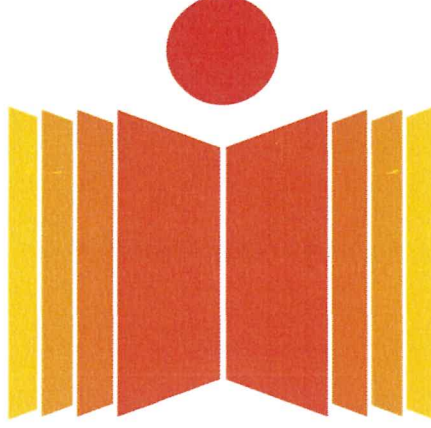


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भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Volume - 3

TECHNICAL SPECIFICATIONS - CIVIL WORKS

Name of the work: Construction of Director's Residence cum Integrated Office Ancillary Buildings including Boundary wall at IIT Hyderabad, Kandi, Sangareddy.


Executive Engineer (Civil)
IIT Hyderabad

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SCOPE OF WORK

[1] Construction of Director's Residence cum Integrated Office Ancillary Buildings including Boundary wall at IIT Hyderabad.

Scope of Work

The scope of work under this contract shall include, but not be limited to, the following:

- Construction of the Director's Residence-cum-Integrated Office Building comprising Ground Floor + First Floor (G+1) RCC framed structure including servant quarter having a cumulative plinth area of 560 Sq.m, with a floor-to-floor height of 3.60 m for both floors, complete in all respects.
- Construction of the building in accordance with the approved architectural, structural, electrical, plumbing, HVAC (where applicable), and service drawings, Schedule of items, technical specifications, relevant Indian Standards (IS Codes), National Building Code (NBC), CPWD Specifications (latest edition), and directions of the Engineer-in-Charge.
- **Execution of all structural works including:**
 - Site clearance and setting out.
 - Earthwork in excavation and backfilling.
 - PCC, RCC foundations, columns, beams, slabs, staircases, lintels, chajjas, sunshades, and other structural components.
 - Reinforcement steel, formwork, concrete, curing, and all associated structural works.
- **Construction of the Director's Residence comprising functional residential spaces including:**
 - Three bedrooms.
 - Living room.
 - Dining room.
 - Kitchen.
 - Prayer room.
 - Toilets and washrooms.
 - Utility areas.
 - Internal circulation spaces.
 - Balconies, verandahs, and other architectural elements as shown in the approved drawings.
- **Construction of the Integrated Office within the Director's Residence, including:**
 - Office rooms/workspaces.
 - Washroom facilities.
 - Waiting and circulation areas, wherever provided.
 - Associated architectural finishes and functional requirements as indicated in the approved drawings.
- Construction of one staircase and installation of one passenger lift complete with lift shaft, machine room (where applicable), pit, associated civil works, electrical connections, testing, commissioning, statutory approvals, and handing over in operational condition.
- Construction of the Servant Quarter complete in all respects as per the approved drawings, including all civil, architectural, plumbing, sanitary, electrical, and finishing works.

- Construction of the **compound wall** of Approximate Length 340 meters enclosing the entire Director's Residence and Servant Quarter within the designated site boundary, including:
 - RCC Foundations, columns and plinth beam.
 - Steel work
 - Finishing and Painting.
 - Entrance/Exit gates at required locations
 - Pedestrian gate, if required
 - Gate pillars.
 - Security provisions as shown in the drawings.
- **Execution of all architectural works including:**
 - Brick/Block masonry.
 - Internal and external plastering.
 - Waterproofing treatments.
 - Flooring and skirting.
 - Wall dado.
 - Stair finishes.
 - Roofing and terrace treatments.
 - Ceiling works including false ceilings wherever specified.
 - Cladding, coping, parapets, and other architectural finishes.
- Supply and fixing of all doors, windows, ventilators, glazing, hardware, louvers, railings, grills, handrails, and all associated fittings complete.
- **Supply, fabrication, and installation of all fixed furniture and joinery items including:**
 - Wardrobes.
 - Modular kitchen.
 - Kitchen cabinets.
 - Storage units.
 - Counters.
 - Shelves.
 - Mirrors.
 - Vanity units.
 - Other built-in furniture as indicated in the drawings.
- **Execution of all plumbing and sanitary works including:**
 - Internal water supply.
 - Soil, waste and vent piping.
 - Internal drainage.
 - Rainwater drainage.
 - Sanitary fixtures.
 - CP fittings.
 - Water storage tanks. (Underground and Overhead)
 - Pumps wherever specified.
 - Testing and commissioning.
- **Execution of complete electrical works including:**
 - Internal electrification.
 - Lighting systems.
 - Power wiring.
 - Distribution boards.
 - Earthing.
 - Lightning protection.
 - Cable laying.

- Switchgear.
 - Electrical panels.
 - External electrical services.
 - Testing and commissioning.
- Supply and installation of all lighting fixtures, ceiling fans, exhaust fans, decorative lighting fixtures, and electrical accessories as specified in the tender documents.
- **Execution of external development works including:**
 - Internal access pathways, wherever specified.
 - Paved areas.
 - Surface drainage.
 - External water supply.
 - Sewer connections.
 - Storm water drainage.
 - Landscaping provisions.
 - Site grading.
 - External utility connections.
 - Miscellaneous site improvements shown in the approved drawings.
- **Carrying out all painting and finishing works including:**
 - Internal painting.
 - External painting.
 - Wood polishing.
 - Enamel painting.
 - Protective coatings.
 - Texture finishes.
 - All decorative finishes specified in the tender.
- **Provision of all temporary works necessary for execution of the project including:**
 - Site office.
 - Storage facilities.
 - Temporary utilities.
 - Barricading if required
 - Safety arrangements.
 - Scaffolding.
 - Dewatering, if required.
 - Protection of existing structures and services.
- Procurement, transportation, storage, handling, testing, and incorporation of all materials required for execution of the works, ensuring compliance with approved specifications and quality standards.
 - Conducting all required field tests, laboratory tests, inspections, third-party testing (where specified), quality assurance procedures, and obtaining necessary approvals before and during execution.
 - Coordination with statutory authorities and obtaining all approvals, inspections, clearances, certificates, and permissions required for execution and commissioning of the works, wherever the responsibility rests with the contractor.
 - Protection of completed works until final handing over, including maintenance of finished surfaces and replacement of damaged work at no additional cost.
 - Removal of construction debris, dismantling of temporary works, cleaning of the entire site, and restoration of affected areas to the satisfaction of the Engineer-in-Charge.

