried out for heat detector but with the application of heat from a hair dryer-held at approximately 60 cm distance. Repeat testing of the same detector shall be carried out at 24 hours interval.

9.2 Combined Test :-

9.2.1 The panel shall be checked for basic tests, such as, visual checking of input voltage and amperage. All loops one by one, shall be D-wired to check for fault signal indication in the panel.

9.3.2 Subsequently, in every loop of panel, a detector shall be subjected to smoke or heat test and signals shall be checked on the panel

9.3.1 The hooter shall sound automatically and the piezo sounders shall also sound. It shall also be possible to check that the hooters of all panels sound automatically when the panels are auto moded.

9.3.2 The power source shall be cut off and checked for standby supply from the batteries. After six hours the power source shall be switched on to check for auto switch over to mains mode. The trickle charger shall take over the charging of the battery to its maximum cut off level with auto cut off. A set of discharged batteries shall be connected to the panel in place of the new batteries and the trickle/boost switch checked for charging of the batteries.

9.3.2 Tests shall be conducted for AC failure, charger failure, battery disconnected or battery failure. In all such cases the relevant indication should come and the sounder shall also sound alarm.

9.4 Manual Call Box :

The manual call box glass shall be removed by unscrewing the back. The micro switch shall instantaneously give a fire signal in the pa

9.5 Random Sample Testing :

About 5% of all fire alarm components shall be subjected to random testing by connecting to the panels. All smoke detectors shall be tested as given above and later cleaned with a vacuum cleaner. Hooters shall also be tested through direct 24V supply. It shall be tested for 10 minutes.

9.6 Testing of Earthing system:

The earth continuity conductor including metallic parts of the equipments shall be tested for earth to electrical continuity. All tests shall be carried out as per IS 3043 and resistance of complete installation shall not be more than one ohm.

9.7 COMMISSIONING AND ACCEPTANCE TESTS

The commissioning and acceptance tests shall be apart from the standard or routine tests prescribed and normally conducted by the manufacturer and will be irrespective of the fact whether the same are covered by such tests or not.

Each sounder circuit shall be energised separately and the sound level reading taken to check for conformity with the minimum standards.

b. Mains failure performance

c. Battery disconnection test.

d. Open circuit of each sounder circuit to be tested.

e. Short circuit of each sounder circuit to be tested.

f. The results of the above tests either by fault warning or fire alarm shall be recorded in the log books which will be signed both by the Consultant and Engineer in charge.

Contractor shall preserve the copies of invoices, test certificates, gate passe s etcto prove the genuineness ofmaterial/purchases. The responsibility of proc urement, genuine material of specialized works shall rest with the contractor.

No inspection out side the country is permissible if required so the same will be deemed to be waived off and necessary test reports shall be submitted before the dispatch of equipment.

LIFTS

Special Condition for Comprehensive & Maintenance

Provision of maintenance service by the contractor comprehensive maintenance for five years.
The contractor shall perform the maintenance services as agreed to in the contract and in these general terms and conditions. In performing the said services, the contractor shall take all reasonable steps to maintain the equipment in proper operating condition. The contractor shall use trained and appropriately supervised personnel to perform the maintenance services shall be conducted during the normal working hours, shall send at regular intervals and as frequently as the company thinks necessary, having regards to the age, the nature and condition of the elevator (but not less than---------- times per annum), a technician to systematically inspect, adjust and lubricant the parts of the elevator to the extent necessary to maintain the elevator in satisfactory working order. If not separately agreed, any work conducted outside the normal working hours is not included in the price and shall be invoiced separately. The contractor will supply all lubricants (made as per standards of the contractor). Necessary for this purpose.
Upon notification by the costumer of a breakdown or failure in the elevator, the contractor shall send as soon as may reasonably be possible the during the contractors normal working hours a technician to carry out necessary repairs in order to restore the elevator to satisfactory working condition.
The contractor will carry out according to its standards customary annual safety test to examine all safety devices the contractor will not be required to make any other tests. The contractor will neither be required to install new attachments' nor to make replacements with parts of a defective design to the elevator whether or not recommended or directed by Insurance companies or by governmental or non governmental authorities.
In performing the services, the contractor will replace (identical or equivalent item) or rectify at its option any components of the elevator rendered defective due to normal wear and tear and arising out of ordinary and reasonable use of the elevator except for such items and conditions which are excluded hereunder as particular and general exclusions. The parts which are replaced shall become the contractor's property.
The contractor reserves the right to keep the control cubicle locked.
The equipment under contract will remain out of commissioning while the maintenance process is being carried out. No one will be allowed to use the equipment during this period.

TECHINICAL SPECIFICATION FOR ELEVATORS

1. Electric Supply

The available system of electric supply is 415 volts between phases and 230 volts between neutral & phase and neutral – 3 phase 4 wire AC 50 Hz system suitable for operation at ±10% of rated supply voltage. In addition for illumination and control power required for elevators and equipment shall be indicated in the tender. Power shall be provided at one point n each Machine Room at a point to be indicated by the Contractor. All subsequent electrical systems shall be the responsibility of the Contractor.

1.2 Technical Particulars

The technical particulars of the Elevators are detailed in the enclosed schedule. The schedule indicates the capacity, travel, speed, number of openings, machine room and hoist way sizes etc. Should any further information required by the Contractor the same can be obtained from the offices of the Consultants.

1.3 Driving Mechanism

1.3.1 Elevator Machine

The Elevator machine shall be suitable for 415 volts 3 phase 50 Hz AC supply with a voltage variation of +/- 10% and shall be placed directly above the hoist way upon the machine room floor slab and steel beam furnished in place by the Contractor.

The machine shall have a high efficiency and low power consumption and shall be designed to withstand the peak currents in lift duties. Anti vibration rubber pads of adequate thickness shall be used below the machine to reduce the noise and vibrations.