- Testing, commissioning, trial operation, and demonstration of all building services, electrical systems, plumbing systems, lift installation, and other utilities to establish satisfactory performance.
- **Submission of all completion documents including:**
 - As-built drawings.
 - Test certificates.
 - Operation and Maintenance (O&M) manuals.
 - Warranty documents.
 - Manufacturer's certificates.
 - Statutory approvals.
 - Completion reports and any other documentation required under the contract.
- Handing over the completed Director's Residence-cum-Integrated Office, Servant Quarter, Compound Wall, and all associated infrastructure in a safe, functional, fully operational, and defect-free condition ready for occupation.
- The work shall be executed strictly in accordance with the Schedule of items, approved drawings, technical specifications, contract conditions, relevant Indian Standards (IS Codes), CPWD Specifications (latest edition), National Building Code (NBC), and the instructions of the Engineer-in-Charge.
- The Schedule of items, architectural drawings, structural drawings, service drawings, and other tender documents are enclosed for guidance to enable bidders to understand the nature, scope, and magnitude of the work and to prepare their bids accordingly.

COMMON SPECIFICATIONS

GENERAL CONDITIONS

General specifications for construction:

1. Several documents forming the Bid are to be taken as mutually complementary to each another.
2. Except for the items, for which particular specifications are given or where it is specifically mentioned otherwise in the description of the items, the work shall generally be carried out in accordance with the following:

Civil work:

1. CPWD Specifications 2019 Volume- I
2. CPWD Specifications 2019 Volume- II
3. MORTH specifications (5th Edition) published by IRC with up-to-date amendments.

All above specifications shall be applicable with corrections slips up to the last date of submission/ uploading of Bid.

All above specifications hereinafter shall be referred as CPWD specifications. Wherever CPWD Specifications are silent, the latest BIS Codes/Specifications, National Building Code 2016, MoRTH specification or any other specification shall be followed.

If there is any difference or discrepancy between the description of items as given in the schedule of items, Approved Architectural and Structural Drawings, particular specifications for individual items of work (including special conditions) and BIS Codes etc., the following order of preference shall be followed:

- a) Detailed description of each item as mentioned in the Scope, Schedule of Items & Nomenclature, Technical Specifications of Items of works
- b) Approved Architectural and Structural Drawings.
- c) CPWD Specifications, Civil, Electrical & Mechanical and Horticulture with up-to-date corrections as on last date of submission of Bid.
- d) Manufacturer's Specifications
- e) Indian Standard Specifications of B.I.S.
- f) National Building Code 2016.
- g) Sound Engineering practices.
- h) Decision of Engineer-in-charge.

A reference made to any Indian Standard Specifications in these documents, shall imply to the latest version of that standard, including such revisions/ amendments as issued by the Bureau of Indian Standards up to last date of

submission of Bids. The Contractor shall provide and make it available at his own cost all such publications of relevant Indian Standards applicable to the work at site, with correction slips up to last date of submission of Bids.

GENERAL:

1. The Bidder shall acquaint himself with the proposed site of work, its approach roads, working space available etc. before quoting his rates and no claim on this account shall be entertained by the department.
2. 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.
3. Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.
4. The Contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the occupiers of adjacent properties and to the public in general and to prevent any damage to such properties and any pollution of smoke, streams and water-ways. He 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 thereon by the Contractor. All waste or superfluous materials shall be disposed of by the Contractor without any reservation entirely to the satisfaction of the Engineer-in-charge. Nothing extra shall be paid on this account.
5. Utmost care shall be taken to keep the noise levels to the barest minimum so that no disturbance as far as possible is caused to the occupants / users of building/adjacent properties.

SETTING OUT:

1. The Contractor shall establish, maintain and assume responsibility for grades, lines, levels and bench marks. He shall report any errors or inconsistencies regarding grades, lines, levels, dimensions to the Engineer-in-charge before commencing work. Commencement of work shall be regarded as the Contractors acceptance of such grades, lines, levels and dimensions and no claim shall be entertained at a later date for any errors found.
2. If at any time, any error in this respect shall appear during the progress of the work, the Contractor shall, at his own expense rectify such errors, if so required to the satisfaction of the Engineer-in-charge.

- a) Though the site levels may be indicated in the drawings, the Contractor shall ascertain himself and confirm the site levels with respect to GTS (Global Trigonometrical Survey) Bench mark from the concerned authorities.
- b) The approval by the Engineer-in-charge of the setting out by the Contractor shall not relieve the Contractor of any of his responsibilities.
- c) The Contractor shall be entirely and exclusively responsible for the horizontal, vertical and other alignment, 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 instructions and satisfaction of the Engineer-in-charge-in-Charge.
- d) The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference bench mark, spot levels, construction of all safety and protection devices, barriers, earth embankments, preparatory works, all testing of materials, working during monsoon, working at all depths, height and locations etc. unless specified in the schedule of items.

Temporary Water, Electricity & Telephone Connections:

1. The Contractor shall make his own arrangements for water and for Electricity by obtaining electric connections and by providing diesel generators of adequate capacity if required and make necessary payments directly to the State Govt. departments concerned. Contractor shall get the water tested from laboratory approved by the Engineer-in charge at regular interval as per the CPWD Specifications 2019. All expenses towards collection of samples, packing, transportation, testing charges etc. shall be borne by the Contractor.
2. The Contractor shall arrange electricity at his own cost for testing of the various electrical installations as directed by Engineer-in-charge and for the consumption by the Contractor for executing the work. Also all the water required for testing various electrical installations, fire pumps, wet riser / firefighting equipment's, fire sprinklers etc. and also testing water supply, sanitary and drainage lines, water proofing of underground sump, Terrace tanks, water proofing treatment etc. shall be arranged by the Contractor at his own cost. Nothing extra shall be payable on this account.
3. Arrangement of temporary telephone, Internet, water and electricity connections required by Contractor, shall be made by him at his own cost and also necessary permissions shall be obtained by him directly from concerned authorities, under intimation to the Department. Also, all initial cost and running charges, and security deposit, if any, in this regard shall be borne by him. The Contractor shall abide by all the rules/ bye laws applicable in this regard and he shall be solely responsible for any penalty

on account of violation of any of the rules / byelaws in this regard. Nothing extra shall be payable on this account.

4. The Contractor shall be responsible for maintenance and watch and ward of the complete installation and water / electricity meter and shall also be responsible for any pilferage, theft, damage, penalty etc. in this regard. The Contractor shall indemnify the Department against any claim arising out of pilferage, theft, damage, penalty etc. whatsoever on this account. Security deposit for the work shall be released only after No Dues Certificates are obtained from the local Authorities from whom temporary electric/ water / telephone connection have been obtained by the Contractor. Nothing extra shall be payable on this account.
5. The Department shall in no way be responsible for either any delay in getting electric and/or water and/or telephone., Internet connections for carrying out the work or not getting connections at all. No claim of delay or any other kind, whatsoever, on this account shall be entertained from the Contractor. Also, contingency arrangement of stand-by water & electrical supply shall be made by the Contractor for smooth progress of the work so that work does not suffer on account of power failure or disconnection or not getting connection at all. No claim of any kind whatsoever shall be entertained on this account from the Contractor. Nothing extra shall be payable on this account.

EXECUTION:

1. The work shall be carried out in accordance with the detailed nomenclature of each Schedule of items, Architectural and structural drawings issued by the Engineer-in-charge through an architectural/structural consultants engaged by the Institute. Before commencement of any item of work the Contractor shall correlate all the relevant architectural and structural drawings, nomenclature of items and specifications etc. issued for the work and satisfy himself that the information available there from is complete and unambiguous. The figures and written dimension of the drawings shall be superseding the measurement by scale. The discrepancy, if any, shall be brought to the notice of the Engineer-in-charge before execution of the work. The Contractor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and or incomplete information and no claim whatsoever shall be entertained on this account.
2. The Contractor shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other Contractor(s) or by the Engineer-in-charge and shall as far as possible arrange his work and shall place and dispose of the materials being used

or removed, so as not to interfere with the operations of other Contractor & simultaneously working or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of others.

3. The cost of work shall be inclusive of pumping out or bailing out water encountered in foundation, if required, for which no extra payment will be made. This will include water encountered from any source, such as rains, floods, and sub-soil water table being high due to any other cause whatsoever.
4. The foundation trenches shall be kept free from water while works below ground level are in progress.
5. Samples including brand /quality of materials and fittings to be used in the work 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. Nothing Extra shall be paid on this account.
6. Unless otherwise specified in the schedule of items, the rates quoted by the Contractor for all items of the work shall be inclusive of cost of all Labour, material, leads & lifts, tools & plants, mandatory taxes direct and indirect costs and other inputs involved in the execution of the item. Nothing extra shall be paid on this account.
7. Royalty or Seigniorage fee for all the boulders, stone aggregate, brick aggregate, shingle, coarse or fine sand, earth, gravel, bajri etc. collected by him for the execution of the work, and payment need to be done directly to the Revenue Authority or authorized agent of the State Government concerned or Central Government. Further, the Contractor needs to submit proof of submission of full royalty to the State Government or local authority. Nothing extra shall be payable on this account.
8. Any cement slurry/bonding material added over base surface for continuation of concreting for better bond is deemed to have been built in the items and nothing extra shall be payable and no extra cement considered in consumption on this account.
9. Unless otherwise specified in the contract, no payment shall be made for any damage caused by rain, snowfall, flood or any other natural calamity, whatsoever during the execution of the work. The Contractor shall be fully responsible for any damage to the Govt. property and work for which the 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.

10. The Contractor shall be required to protect the flooring work with suitable material till handing over of the building. Nothing extra shall be payable on this account.
11. The Contractor shall provide for adequate number of garbage bins around the construction site and the workers facilities and will be responsible for the proper utilization of these bins for any solid waste generated during the construction. The Contractor shall ensure that the site and the workers facilities are kept litter free. Separate bins should be provided for plastic, glass, metal, biological and paper waste and labelled in both Hindi and English with suitable symbols.
12. The Contractor shall be responsible for the watch and ward / guard of the building's safety, fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the department. No extra payment shall be made on this account.
13. Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar service encountered in the course of the execution of work shall be protected against the damage by the Contractor at his own expense. In case the same are to be removed and diverted, the same shall be payable to the Contractor unless specified in the item or specifications concerned to that item. The Contractor shall work out the cost and submit to Engineer-in-charge for approval. 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.
14. The Contractor(s) shall obtain all requisite permission/ licenses from the Municipality, police and other authorities that may be required as per law for temporary constructions, enclosures etc. Contractor(s) shall pay necessary charges on account of these operations in executing the contract for which nothing shall be paid. He shall make good any damage to the property whether public or private and shall maintain lights either for illumination or for cautioning the public at night. The Contractor(s) shall erect the barricading as per norms mentioned in the Bid document or higher height enclosing the area as per direction of Engineer-in-charge, and nothing extra will be payable on this account.

15. The Contractor(s) shall take instructions from the Engineer-in-charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall be stacked on areas where other buildings, roads, services and compound walls are to be constructed. The stacking shall take place as per stacking plan. However, if any change is required, the same shall be done with the approval of Engineer-in-charge.
16. Contractor(s) shall provide Permanent Bench Marks, flag tops and other reference points for the proper execution of work and these shall be preserved till the end of the work. All such reference points shall be in relation to the levels and locations, given in the Architectural and plumbing drawings.
17. Construction Site premises, temporary barrication shall be done based on the requirement as per the Directions of the Engineer In-Charge with barricading system of MS Framework with pre-coated Galvanized sheets.
18. No foreign exchange shall be made available by the Department for importing (purchase) of equipment, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor, on account of variation in the foreign exchange rate.
19. Water tanks, taps, sanitary, water supply and drainages pipes, fittings and accessories should conform to the specifications provided in Bidding documents, if CPWD Specifications are not available, NBC – 2016, IS codes shall be followed. The Contractor(s) should engage approved plumbers for the work and get the materials (fixtures/fittings) tested, by the municipal Body/Corporation authorities wherever required at his own cost.
20. The Contractor shall get the water tested with regard to its suitability for construction and conforming to the relevant BIS Code at 3 months' frequency or on change of source of water whichever is earlier. The Contractor shall obtain written approval from the Engineer-in-charge before he proceeds by using the same for execution of work. The water testing charges shall be borne by the Contractor.
21. All materials obtained/procured from Govt. Stores or otherwise shall be got checked by the Engineer-in-charge or his any authorized representatives on receipt of the same at site before use by making MIRs as required by all the stakeholders.
22. All material shall only be brought at site as per program finalized with the Engineer-in-charge. Any redelivery of the material not required for