The elevator machine shall be worm gearless reduction type and shall consist of a motor, electromechanical brake worm gear, sheave shaft and sheave all completely mounted on a common bed plate. The worm shall be provided with ball bearings to take the end thrust and roller bearings shall be provided for the sheave shaft to ensure alignment and long bearing life. The hard alloy cast iron or steel sheave shall have rope grooves to ensure proper traction and minimum rope wear. Adequate means of lubrication shall be provided for all bearings and worm gear.

Means for manual operation of the lift car shall be made by providing winding wheel suitably marked to indicate the direction of the movement to enable the lift car to be brought to the nearest landing. There shall be a warning display for switching off electrical supply before the manual operations.

1.3.2 Brake

The electromagnetic brake shall be spring applied and electrically released. It shall come into action after the lift has come to a complete halt to hold the car in position. The brake shall operate automatically with the safety devices and release the brake manually such release requiring the action of manual force to move the lift in short stops.

1.3.3 AC Motor

The AC self lubricating motor shall be suitable for elevator use with high starting torgue and low starting current. Thermostats shall be embedded in the stator winding to indicate the temperature rise in the motor. The AC motor shall have class F insulation and suitable for 210 starts per hour with a maximum temperature rise of 50°C over the ambient.

1.4 Controls

The Elevators control shall be AC variable voltage variable frequency (A.C.V.V.V.F). The system shall control the starting, stopping direction of motion, running of the lift motor and application of the brake and/or safety devices in the event of power failure or any other emergency. It shall be so designed as to ensure a smooth and constant acceleration and retardation under all opening conditions.

The contractor shall be wall/floor mounted, vertical totally enclosed cubicle type with hinged doors on the front and the rear to provide easy access to all components in the controller. The cubicle shall be well ventilated such that the temperature inside never exceeds the safe limits of the components at ambient room conditions in the machine room.

The controller shall operate within the supply voltage variation of plus 10% to minus 20% of the nominal voltage.

a) Over current
b) Under voltage
c) Over voltage
d) Single phasing
e) Phase reversal

The controller shall be designed to cut off the power supply, apply the brake and bring the car to a rest in the event of any of the above failures occurring.

The Contractor must state clearly the forms of protection provide for each equipment.

If any devices of the electro mechanical type are used the same shall be equipped with arc chutes to prolong the life of contacts. Contractors must stipulate the type of devices used and the material of the contacts.

Contractors must support such offers with complete details of experience, number of lifts installed and operational in India, collaboration for equipment design and manufacture etc.

1.5 **Hoist Ropes**

Round standard steel wire ropes as per Indian standards shall be used for Lift suspension. The number and size of the hoist way ropes shall be so selected to ensure proper factor of safety minimum 10 and adequate traction for the elevator. The governor ropes shall also be wire ropes.

The Hoist way landing door shall be provided with an interlock such that:

a) It shall not be possible for the car to be started or kept in motion until all the landing doors and the car door are locked in the closed position.
b) It shall not be possible to open the landing door from the landing unless the Lift car is within the particular landing zone.
c) The car doors & Hoist way landing doors open automatically as the car is stopping at a landing. The closing of the car and landing door must occur before the car is set in motion.

1.6 **Car Platform**

The car platform shall be of framed construction and designed on the basis of rated load.

1.7 **Car Enclosure**

The elevator car enclosure shall be as per parameters enclosed in the schedule of quantities. The ceiling shall have an arrangement for a cabin fan mounted on the roof of the car. Indirect fluorescent lighting shall be provided to evenly illuminate the car. The car enclosure shall pre-laminated particle board 12 mm thick to wall and ceiling in desired shade and grooves covered with teakwood beading of desired shape with floor 5mm thick steel chequered plate.

Car Design:
Car walls finish stainless steel, front and doors in stainless steel, mirror on rear car panel, Dimpled anti skid vinyl flooring

Car operating Panel:
Stylish brushed SS finish car operating panel, visual call confirmation, dot matrix display,car position indicator

Landing doors:
fully automatic landing doors in powder coated finish

1.8 **Car Door**

The car entrance for the elevators shall be protected by Steel collapsible gate duly painted and providing car and landing doors with horizontal biparting as per IS14665

1.9 **Hoist way Landing Doors**

For the hoist way doors at each landing, two mild steel painted panels centre opening horizontal sliding doors shall be provided to give a clear opening as indicated in the technical parameters. These shall be duly painted to the shade approved by the institute and suit to the site condition.

1.10 **Car and Hoist way Operations**

The car and hoist way doors shall be mechanically connected such that both move simultaneously for opening and closing. The hoist way landing door shall be provided with and interlock such that.

It shall not be possible for the car to be started or kept in motion until all the landing doors and the card door are locked in the closed position.
It shall not be possible to open the landing door from the landing unless the lift car is within the particular landing zone.
The car doors and hoist way landing doors open automatically as the car is stopping at a landing. The closing of the car and landing door must occur before the car is set in motion.

2. **Door Hangers and Tracks**

The car and the landing door shall be provided with two point suspension sheave type hangers complete with tracks sheaves and rollers shall be steel with moulded nylon collar and shall include shielded ball bearings. Tracks shall be of suitable steel section with smooth surface. The landing doors shall be complete with headers, sills, frames etc as reqd.

2.1 **Cabin Fan**

A noiseless cabin fan shall be include for all elevators.

2.2 **Emergency Light**

An emergency light unit using sealed maintenance free battery power pack and flourescent lamp to operate automatically in case of power failure shall be provided in each elevator car.

2.3 **Alarm Bell**

An emergency alarm bell including wiring shall be provided and connected to plainly marked push button in the car operating panel. The alarm shall be provided in the Ground floor lobby if required, The Owner may at his own cost extend the alarm bell to the security/control room.

The alarm unit shall be solid state siren type operated by 2 nos. 9 volts dry batteries to give a waxing and warning siren when the alarm button in the car is pressed momentarily.