- immediate consumption shall not be accepted and thus not be paid for.
23. All materials and fittings 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. If a particular brand of material is specified in the item of work in Schedule of Quantity, the same shall be used after getting the same approved from Engineer-in-charge. Wherever brand/quality of material is not specified in the item of work, the Contractor shall submit the samples as per approved list of brand/Make names given in the Bid document/particular specifications for approval of technical sanctioning authority. For all other items, materials and fittings of BIS Marked shall be used with the approval of Engineer-in-charge. Wherever BIS Marked material / fittings are not available, the Contractor shall submit samples of materials / fittings manufactured by firms of repute conforming to relevant specifications or BIS codes and use the same only after getting the approval. To avoid delay, Contractor should submit samples as stated above well in advance so as to give timely orders for procurement. If any material, even though approved by Engineer-in-charge is found defective or not conforming to specifications, shall be replaced / removed by the Contractor at his own risk & cost.
24. The day-to-day receipt and issue accounts of different grade/brand of cement shall be maintained separately in the standard Performa by the Contractor which shall be periodically checked by the Engineer-in-charge or his authorized representative.
25. Cement bags shall be stored in two separate stacks, one for tested cement and the other for fresh cement (under testing) to be constructed by the Contractor at his own cost as per sketches given in C.P.W.D Specifications – 2019 Vol. I to II with up-to-date correction slips having weatherproof roofs and walls. The size of the cement godown is indicated in the sketch for guidance. The actual size of godown shall be as per site requirements and nothing extra shall be paid for the same. The decisions of the Engineer-in-charge regarding the capacity needed will be final. The authorized representative of the Contractor at the site of work is responsible for the issue of cement from godown according to the daily requirement with the knowledge of Engineer-in-charge or his authorized representative. The account of daily receipt and issue of cement shall be maintained in a register in the prescribed proforma and signed daily by the Contractor or his authorized agent in token of its correctness.
26. For construction works which are likely to generate malba / rubbish, the Contractor shall dispose of malba / rubbish & other unserviceable

materials and wastes at his own cost to the notified specified Municipal dumping ground only and under no circumstances these shall be stacked / dumped even temporarily, outside the construction premises

27. The Contractor shall arrange all the materials and manpower in advance for execution of work within stipulated period and as per Milestones specified in the Bid document.
28. The Contractor shall give performance test of the entire installation(s) as per the specifications & codes in the presence of the Engineer-in-charge or his authorized representative before the work is finally accepted and nothing extra what-so-ever shall be payable to the Contractor for the test.

Scaffolding & Staging:

1. Wherever required for the execution of work, all the scaffolding shall be provided and suitably fixed, by the Contractor. The scaffolding shall be provided strictly with steel double scaffolding system, suitably braced for stability, with all the accessories, gangways, etc. with adjustable and suitable working platforms to access the areas with ease for working and inspection. Single scaffolding system is strictly prohibited and shall invite necessary action. It shall be designed to take all incidental loads. It should cater to the safety features for workmen. It shall be ensured that no damage is caused to any structure due to the scaffolding. Nothing extra shall be payable on this account.
2. Any particular structural system may involve requirement of scaffolding and staging for its execution. Since the choice of selection of structural system is left to the Contractor, the rates quoted by him are deemed to be included for the requirement of scaffolding and staging for that particular structural system. Hence nothing extra is payable for using scaffolding or staging or any other supporting system for a given structural system chosen by the Contractor.
3. The Contractor should submit the shop drawings of staging and shuttering for approval of Engineer-in-charge before actually commencing the execution of work under the item. Nothing extra shall be payable on this account.

Co-ordination with other agencies:

1. The Contractor shall execute his work so as not to interfere with or hinder the progress of the work being performed by other Contractors or by the Engineer-in-charge. As far as possible, he shall arrange his work and place, so as not to interfere with the operations of other

Contractors or shall arrange his work with that of the others, in an acceptable and coordinated manner and shall perform it in proper sequence.

Procurement of materials:

1. All material shall only be brought at site as per program finalized with the Engineer-in-charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.
- 2 The Contractor shall procure the required materials in advance so that there is sufficient time for testing of the materials and approval of the same before use in the work.

**PARTICULAR SPECIFICATIONS FOR
CIVIL WORKS**

1.0 EARTH WORK: -

- 1.1 The work shall be done in accordance with CPWD Specifications - 2019 - Vol. I & Vol. II and National Building Code 2016 with up-to-date correction slips.
- 1.2 Excavation shall be undertaken to the width of the Basement / Retaining wall footing including necessary margins for construction operation as per drawing or directed otherwise. Where the nature of soil or the depth of the trench and season of the year, do not permit vertical sides, the contractor at his own expense shall put up the necessary shoring, strutting and planking or cut slopes with or without steps, to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer – in – charge.
- 1.3 Wherever the Black-cotton soil encountered in foundations of proposed structures shall be removed the black Cotton soil in total till the moorum strata reaches and as per the structural designer's recommendations.
- 1.4 Exactions in encountered Hard rock shall be carried out with suitable methods like chemical cracking with non-explosive chemicals etc., except blasting and as per the directions of Engineer in Charge.
- 1.5 The contractor shall make at his own cost all necessary arrangements for maintaining water level, in the area where works are under execution low enough so as not to cause any harm to the works or problems in carrying out with the execution. The water coming from any source, such as rains, accumulated rain water, floods, leakages from sewer and water mains, subsoil water table being high or due to any other cause whatsoever. The contractor shall make necessary provision of pumping, dredging, and bailing out water coming from all above sources and excavation and other works shall be kept free of water by providing suitable system approved by the Engineer-in-charge.
- 1.6 All the major excavation shall be carried out by mechanical excavator.

2.0 Anti-termite treatment

Diluting and injecting chemical emulsion for POST CONSTRUCTIONAL anti-termite treatment shall be carried out as per the BIS 6313.

Materials

Chemicals: Any one of the following chemicals in water emulsion to achieve the percentage concentration specified against each chemical shall be used:

- (i) Chlorpyrifos Emulsifiable Concentrate (EC) of 20%
- (ii) Imidacloprid 30.5% Suspension Concentrate (SC)
- (iii) Bifenthrin 2.5% Emulsifiable Concentrate (EC)

Anti-termite treatment chemical is available in concentrated form in the market and concentration is indicated on the sealed containers. To achieve the specified percentage of concentration, Chemical should be diluted with water in required quantity before it is

used. Graduated containers shall be used for dilution of chemical with water in the required proportion to achieve the desired percentage of concentration. For example, to dilute chemical of 20% concentration, 19 parts of water shall be added to one part of chemical for achieving 1% concentration.

3.0 CONCRETE WORK: -

The work shall be done in accordance with CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.

1.0 R.C.C./P.C.C WORK (DESIGN MIX CONCRETE):-

The work shall be done in accordance with CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.

The minimum grade of PCC shall be M 15 or as per the approved GFC's or as directions of engineer in charge.

2.0 R.C.C. (DESIGN MIX CONCRETE):-

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

2.1 The sources of coarse aggregate, fine aggregate & water to be used in concrete work shall be identified by the contractor & he will satisfy himself regarding their conforming to the relevant specification & their availability before getting the same approved by the Engineer-in-Charge.

2.2 **Coarse Aggregate:** - As per CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.

2.3 **Fine Aggregate:** - As per CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.

2.4 **Water:** - It shall conform to requirements laid down in IS:456-2000 / CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.

2.5 **Cement:** - **OPC 53** shall be used for design mix concrete and shall conform to IS-8112.

2.6 **Admixtures / Plasticizers:** - The admixture shall conform to IS: 9103, wherein required, the admixture of approved quality and approved make only shall be used to attain the required workability.

2.7 **Grade of Concrete:** - For RCC Works: Minimum Grade Shall be M25 or as per the approved Good for construction drawings whichever is more and as per the directions of Engineer in Charge.

NOTE:-

i) In the designation of a Concrete mix letter M refers to the mix and the number of the specified characteristic compressive strength of 15 cm - Cube at 28 days expressed in N/mm²

2.8 The contractor shall engage one of the following approved laboratories/ test house at their own expenses for designing the concrete mix in accordance with relevant IS Codes and to conduct laboratory test to ensure the target strength and workability criteria for a given grade of concrete.

2.8.1 IIT's other than IIT Hyderabad

2.8.2 Any other Institute / NABL Accredited Laboratory as approved by EIC.

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

2.10 The contractor shall submit the report on design mix from any of above approved laboratories for approval of Engineer-in-Charge within 30 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the design mix is approved. In case of 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.

2.11 Trial Batches

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

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

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

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

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

2.17 All cost of mix designing and testing connected therewith including charges payable to the laboratory shall be borne by the Contractor including redesigning of the concrete mix wherever

required and directed by Engineer-in-Charge.

2.18 APPROVAL OF DESIGN MIX :-

The mix design for a specified grade of concrete shall be done for a target mean compressive strength

$$T_{ck} = F_{ck} + 1.65s$$

Where F_{ck} = Characteristic compressive strength at 28 days.

s = Standard deviation which depends on degree of quality control.

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

GRADE OF CONCRETE	STANDARD DEVIATION(S)
M-10	3.5
M-15	3.5
M-20	4.0
M-25	4.0
M-30	5.0
M-35	5.0
M-40	5.0
M-50	5.0

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

- (a) The average strength of each test sets is not less than the specified target mean compressive strength (T_{ck}).
- (b) The strength of any specimen cube is not less than $0.85 T_{ck}$.
- (c) The concrete mix is required degree of workability and acceptance concrete finish.

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

2.20 WORK STRENGTH TEST: -TEST SPECIMEN: -

Work strength test shall be conducted in accordance with IS:516 on random sampling. Each test shall be conducted on six specimens, three of which shall be tested at 7 days and remaining three at 28 days.

TEST RESULTS OF SAMPLES: -

The test results of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than +/- 15% percent of the average. If variation is more, the test results shall be treated as invalid. All the samples shall be tested at Third party lab and the testing charges payable to the laboratory shall be borne by the Contractor.

FREQUENCY OF TESTS: -

The minimum frequency of sampling and testing of each grade of concrete shall be as specified in the Mandatory test statement.

2.21 STANDARD OF ACCEPTANCE: -

The acceptance criteria of Concrete shall be as per IS 456.2000

2.22 Production of Concrete

The contractor may procure all the concrete from approved Ready Mix Concrete (RMC) supplier as approved by the Engineer-in-charge after carryout the necessary design mixes from the approved labs as specified above. All technical requirements such as cement type, minimum cement quantity, w/c ratio, aggregates weights, slump, admixture etc. shall be ensured at RMC plant in line with the approved design mixes and contractor shall be wholly responsible for ensuring the quality of concrete as required at site. The concrete batch sheet shall be supplied for every batch of concrete. Necessary moisture corrections of aggregate shall be ensured on daily basis prior to production of concrete. Dedicated contractors engineer shall be deployed during the production of concrete to ensure the material utilization and quality of the concrete.

2.23 Transportation, Placing and Compaction of Concrete

- a. Mixed concrete from the RMC plant shall be transported to the point of placement by transit mixers and placed in position through concrete pumps and/or steel closed bottom buckets capable of carrying minimum 0.6 cum concrete. In case the concrete is proposed to be transported by transit mixer, the mixing speed shall not be less than 4 rev/ min. of the drum nor greater than a speed resulting in a peripheral velocity of the drum 70 m/minutes at its largest diameter. The agitating speed of the agitator shall be not less than 2 rev/min nor more than 6 rev/min of the drum. The number of revolution of the mixing drum or blades at mixing speed shall be between 70 to 100 revolutions for a uniform mix, after all ingredients, have been charged into the drum. Unless tempering water is added, all rotation after 100 revolutions shall be at agitating speed of 2 to 6 rev/min and the number of such rotations shall not exceed 250. The general construction of transit mixer and other requirement shall conform to IS:5892.

- b. In case concrete is to be transported by pumping, the conduit shall be primed by pumping a batch of mortar through the line to lubricate it. Once the pumping is started, it shall not be interrupted (if at all possible) as concrete standing idle in the line is liable to cause a plug. The operator shall ensure that some concrete is always there in the pump receiving hopper during operation. The lines shall always be maintained clean and shall be free of dents at all stages. Special precaution shall be taken that surrounding temperature during concreting shall not exceed 30 degrees centigrade.
 - c. Except where otherwise agreed to by the Engineer-in-Charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 450 mm. Unless agreed to by the Engineer-in-Charge, concrete shall not be dropped into place from a height exceeding 1.5m. In order to avoid such situations chutes, tremie pipe or closed bottom buckets shall be used. These shall be kept clean and used in such a way as to avoid segregation. Slope of the chute shall be so adjusted that concrete flows without the use of excessive quantity of water. The delivery end of chute shall be as close as possible to the point of deposit. The chute shall be thoroughly flushed with water before and after each working period and the water used for this purpose shall be discharged outside the formwork. The concrete shall be compacted by using immersion type vibrators. When the concrete is being continuously deposited to a uniform depth along a member, vibrator shall not be operated within one meter of free end of the advancing concrete. Every effort shall be made to keep the surface of the previously placed layer of concrete alive so that the succeeding layer can be amalgamated with it by the vibration process. The vibrator head shall not be brought more than 200 mm near to the formwork as this may cause formation of water stagnations. The formwork shall be strong and great care shall be exercised in its assembly. It shall be designed to take up increased pressure of concrete and pressure variations caused in the neighborhood of vibrating head, which may result in excessive local stress on the formwork. The joints of the formwork shall be made and maintained tight and close enough to prevent the squeezing out slurry or sucking in of air during vibration. The formwork to receive concrete shall be cleaned and made free from standing water, dust, etc. The contractor shall keep provision for screed and shutter vibrators at site.
 - d. No concrete shall be placed in any part of the structure until the approval of Engineer-in-Charge has been obtained. If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer-in-Charge. Concreting shall be done continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 60 minutes.
- 2.24 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 contractor. However, the Engineer-in-Charge may order for additional tests (like cutting cores, ultrasonic pulse velocity test, load test on structure on 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.