2.4 **Operation Buttons**

The following operation buttons shall be provided

2.5 **In Each Lift Car**

Stainless steel return panels of suitable thickness shall be provided on each side of the door with the following flush mounted controls on one side:-

a) Illuminated type push buttons corresponding to the floors served. Floor nos. on push buttons shall be numbered from 1 to onward.
b) Door open button

c) Emergency stop button
d) Emergency call button connected to a bell for an emergency signal
e) Two position key operated switch for 'with attendant' and 'without attendant' operation
f) Ventilation fan ON/OFF switch
g) Built in intercom of the pick and speak type
h) UP/DOWN direction display

2.6 **At Landing**

Illuminated type 'UP' and 'DOWN' push buttons at each intermediate landings and single illuminated type push buttons at terminal floors. The push buttons shall illuminated when the same is pressed to indicate that the call has been registered. The button shall remain illuminated until the call is answered.

One set of calling buttons shall be provided for a bank of two elevators

2.7 **Indications**

2.7.1 **In Each Car**

The following indications shall be provided in the cars:

a) Digital car position indicator provided above door to indicate the landing at which the car is stopped or passing.
b) Illuminate "UP" and "DOWN" arrows on the position indicator above door to indicate direction of travel.

2.17.2 ***At all landings***

Combined hall position indicator and hall lanterns is not part of the offer. This feature is generally a standard part of the equipment for Duplex Lifts i.e. two Lifts in the same control.

2.17.3 ***Safety Devices***

The following safety devices shall be provided:

2.17.4 ***Self Leveling***

The Lift shall be provided with a +/- 5mm self leveling accuracy feature of the two way automatic type. The self leveling device should automatically correct for under run, over run and rope stretch.

2.17.5 ***Terminal & Final Limits***

Terminal limit switches shall be provided to slow down and stop the car automatically at the terminal landings and final limit switches shall be furnished to automatically cut off the power and apply the brake should the car travel beyond the terminal landings.

2.17.6 ***Terminal Buffers***

Suitable spring buffers shall be used from existing Lift.

2.17.7 ***Interlocking***

Adequate interlocking is to be provided so that the car shall not move if the landing doors are even partially open.

2.17.8 ***Car Safety and Governor***

The car safety shall be provided to stop the car whenever excessive descending speed is attained. The safety will be operated by a centrifugal governor located at the top of the hoistway and connected to the governor through a continuous steel rope. Suitable means shall be supplied to cut off power from the motor and apply the break on application of the safety.

2.17.8 ***Fireman Switch***

Each elevator shall have a fireman switch glass front for access by the fireman. The operation of this switch shall cancel all calls to this Lift and will stop at the next nearest landing if traveling upwards. The doors will not open at this landing and the Lift will return to the ground floor. In case the elevator is traveling downwards when the fireman's switch is operated it will go straight to the ground floor by passing all calls enroute. The emergency stop button inside the car shall be rendered inoperative.

3. **Gearless machine:**
The gearless machine shall consist of a motor, traction sheave and break-drum or brake disc completely aligned on a single shaft. Gearless machine shall be A.C. gearless with VVVF drive.

4. **Hand winding wheel or handle:**
At times of lift stoppage due to any reasons, it shall be possible to move the lift car to the nearest landing manually. The manual operation shall be by means of winding. Wheel or handle mounted on the end of the motor shaft. The up or down direction of the movement of the car should be clearly marked on the motor or at suitable location. A warning plate written in bold signal red colour advising the maintenance staff to switch off the mains supply before releasing the break and operating the wheel is to be prominently displayed.

5. **Inter- communication system:**
Recommends for provision o f either an emergency or a telephone inside the car but as a general experience it is seen that over a period of time these devices become inoperative due to one reasons or the other. Therefore, in order to have at least one device of communication functioning at all the times, as an alternative arrangement, provision of both i.e. telephone with minimum tow connections-one at the operator's room and other at guard room and the emergency signal with re-chargeable batteries as source of supply shall be made in the lift cars.

The device used for emergency signals should incorporate a feature that gives immediate feed-back to the car passengers that the device has worked properly and the signal has been passed on to the intended agency. This shall be achieved by pressing of button from control room which shall give audio signal to the passengers in the car.

6. **Emergency Power Supply for lift car:**
This shall include suitable secondary battery with trickle/boost charge arrangement and inverter power pack with necessary contactors for supplying the light fixtures in the lift car. The same battery shall also feed the alarm bell and communication equipment.

7. **Car landings:**
All the lift car landing shall be well lit to an illumination level of 150 lux and shall be free from obstructions. The control for landing lights and the sigh lights shall be tamper proof. Wherever stand by power supply is available, these lights shall be connected to standby circuits also.

8. **Instructions:**
Detailed instructions as specified for guidance of passengers shall be prominently displayed inside the car by contractor and outside the car at all landings by the department. The Braile signage will be posted by the department outside lift lobby at all landings for the lift meant for barrier free requirements as per Appendix VII.

9. **Levelling:**
All lift (s) shall be incorporated with suitable floor leveling devices. In case of lifts with automatic power operated doors and with A.C. VVVF controller a separate level device for automatic leveling with leveling accuracy of ± 5mm shall be incorporated.

10. **Counter Weight Guards:**
Guards of wire metal/ mesh shall be provided in the lift pit to a suitable height above the pit floor to eliminate the possibility of injuries to the maintenance personnel.

11. **Guide shoes**:
Two numbers of guide shoes at the top and two numbers at the bottom shall be provided on the lift car and counter-weight.

12. **Type of shoes:**

For passenger lifts and bed-cum-passenger lifts

i. For speed upto 1.5 mps sliding guide shoes shall be used. Sliding guide shoes For car shall be always flexible and for counterweight solid guide shoes can be Used upto 1.0 mps.

ii. For speeds more than 1.5 mps roller guide shoes shall be used for car and Counter weight.

13. Rope fastenings:

The ends of lift ropes shall be properly secured to the car and counter weight hitch plates as the case may be with adjustable rope shackles having individual tapers babbit sockets, or any other suitable arrangement. Each lift rope shackle shall be fitted with a suitable shackle spring, seat washer, shackle nut & shackle nut split pin.

14. Guards for lift ropes:

Where lift ropes run round a sheave or sheaves on the car and/ or counterweight of gearless machine suitable guards shall be provided to prevent injury to maintenance personnel.

15. Number & size of ropes:

The contractor must indicate the number and size of lift ropes and governor ropes proposed to be used, their origin, type, ultimate strength and factor of safety. The contractor should furnish certificate of ropes from the rope from the rope manufacturers issued by competent authority.

16. Safety Equipments:

Every lift installation shall necessarily be provided with the following safety features:

The safety gear shall be provided in accordance with IS (part-4-Sec.4):2001, each type of car safety shall be actuated by a speed governor.

17. Governor:

The car safety shall be operated by speed governor located overhead and driven by governor rope suitable connected to the car and mounted on its own pulleys. The rope shall be maintained in tension by means of weighted or spring loaded tension sheaves located in the pit. Governor shall be provided for lifts with a travel of more than 5.5 meters. The governor rope shall be not less than 6mm in dia and shall be made of steel or phosforbronze. These shall be in accordance with IS 14665 (part 4/sec-4):2001. Governor for car safety gears shall be adjusted to actuate the safety gear at the following speeds: -

i. For rated speeds upto 1m/s maximum governor tripping speed shall be either 140 percent of rated speed or 0.88 m/s, whichever is higher. For rated speed above 1m/s maximum governor tripping speed shall be 115 per cent of the rated speed plus 0.25 m/s.

ii. Minimum governor tripping speed shall be 115 per cent of the rated speed.

18. The governor shall be of "V" groove wheel design and only wheel is stopped to actuate the car safety upon a pre-determined over speed downward without damaging the rope.

19. The governor, rope and sheave shall be so located so as to minimize danger of accidental injury to the equipment.

20. The governor sheave and tension sheave shall be according to clause 2.4 and the sheave bearing shall be according to clause 2.7 of this chapter.

21. The requirements for field tests on car safety and governor and for drop tests to sliding type can safeties shall be as specified in section IV of this specifications.

22. Buffers –

Buffers shall be oil resistant rubber pad type for speeds upto 0.25 mps and spring/ oil type for speeds upto 1.5 mps and only oil type for speeds higher than 1.5 mps.

Buffers shall be suitable for installation in the space available. Buffers anchorage at pit floors shall be installed avoiding puncturing of water proofing.

Oil buffers of the car and counter weight shall be of the spring return type of gravity type.

The partial compression of spring return oil buffe4rs when the car is in level with terminal landing will not be acceptable.

All buffers shall be tested at manufacturer's works and a copy of the test report shall be submitted.

When the lift car rests on fully compressed buffers there shall be at least 60 cms clearance between the lowest point in its car frame and any obstruction in the pit exclusive of buffers and their supports. Similarly when the lift car cross head is 60cm from the nearest obstruction above it, no projection on the car shall strike any part of overhead structure.

The contractor must indicate the name of buffer manufacturers, buffer stroke & certified maximum loads.

23. Door Locks:

Electro-mechanical door lock shall be provided for all the landing doors and they shall be such that the doors cannot open unless the car is at rest at the particular landing. It shall not be possible to move the car unless all the landing doors and the car door are closed and locked. This requirement however does not apply when the lift car is provided with automatic leveling devices and in such cases, it shall be permitted to move the car with both the doors open in the leveling zone for the purpose of leveling.

24. Automatic- cum-attendant operation:

i. Single automatic Push Button with/ without attendant – The operating devices for this operation shall incorporate in the car control panel, car buttons corresponding to the various landings served and single landing button at each landing, all electrically connected to controller governing floor selection, direction of travel, acceleration, retardation etc.

This system shall be so arranged that when the car is not in use, on pressing a landing call button the car shall start automatically provided all the doors are closed. During the movement of the car and also when car tops at floor landing, other landing call buttons are in-operative for a predetermined time. The pressing of a car button shall automatically start the car and sent it to the desired landing. In all the cases, the starting of the car is contingent on the establishment of landing door and car inter-lock circuits. To indicate the availability, or 'in use' light shall be place in the landing call button panel. When light shall be 'OFF' the passenger shall be able to call the car. In case of manual operated door if the lift is standing at any landing with doors open (when not in use), the pressing of the landing call button shall ring a bell, fitted at the top of car to attract the attention of the people soliciting their help for closing the lift door if any one of the them happens to be near the lift incase of power operated doors, the landing and car doors shall be arranged to open automatically when the car is parked at landing after all the calls are served and the lift is parked at any landing. The doors can remain open or alternatively if desired, the car shall be arranged to close after a pre-determined time unless closing is prevented or interpreted by the car doors re-opening device or the door open button.

The lift shall be suitable for dual operation with or without attendant by the provision of key operated transfer switch indicating 'attendant' and 'automatic' positions. During 'attendant' operations the landing call shall be disconnected from the control system and shall be connected to an announciator in the lift car. The attendant shall then operate the car to answer the registered calls. This operation is recommended for single speed control lift for low rising building having a single lift installation.

25. Simplex Selective-Collective operation with/ without attendant:

Automatic operation by means of one button in the car for each landing level served and by up and down buttons at the landings, wherein all stops registered by the momentary actuation of the car made defined under non-selective Automatic Operation but where in the stops registered by the momentary actuation of the landing buttons are made in the order in which the landing are reached in each direction of travel (irrespective of the sequence in which the buttons have been actuated). With this type of operation, all 'up' landing calls are answered when the car is traveling in the up direction and all 'down' landing calls are answered when the car is traveling in the down direction, except in the case of the uppermost or lowermost calls which are answered as soon as they are reached in-respective if the direction of travel of the car.