STEEL REINFORCEMENT:

- The Steel Reinforcement work shall be carried out as per CPWD Specifications - 2019 - Vol.I & Vol. II with upto date correction slips. And as per the directions of the Engineer in Charge.
- The minimum grade of Reinforcement Steel shall be FE 550D.

4.0 Water Proofing

Before application of the any waterproofing treatment, the mother slab shall be flooded with water up to a depth of 50mm for a period of 48 hours. Leakages found shall be marked and grouted with cementitious grout admixed with cebex 100 or equivalent. After the curing period of the grout, the mother slab shall again be flooded with water as mentioned above for a period of 48 hours.

The above procedure shall be repeated till the mother slab is leak and seepage proof. Only after satisfactory inspection and clearance from the Engineer in Charge the below mentioned waterproofing procedures shall be followed for the respective areas of application.

Crystalline water proofing in Terrace, Toilets, balcony, Water Tanks, lift pits and water bodies etc.

1. Scope of Work

The work shall comprise providing and applying integral crystalline waterproofing treatment to RCC surfaces including terraces, toilets, balconies, water storage tanks, lift pits, podium slabs and other water bodies as indicated in the drawings and as directed by the Engineer-in-Charge.

The waterproofing system shall consist of:

- Surface preparation.
- Application of crystalline waterproofing slurry.
- Protective screed with slope formation.
- Treatment of joints.
- Tile finish in water storage tanks at the specified locations.
- Testing and completion of the waterproofing system.

2. Materials

2.1 Crystalline Waterproofing Compound

The crystalline waterproofing material shall be a cementitious, hydrophilic crystalline slurry specifically designed to penetrate concrete pores and capillaries and form insoluble crystals to block water ingress.

The material shall:

- Comply with the requirements of ACI 212.3R-2010.
- Reduce permeability of concrete by more than 90% compared to control concrete when tested as per DIN 1048.

- Resist hydrostatic pressure up to 16 bar from the negative side.
- Possess self-healing properties for cracks up to 0.50 mm width.
- Be suitable for potable water retaining structures.
- Be supplied by an approved manufacturer and accompanied by test certificates.

3. Surface Preparation

3.1 General

Before application of the waterproofing treatment:

- Concrete surfaces shall be structurally sound, clean, and free from dust, laitance, grease, oil, curing compounds, paint, loose particles, and any contaminating materials.
- Honeycombs, cracks, voids, tie rod holes, and damaged areas shall be repaired using approved polymer-modified repair mortar.
- All construction joints, cold joints, and wall-floor junctions shall be treated as recommended by the manufacturer.
- Surface shall be roughened by mechanical means wherever required.
- The substrate shall be thoroughly saturated with clean water and maintained in Saturated Surface Dry (SSD) condition before application.

4. Application of Crystalline Waterproofing Slurry

4.1 Mixing

For Vertical Surfaces: The crystalline slurry shall be prepared by mixing 5 parts crystalline waterproofing powder : 2 parts clean water to obtain a brushable consistency.

For Horizontal Surfaces: The crystalline slurry shall be prepared by mixing 3 parts crystalline waterproofing powder : 1 part clean water to obtain the required consistency. Mixing shall be done mechanically using a slow-speed mixer until a homogeneous lump-free slurry is obtained.

4.2 Application on Vertical Surfaces

- The slurry shall be applied two coats by using synthetic fibre brushes. Each coat shall be applied uniformly after the preceding coat has become touch dry.
- Coverage rate shall be 0.70 kg/m² per coat, Total consumption: 1.40 kg/m²

The second coat shall be applied perpendicular to the direction of the first coat.

4.3 Application on Horizontal Surfaces

- The slurry application coat shall be applied using a synthetic brush with Consumption rate shall be: 1.10 kg/m². The coating shall completely cover the substrate without pinholes or discontinuities.

5. Curing

- Treated surfaces shall be protected from direct sunlight, rain, and mechanical damage.
- The waterproofing layer shall be cured by water spraying, wet hessian covering, or other approved methods.
- Curing shall be continued for a minimum period of 72 hours or as recommended by the manufacturer.

6. Protective Screed and Slope Making Layer

After completion of the crystalline waterproofing treatment, a protective screed shall be laid with M20 grade of concrete with minimum thickness 50 mm with Slope: 1 in 100 towards rainwater outlets/drain points.

- Polypropylene fibres with 12 mm long, 100% virgin polypropylene. The Dosage shall be of 0.9 kg/m³ of concrete.

6.2 Laying

- Concrete shall be properly compacted and finished with broom finish.
- Adequate precautions shall be taken to avoid damage to the waterproofing layer.
- The screed shall be raised along wall junctions to form a smooth waterproof fillet (Vatta) to eliminate sharp corners.

6.3 Panel Formation

The screed shall be divided into panels measuring 2.0 m × 2.0 m with construction joints of Width: 6 mm and Depth: 10 mm. The joints shall be cleaned and filled with approved Polyurethane Sealant, or Polysulphide Sealant, or Hybrid Sealant as approved by the Engineer-in-Charge.

6.4 Curing

The screed shall be cured continuously for a minimum period of 7 days.

7. Tile Finish in Water Storage Tanks and water bodies.

- First quality matt finish vitrified tiles of approved make, shade, and size shall be provided and laid which shall conform to relevant IS standards.
- Tiles shall be laid in the pattern shown in architectural drawings.
- Tile adhesive and grouting between the joints shall be food grade and shall be as approved by the Engineer-in-Charge.

No extra payment shall be made for laying tiles in water storage tanks.