26. Duplex Collective Selective Operation with/ without attendant:

The control system for this operation shall be similar to the one described under simplex selective-collective operation except that in this system there shall be tow lift car adjacent wells. It shall be arranged to co-ordinate both cars for efficient service and prevent them from answering the same calls by the provision of only one set of landing call button fixtures. It shall automatically assign each call to the car that will be in the best position to answer promptly. The system shall be so arranged that when the cars are idle, normally one car will be parked at the lower main landing with its doors closed or

open and the other car shall be free car parked with the doors closed or open to the landing where it answered its last call, and shall be the one to attend to the nearest call.

Each car shall always respond to calls registered by its own car call buttons. When either car is parked out of service for any reasons the other car shall function as single car (simplex) selective collective. Besides the control system shall also arranged for independent service from inside the car.
A by-pass button (non-stop button) shall also be provided inside the car to enable the attendant to by-pass any landing if the car is full or if otherwise so required.
The two lifts shall be arranged with or without attendant operation and shall function as described using single car selective-collective operation. When the transfer switch is in the attendant position the operation of the cars shall be identical with that described for automatic operations except that:

i. Closing of doors and starting of cars shall be initiated by the car buttons only.
ii. Buzzers and directional lights in the car are operative, and
iii. Landing by-pass shall be effective.

The pressing of an up or down landing call shall illuminate appropriate direction indicator in the car panel, which is to answer that call and if the doors are open shall also sound buzzers as a signal to the attendant. If both cars are parked at the lower landing the above signals shall be given to the car which has been at the floor for longest time.

27. Automatic selection of traffic programme:

The group supervisory control continuously examines traffic conditions in the building and automatically puts into operation the programme which can best cope with the demand at any particular time. This is fully automatic and requires no supervision or attendant. To suit the traffic demand in the building, suitable traffic programmes can be selected for inclusion in this control.

28. Controlling Equipment:

The movement of the car shall be electrically controlled by means of a controller located in the machine room.

29. Control circuits:

The control circuit shall be designed to the type of lift specified for safety operation. It shall not be possible to start the car unless all the car and landing doors are fully closed and landing doors locked. The circuit shall have an independent fuse protection for fault and over loads and be arranged so that earth fault or an open circuit shall not create unsafe condition. The circuit shall be so arranged that for the stoppage of the car at specified landing or for actuation of a contactor by emergency switches or operation of safety gears the system shall not depend upon the completion or maintenance of an electrical circuit to cut off power supply and apply the brakes. This requirement is not applicable to dynamic braking and speed control devices.

30. Terminal Boards:

All wiring for external control circuits shall be brought to a terminal board with means of identification of each wire. Metallic/plastic identification tags shall invariably be provided. All connections of wires to terminal boards shall be adequately clamped or screwed.

31. Auxiliary Switches:

i. Emergency stop switches:
On top of the lift car an emergency stop switch shall be provided for use by maintenance personnel. Stop switch shall be provided in the machine room. Operation of these switches/ buttons shall cancel all the registered calls and landing calls for that particular lift.

ii. Maintenance switch on top of the car
For purpose of inspection and maintenance, maintenance switch shall be provided on top of the car. The control circuitory shall be so arranged that in the event of the operation of this switch:

a. The car speed shall be less than the rated speed not exceeding 0.85 meters/sec.
b. The car movement shall be possible only on the application of the continuous pressure on a button. It shall be so mounted to prevent any inadvertent operation.

iii. Fireman Switch:
Fireman switch with glass to break for access shall be provided at ground or main floor for all the lifts. The operation of this switch shall isolate/ or cancel all calls to all the lifts and the lifts will stop at he next nearest landing if traveling upward. The doors will not open at this landing and the lifts will start

traveling to ground floor. If these were already traveling down, they will go straight to ground floor direct without stopping enroute.

iv. Inspection facility:
An inspector's change over switch and set of test buttons shall be provided in the controller. Operation of the inspector's change over switch shall make both the car and landing buttons inoperative and permit the lift to be worked in either direction from machine room for test purposes by pressing corresponding test buttons in the controller. It shall not however interfere with the emergency stop switches inside the car or on the top of the car.

v. Safety line indicators:
If specified visual tell tale lights may be provided to monitor the conditions of faults in the safety line of the lift for easier fault finding. These indicators will remain lit when safety circuits are normal.
One indicator shall be provided for each safety on the controller. If any indicators fail to light up as the lift proceeds in its sequence of operation, there shall be visual indication of the safety line open circuit and also its location for easier fault finding.

32. Control Wiring:

i. Wiring in machine room:
Power wiring between the controller and main board controller to various landings shall be done in heavy gauge conduit or metal duct & shall conform to I.E. Rules 1956 and CPWD Specifications for electrical works. Following general principles shall be followed in siring:

a. i) Control cables carrying DC and power cable carrying AC shall not be run in the same conduit or metal duct and they shall be laid as per I.E. rules.
ii) Metal duct with removable inspection cover shall be preferred.
iii) in case of control cables also the harness shall be separate as far as feasible for separate functions and laid separately in suitably dimensioned metal duct or in a separate conduit such as the signal8ing, locking, lamp indication and safeties. Control cables for different voltages in the lift installation works should be laid as per IE. Rules.
b. At least 5 percent with a minimum of 5 unconnected spare wires shall be available out of all the lines to be provided in the wiring harness from the midway junction box to the machine room.
c. There shall be a master isolating switch Fuse associated with the controller heavy duty load break, quick make quick break type TP&N preferably interlocked with controller cabinet door. Isolator handle shall have provision for external locking in off position.
All relays shall be suitable for lift service and shall incorporate adequate Contact wipe for reliable operation. Relays shall operate satisfactorily between 80 percent to 110 percent of their voltage.
Main motor contactors shall be suitable for A.C. duty. Tenderer shall be required to furnish full details of make, type, applicable standard, voltage and current rating, duty class, type and routine tests done etc., on contactors and relays. Copies of type test certificates and other test certificates shall also be furnished by the successful tenderer.
All cables shall be with copper conductors and flame retardant or PVC insulated of appropriate size. The cables feeding motor and in heavy current flow paths shall be so selected that the size matches the protecting fuses and will not result in more than 2 percent voltage drop from the main board to the terminals of motor. Control cables shall not be less than 0.5 sq. mm. or equivalent if stranded; where installation of heavy gauge conduits present difficulties, short lengths of flexible conduits will be permitted but effective electrical continuity and earth bonding shall be ensured. Ferrules shall be slipped at the ends of all cables as per standard control wiring practice. All terminal blocks shall be suitably marked.

33. Trailing Cables:

A single trailing cable for lighting control and signal circuit is permitted, if all the conductors of this trailing cable are insulated for maximum voltage running through any one conductor of this cable. The lengths of the cables shall be adequate to prevent any strain due to movement of the car. All cables shall be properly tagged by metallic/plastic tags for identification.
Trailing cables shall run from a junction box on the top of the car to a junction box located in the shaft near mid point of travel and from these junction boxes conductors shall be run to the various locations
Trailing cables exceeding 30 meters in length shall run so that the strain on individual cable conductors will be reduced to a minimum and the cables are free from contact with the car counterweight, shaft walls or other equipment.
Trailing cables exceeding 30 meters in length shall have steel supporting fillers and shall be suspended directly by them without rubbing over other supports.

Cables less that 30 meters in length shall have no – metallic fillers and shall be suspended by looping cables around supports of porcelain spools type or equivalent.
5 per cent of the total capacity subject to a minimum of 5 wires shall be available unutilized in the trailing cable everywhere suitably distributed between various functions.

34. Earthing:
Metal frames and all metal work of the lift controller frame etc., shall be earthed with double earth leads taken to the earth bar. Looping shall be permitted if such routing is feasible. All other individual metallic frame work of components etc., shall be loop earthed.

35. Lift Rope Compensation:
The lift rope compensation for lift travel shall be provided for lift travels beyond 40m in all cases.

36. Automatic Rescue Devices (ARD):
The automatic rescue devices (ARD) meant for the purpose of bringing the lift car to the nearest landing doors. Are being used selectively and is generally restricted to commercial buildings having heavy traffic. However, frequent power failures being the common phenomenon, the provision of ARD shall be made in all the lifts in public buildings. The ARD shall have the following specifications:

i. ARD should move the elevator to the nearest landing in case of power failure during normal operation of elevator.
ii. ARD should monitor the normal power supply in the main controller and shall activate rescue operation within 10 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 operation is completed by the ARD the elevator is automatically switched over to normal operation as soon as normal power supply resumes.
iii. 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.
iv. All the lift safeties shall remain active during the ARD mode of operation.
v. The battery capacity should be adequate so as to operate the ARD at least seven times a day provided the duration between usages are at least 30 minutes.

LIST OF APPROVED MAKES

SL.NO.	DETAILS OF EQUIPMENT AND MATERIALS	MANUFACTURER'S NAME
1.	ELEVATORS	OTIS / KONE / SCHINDLER/MITSUBISHI/JOHNSON LIFTS PVT.LTD.

LIFT ADDITIONAL SPECIFICATION

List work item details and specification for items to be used in addition to CPWD specifications

1. SITC of MR Gearless lift having contract speed & serving different floors in the lift shaft as per detailed specifications enclosed and as under:

Built in special features:

a. Automatic Rescue Device- ARD Automatically takes the lift to the nearest level in the case of a power interruption.

b. VVVF Controller: This world leading technology comes standard in all Lifts. The Variable Voltage Variable Frequency (VVVF) control, ensures 50% energy savings. It also creates a super comfortable ride quality - when jerk- free starts and stops. Smooth acceleration and declaration and no landing variations. Time after time. I the long run, this prevents wear and tear of components, which comes means less downtime and huge savings on spares.

c. Stainless Steel Buttons: Sophisticated design - button flush with back plate. Orange LED illumination. Engraved numbers. Highly tamper resistant.

d. Fireman Switch: To enable fire- service personnel to take over complete control over one or more lifts.

e. VVVF Door Controller: Silken Smooth door movement. Advanced features like adjustable independent times for opening and closing. Slow -nudging features ideal for high traffic situations.

f. Infra Red Screen Sensor: Curtain of 154 infra red beams to prevent accidental closing of the door.

g. Infra Red Screen Sensor: Curtain of 154 infra red beams to prevent accidental closing of the door.

h. Floor Height Car Fixture: Designed specially for high- rise buildings. With Press & Speak facility and overload indicator.

i. Overload Indicator: When the lift is overloaded indicator light turns on and the alarm beeps.

j. Door Frame: Only lifts come with elegant door frames in corrosion - resistance, pre-coated steel that gives strength as well as an enlarged appearance.

16 PASSENGER (G+6) 03 Nos. LIFT SPECIFICATIONS

Type Of Lift	PASSENGER
Load / Speed	16 Persons (1088Kgs.) / 1.5 Mtr. Per Second
Drive	MICRO PROCESSOR BASED VVVF

Travel / PIT / HEADROOM	20 METER/ PIT 1600mm/ HEADROOM 4500 mm
Number Of Floors	(G+6) 7 floors
Floor Display Char	0,1,2,3,4,5,6
Number Of Landing Entrances	7 (G+6)
Number and Position of Car Entrances	1 (ONE), IN FRONT ONLY
Position Of Machinery	Directly Above the Lift Well- Gearless
Size of Lift Well	2500 X 2100 X (MM Wide * MM Depth * MM Height * M M E- Value)
Lift Car Inside Size	2000 X 1300 (MM Wide * MM Depth * MM Height * MM C-Value)
Clear opening of Gates / Doors / Lintel	1000 X 2000 (MM Wide * MM Height) Lintel - 2200 mm .
Type or Design of Lift Car	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH -
Additional Specification	As per CPWD specification and relevant IS code
Car Ceiling - Car Floor	SLEEK (SMALL CIRCULAR LIGHTS) - SS HAIRLINE FINISH –PVC
Car Fittings	LED LIGHTS & CROSS FLOW - FAN
Type Of Car Front Entrance Prot ection	POWER OPERATED CENTRE OPENING SLIDING D OOR -STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH
Land Entrance Protection (0,1,2, 3,4,5)	SIDE/ CENTRE OPENING SLIDING DOOR - STAINLESS STEEL (1.5 mm) – HAIRLINE FINISH
Landing Door Frame (0,1,2,3,4,5 ,6)	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH
Type Of Control System	MICROPROCESSOR BASED SIMPLEX SELECTIVE COLLECTIVE CONTROL WITH / WITHOUT ATTENDE NT
Electric Supply	AC 3 PHASE, 50 CYCLES, 415 VOLTS ±10%