8. Sunken filling: Lightweight AAC block filling with light weight AAC bats (of size 40-60 mm) with cement mortar mixed in the ratio 1:3:6 (1 cement : 3 coarse sand : 6 block bats) including mixing of approved water proofing compound in recommended proportion. The laid brick bat mix shall be well rammed and compacted as required. Further surfaces shall be screeded with cement concrete mix M15 admixed with approved integral water proofing compound in recommended proportion, laid to an average thickness of 25mm and finished smooth or ready to receive finish material as specified. Care shall be taken prior to filling all pipes passing through sunk portion such that the pipes are pressure tested by maintaining pressure for 24 hours and junctions of pipes passing through walls, slabs are well grouted and sealed.

9. Testing

After completion:

- Water-retaining structures shall undergo water-tightness testing.
- Terraces, balconies, toilets, and similar areas shall be subjected to ponding tests for a minimum of 48 hours.
- Any leakage or dampness observed shall be rectified by the contractor at no additional cost.

Note: For all water proofing systems for respective areas of applications as mentioned above, the treated surfaces shall be checked for any leakage and seepage by flooding with water upto a depth of 50mm for a period of 48

hours. Leakages/seepage found shall be Treated as per the approved methodology as per the directions of Engineer in charge.

Guarantee Bond

- a) Five years guarantee bond in prescribed proforma attached with Bid document shall be Submitted by the Contractor which shall also be signed by both the specialized agency and the Contractor to meet their liability/ liabilities under the Guarantee Bond. However, the sole responsibility about efficiency of water proofing treatment shall rest with the main Contractor.
- b) **10% (Ten percent) of the cost of Water Proofing work shall be retained as Security Deposit and the amount so withheld would be released after Five years from the date of completion of the entire work 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 to within the specified period, the same will be got done from another agency at the risk and cost of Contractor.
- c) However, the Security Deposit deducted may be released in full against Bank Guarantee of equivalent amount in favour of authority intimated by Engineer-in-Charge, if so decided by the Engineer-in- Charge.
- d) The Security Deposit against this item of work shall be in addition to the Security Deposit mentioned elsewhere in contract form.

5. Door & Window Frames:

All the door and window frames shall be as specified in the relevant Schedule of items and approved architectural drawings.

Materials

- Timber shall be well-seasoned Second-Class Teak Wood conforming to relevant provisions of IS 4021 and IS 1003.
- Moisture content of timber shall be as per IS 287 at the time of installation.
- Timber shall be free from sapwood, decay, cracks, splits, warping, insect attack, dead knots, loose knots and other defects affecting strength and appearance.
- The timber shall be of uniform texture, straight grained and properly seasoned.
- All concealed surfaces of timber in contact with masonry or concrete shall be treated with two coats of approved wood preservative or hot coal

tar/bituminous paint before fixing.

- Timber shall be protected against termite and fungal attack as per project specifications.
- Holdfasts, dash fasteners, anchor fasteners and M.S. lugs shall conform to approved drawings and relevant specifications.

Workmanship

- The timber shall be sawn, planed and dressed on all sides to the required dimensions and profiles.
- Frames shall be accurately fabricated to the sizes shown in drawings.
- Joints shall be made with mortise and tenon construction, properly fitted, glued and secured with hardwood pins or approved fasteners.
- All surfaces shall be smooth, true and free from tool marks.
- Frames shall be assembled square and true with proper alignment of members.

Installation

- Frames shall be fixed plumb, level and true to line at the locations indicated in the drawings.
- Temporary wooden braces shall be provided to maintain shape and alignment during construction.
- Frames shall be fixed with approved holdfasts or dash fasteners embedded in cement concrete blocks or masonry as specified.
- The gap between frame and masonry shall be filled with cement mortar (1:3) or approved non-shrink grout.
- Care shall be taken to prevent damage, distortion or displacement during masonry and plastering works.
- Exposed surfaces shall be protected from scratches, dents and staining until completion of the project.

6. Door & Window Shutters:

- All door and window shutters shall be as specified in the relevant Schedule of items and approved architectural drawings.
- The shutter shall be free from warping, twisting, delamination, open joints, cracks, or manufacturing defects.
- The Hardwood used in the shutter framework shall be kiln-seasoned with moisture content shall be as per IS 287.
- Timber shall be free from sapwood, large knots, decay, insect attack, and other defects.
- All exposed edges of the shutter shall be provided with Second Class Teak Wood lipping. The Lipping shall be not less than 25 mm depth and of full shutter thickness.
- Lipping shall be properly glued, pinned, and finished flush with the shutter surface as applicable.

Laminates

- Decorative High Pressure Laminated sheets shall conform to IS 2046 Type-S. Laminates shall be as specified in Schedule of items and the approved drawings.
- Adhesive shall be synthetic resin adhesive of approved quality suitable for laminate bonding.
- Adhesive shall be waterproof and resistant to moisture and temperature variations.

Installation

- Door shutters shall be fixed true to line, level, and plumb.
- Hinges shall be recessed neatly and fixed securely.

- Shutters shall operate smoothly without binding, rattling, or excessive clearance.
- Necessary adjustments shall be made after installation to ensure proper functioning.
- All fittings shall be aligned accurately.
- Veneer and laminate surfaces shall be free from scratches, dents, bubbles, waviness, stains, and defects.
- Edges and corners shall be straight, true, and properly aligned.
- Completed shutters shall provide uniform appearance and smooth operation.

7. Decorative Veneer Sheet:

7.1 Scope of work:

The work shall consist of supplying, preparing, and fixing approved decorative veneer sheets of specified design, pattern, and shade on wooden surfaces such as doors, partitions, wall panelling, furniture, cupboards, and other locations as shown in the approved drawings and as directed by the Engineer-in-Charge.

- Decorative Veneer shall be of approved make and design as per the approved drawings selected by the Architect/Engineer-in-Charge. The Thickness of veneer sheet shall be 4.0 mm.
- The Veneer shall be free from Cracks, Splits, Open joints, Worm holes, Buckling, Warping, Stains and discoloration.
- Grain pattern shall be uniform and aesthetically matched throughout the work.
- Veneer sheets shall be cut accurately to required sizes and patterns.
- Matching of grains and joints shall be carried out carefully to achieve a continuous decorative appearance.
- Approved Adhesive shall be uniformly applied over the entire contact surface.
- Veneer shall be pressed firmly using appropriate mechanical or hydraulic pressing methods to ensure full adhesion without voids.
- All air pockets, wrinkles, blisters, and gaps shall be eliminated.
- Joints shall be neat, tight, and practically invisible.
- Veneer shall be fixed true to line and level with proper alignment of grain pattern.
- Excess adhesive shall be removed immediately.
- Any damaged or defective veneer shall be replaced at the contractor's cost.