Brail button	Yes
Automatic rescue device	Yes

16 PASSENGER (G+5) 01 Nos. LIFT SPECIFICATIONS

Type Of Lift	PASSENGER
Load / Speed	16 Persons (1088Kgs.) / 1.5 Mtr. Per Second
Drive	MICRO PROCESSOR BASED VVVF
Travel / PIT / HEADROOM	17 METER/ PIT 1600mm/ HEADROOM 4500 mm
Number Of Floors	(G+5) 6 floors
Floor Display Char	0,1,2,3,4,5
Number Of Landing Entrances	6 (G+5)
Number and Position of Car Entrances	1 (ONE), IN FRONT ONLY
Position Of Machinery	Directly Above the Lift Well- Gearless
Size of Lift Well	2500 X 2100 X (MM Wide * MM Depth * MM Height * M M E- Value)
Lift Car Inside Size	2000 X 1300 (MM Wide * MM Depth * MM Height * MM C-Value)
Clear opening of Gates / Doors / Lintel	1000 X 2000 (MM Wide * MM Height) Lintel - 2200 mm .
Type or Design of Lift Car	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH -
Additional Specification	As per CPWD specification and relevant IS code
Car Ceiling - Car Floor	SLEEK (SMALL CIRCULAR LIGHTS) - SS HAIRLINE FINISH –PVC
Car Fittings	LED LIGHTS & CROSS FLOW - FAN
Type Of Car Front Entrance Prot ection	POWER OPERATED CENTRE OPENING SLIDING D OOR -STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH

Land Entrance Protection (0,1,2, 3,4,5)	SIDE/ CENTRE OPENING SLIDING DOOR - STAINLESS STEEL (1.5 mm) – HAIRLINE FINISH
Landing Door Frame (0,1,2,3,4,5)	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH
Type Of Control System	MICROPROCESSOR BASED SIMPLEX SELECTIVE COLLECTIVE CONTROL WITH / WITHOUT ATTENDE NT
Electric Supply	AC 3 PHASE, 50 CYCLES, 415 VOLTS ±10%
Brail button	Yes
Automatic rescue device	Yes

08 PASSENGER (G+6) 03 Nos. LIFT SPECIFICATIONS

Type Of Lift	PASSENGER
Load / Speed	08 Persons (544Kgs.) / 1.5 Mtr. Per Second
Drive	MICRO PROCESSOR BASED VVVF
Travel / PIT / HEADROOM	20 METER/ PIT 1600 mm/ HEADROOM 4300 mm
Number Of Floors	(G+6) 7 floors
Floor Display Char	0,1,2,3,4,5,6
Number Of Landing Entrances	7 (G+6)
Number and Position of Car Entrances	1 (ONE), IN FRONT ONLY
Position Of Machinery	Directly Above the Lift Well- Gearless
Size of Lift Well	1900 X 1800 X (MM Wide * MM Depth * MM Height * M M E- Value)
Lift Car Inside Size	1300 X 1100 (MM Wide * MM Depth * MM Height * MM C-Value)
Clear opening of Gates / Doors / Lintel	800 X 1600 (MM Wide * MM Height) Lintel - 2000 mm .
Type or Design of Lift Car	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH -

Additional Specification	As per CPWD specification and relevant IS code
Car Ceiling - Car Floor	SLEEK (SMALL CIRCULAR LIGHTS) - SS HAIRLINE FINISH –PVC
Car Fittings	LED LIGHTS & CROSS FLOW - FAN
Type Of Car Front Entrance Prot ection	POWER OPERATED CENTRE OPENING SLIDING D OOR -STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH
Land Entrance Protection (0,1,2, 3,4,5,6)	SIDE/ CENTRE OPENING SLIDING DOOR - STAINLESS STEEL (1.5 mm) – HAIRLINE FINISH
Landing Door Frame (0,1,2,3,4,5)	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH
Type Of Control System	MICROPROCESSOR BASED SIMPLEX SELECTIVE COLLECTIVE CONTROL WITH / WITHOUT ATTENDE NT
Electric Supply	AC 3 PHASE, 50 CYCLES, 415 VOLTS ±10%
Brail button	Yes
Automatic rescue device	Yes

08 PASSENGER (G+5) 01 Nos. LIFT SPECIFICATIONS

Type Of Lift	PASSENGER
Load / Speed	08 Persons (544Kgs.) / 1.5 Mtr. Per Second
Drive	MICRO PROCESSOR BASED VVVF
Travel / PIT / HEADROOM	20 METER/ PIT 1600 mm/ HEADROOM 4300 mm
Number Of Floors	(G+5) 6 floors
Floor Display Char	0,1,2,3,4,5
Number Of Landing Entrances	6 (G+5)
Number and Position of Car Entrances	1 (ONE), IN FRONT ONLY
Position Of Machinery	Directly Above the Lift Well- Gearless

Size of Lift Well	1900 X 1800 X (MM Wide * MM Depth * MM Height * M M E- Value)
Lift Car Inside Size	1300 X 1100 (MM Wide * MM Depth * MM Height * MM C-Value)
Clear opening of Gates / Doors / Lintel	800 X 1600 (MM Wide * MM Height) Lintel - 2000 mm .
Type or Design of Lift Car	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH -
Additional Specification	As per CPWD specification and relevant IS code
Car Ceiling - Car Floor	SLEEK (SMALL CIRCULAR LIGHTS) - SS HAIRLINE FINISH –PVC
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Land Entrance Protection (0,1,2, 3,4,5)	SIDE/ CENTRE OPENING SLIDING DOOR - STAINLESS STEEL (1.5 mm) – HAIRLINE FINISH
Landing Door Frame (0,1,2,3,4,5)	STAINLESS STEEL (1.5 mm) - HAIRLINE FINISH
Type Of Control System	MICROPROCESSOR BASED SIMPLEX SELECTIVE COLLECTIVE CONTROL WITH / WITHOUT ATTENDE NT
Electric Supply	AC 3 PHASE, 50 CYCLES, 415 VOLTS ±10%
Brail button	Yes
Automatic rescue device	Yes

Note: Lift size of 16 passenger and 08 passenger dimension and sum minor specification should be changed as per site requirement.

Schedule of stage payment (In percentage of total cost)

SCHEDULE OF PAYMENTS

S.no	Description	Building Percentage Cost	Grand Total
1	**Upon completion all works upto plinth level (all earth Work , PCC work sand filling , Anti-termite treatment , RCC works DPC etc.**		10.58%
	Earth Work	1.13%	
	Cement Concrete	0.87%	
	RCC Work Foundation	5.63%	
	RCC Column Pedestals	0.65%	
	RCC Plinth Beams	1.25%	
	RCC Shear Wall	0.17%	
	RCC Work Grade Slab	0.88%	
2	**Upon completion of all RCC structural works for the building above Plinth level including mummty, overhead Water tanks , RCC parapets Etc.**		26.81%
	Level 1	4.05%	
	Level2	4.05%	
	Level3	4.05%	
	Level4	4.05%	
	Level5	4.05%	
	Level6	4.05%	
	Level7	2.51%	
3	**Upon Completion of All AAC Block Work above Plinth Level**		9.67%
	Level 1	1.47%	
	Level2	1.47%	
	Level3	1.47%	
	Level4	1.47%	
	Level5	1.47%	
	Level6	1.47%	
	Level7	0.85%	
4	**Upon Complition of all Cladding Works including Wall tiles and Terracotta jalli. Etc**		1.79%
5	**Upon Installation and Completion of Flush Doors , Fire doors frames and Shutter and Door and Window hardware**		3.55%
6	**Upon completion of installation of pressed steel door and window frames and , railing works and other steel Works**		2.73%
7	**Upon Completion of all Flooring Works including Copings , Skirting /Dado, Copings , OH Water Tank tile Works ,Etc**		4.63%
	Level 1	0.70%	
	Level2	0.70%	
	Level3	0.70%	
	Level4	0.70%	
	Level5	0.70%	
	Level6	0.70%	
	Level7	0.43%	
8	Upon completion of Khurras False ceiling Calcium silicate tile , At guest room toilets.including providing the sleeves for passing A.C. lines through RCC / walls in rooms and corridors at all floor level and in blocks of the buildings.		0.03%
9	Upon Completion all internal plastering Works , internal paint and Putty		5.83%
10	Upon completion of external Plaster and Ultratech Texture paint		5.05%
11	Upon completion of Road Works		0.62%
12	Upon Completion of Aluminum Glass door and Shaft Doors		0.08%

13	Upon Completion of all waterproofing works at roofs sunken area, mummty		1.14%
14	Upon completion of site Barricading		0.15%
15	Upon Complition of Landscape Works		1.48%
16	**PLUMBING WORKS**		5.42%
1	Upon installation of complete sanitary fittings and fixtures including water cooler	1.02%	
2	Upon completion of internal drainage (Soil, Waste and Vent Pipes)	1.32%	
3	Upon completion of internal water supply	1.20%	
4	Upon completion of External drainage	0.56%	
5	Upon completion of Rain water drainage	0.92%	
6	Upon installation and commissioning of Ground floor pumps (Underground water tank to overhead tank)	0.10%	
7	Upon installation and commissioning of Terrace pumps (Electric Hot water generator)	0.21%	
8	Upon completion of Puddle flanges	0.09%	
17	Upon Completion of Fire Fighting Works		1.22%
18	Electrical Works		15.26%
A	**Upon completion of electrical wiring, DB's with MCCB's & RCCB's etc., cable tray & raceway, etc., earthing & lightning protection**		
1	Supplying, laying of conduit, boxes,Switches, MCB's, Fan boxes and drawing of wires of all floors	3.22%	
2	Supply of Distribution Boards	0.57%	
3	Supply of internal Light Fixture and Fans	0.85%	
4	Installation of above Equipments	0.56%	
5	Testing and commissioning of all equipment's	0.84%	
B	**Upon completion of electrical panels, cable & cable tray & raceway, etc.,**		
1	Suppy and laying of Cable and Cable trays of all floor	3.83%	
2	Supply of MV PANELS	0.71%	
3	Supply of UPS	0.05%	
4	Installation of above Equipments	0.56%	
5	Testing and commissioning of all equipment's	0.83%	
C	**Upon completion of earthing of all panel and equipments , etc.,**		
1	Supply and Laying of Earthing	0.32%	
2	Installation of above Equipments	0.04%	
3	Testing and commissioning of all equipment's	0.06%	
4	Upon Supply,Installation, Testing and commissioning of Lighting Protection	0.44%	
5	Upon Supply,Installation, Testing and commissioning of Fire Alarm System	1.97%	
	EXTERNAL LIGHTING WORKS		

D	**Upon completion of External lighting, Feeder Pillar,Cable etc.**		
1	**Supply of Street Light, Bollard, Post-Top Light with Street Light Poles**	0.13%	
2	**Supply of Cables**	0.14%	
3	**Supply of Feeder Pillar**	0.03%	
4	**Installation of above**	0.04%	
5	**Testing and commissioning of all equipment's**	0.07%	
E	**Upon Completion of Lift Works**		3.96%