8. Block Masonry:

8.1. Scope of Work

The work shall consist of providing and constructing solid concrete block masonry walls of specified thickness using M7.5 grade concrete blocks in foundations, plinth, and superstructure locations as shown in the drawings, including all necessary cutting, fitting, bonding, scaffolding, curing, and finishing required for complete execution.

8.2. Materials

8.2.1 Solid Concrete Blocks

- Solid concrete blocks shall be factory manufactured and conform to the requirements of IS 2185 (Part-I): Latest Revision.
- Blocks shall be of M7.5 grade with a minimum characteristic compressive

strength of 7.5 MPa at 28 days.

- Blocks shall be dense, sound, homogeneous, free from cracks, honeycombing, warpage, chipped edges, or other defects.
- Dimensions and tolerances shall conform to approved drawings and relevant BIS specifications.
- Blocks shall be properly cured and aged before use.

8.2.2 Cement

Cement shall be Ordinary Portland Cement (OPC) or Portland Pozzolana Cement (PPC) conforming to relevant BIS standards and approved by the Engineer-in-Charge.

8.2.3 Sand

Sand shall be clean, hard, durable coarse sand conforming to IS 383 and free from organic impurities, clay, silt, and deleterious materials.

8.2.4 Mortar

Mortar for masonry shall consist of cement mortar 1:4 (1 cement : 4 coarse sand) mixed in a mechanical mixer or approved manner with sufficient water to achieve the required workability.

8.3. Workmanship

8.3.1 Preparation

- Blocks shall be thoroughly cleaned before laying.
- The top surface of the foundation, plinth beam, slab, or supporting member shall be cleaned and wetted before commencement of masonry work.
- Masonry layout shall be marked accurately as per approved drawings.

8.3.2 Laying

- Blocks shall be laid in regular courses with full mortar bedding.
- Vertical and horizontal joints shall be completely filled with mortar.
- Joint thickness shall generally be maintained between 8 mm and 12 mm.
- Blocks shall be laid true to line, level, plumb, and alignment.
- Successive courses shall be properly bonded with staggered vertical joints.
- Cut blocks shall be used only where necessary and shall be neatly cut to the required size.
- Masonry work shall be raised uniformly throughout its length.

8.3.3 RCC Bands and Mullions

- RCC bands, stiffeners, mullions, lintel bands, sill bands, and other reinforced concrete members shall be provided strictly as per structural drawings and specifications.
- Masonry shall be properly toothed, keyed, or bonded with RCC members to ensure monolithic action.
- Reinforcement, concrete grade, dimensions, and placement shall conform to the structural design and approved drawings.

8.4. Joints and Finishing

- Joints shall be raked to a depth of approximately 8 mm where plastering is specified.
- Exposed masonry surfaces shall be finished neatly and free from mortar stains and projections.
- Openings, embeds, inserts, sleeves, conduits, and fixtures shall be accurately provided as required.

8.5. Curing

- Masonry shall be kept continuously moist and adequately cured for a minimum period of 7 days.
- Proper arrangements shall be made to prevent rapid drying and shrinkage cracks.

8.6. Scaffolding

- Necessary scaffolding, staging, platforms, and supports required for execution of masonry work at all heights and levels shall be provided by the contractor at no extra cost.

9. FLOORING

(i) All flooring, skirting, dado and window sill works shall be done in accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid. The provision of BIS Codes listed in CPWD Specifications shall form a part of this document with all latest codes.

(ii) Whenever flooring is to be done in patterns of tiles and stones, the Contractor shall get samples of each pattern laid and approved by the Engineer-in-charge before final laying of such flooring. Nothing extra shall be payable on this account.

(iii) Different stones / tiles used in pattern flooring, skirting, dado and window sill work shall be executed as defined in the Schedule of finishes, floor finishing layouts and Detailed Architectural Drawings. Contractor needs to refer room data sheet / schedule of finishes and material palette attached with Bid document. Nothing extra for laying pattern flooring shall be paid over and above the quoted rate. No additional wastage, if any, shall be accounted for any extra payment.

(iv) Samples of flooring stones/ Tiles shall be brought to site well in advance for approval of the Engineer-in-charge. The sizes of stones for flooring shall be of size mentioned in Schedule of finishes & Detailed Architectural Drawings or as approved by Engineer-in-charge. 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 shall be made for these samples.

(v) The marble / Kota stone flooring in treads and risers of staircase is to be laid in single piece.

(vi) Chasing of required width and thickness shall be made in block work at skirting location so as to flush the external surface of skirting with internal plastering. No extra payment towards making chases in brick work at skirting shall be made.

(vii) 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 slope if found, shall be made good by the Contractor by dismantling the defective floor/grading concrete and nothing shall be paid for such rectifications.

(viii) The flooring and skirting will be executed as per pattern shown in the Architectural drawings and as per approval of Engineer-in-charge and nothing extra shall be payable on this account.

(ix) The rate shall include the cost of all materials and labour involved in all the operations. Nothing extra shall be paid for use of cut/sawn stone/ tiles in the work

(x) Contractor shall need to protect the finished floor surface during execution of other activities using Cello or approved equivalent bubble guard of minimum 500 gsm thick (minimum size 2400 x1200 mm), fixing the same over floor surface with mastic tape or another approved adhesive. The protective layer shall be removed and cleared of all debris out of site including cleaning the entire covered flooring area at the time of handingover as directed by the Engineer-in-charge.

(xi) Stone for Window Sills should be of approved finish/quality as mentioned in Schedule of finishes & Detailed Architectural Drawings or as approved by Engineer-in-charge. Stone for sill should be minimum 18mm thick granite stone and all exposed edges of sills shall be chamfered at site, half or full bull nosing with mirror polishing should be at factory and brought to site. All polishing work and laying details for stone work shall be as per CPWD specifications and as directed by Engineer-in-charge.

(xii) Pattern for any type of flooring / dado shall be as per Detailed Architectural Drawings. The cost of flooring work is inclusive of all material, workmanship, labour, pattern, colour, style, skirting etc. complete. No extra payment shall be made on this account. The joints for all flooring to run in a straight line and should follow as mentioned below:

(a) **For any type of Stone floor & dado:** min. 3mm (three mm) spacer joints filled with MYK Laticrete SP – 100 or Equivalent approved adhesive as per the Directions of Engineer in Charge

(b) **For any type of Vitrified tile flooring & dado:** 3mm spacer joint filled with MYK Laticrete SP – 100 or Equivalent approved adhesive as per the Directions of Engineer in Charge.

(xiii) **Vitrified Tile Flooring and dadoing:**

(a) The Vitrified Tile Flooring, Skirting, Dado and wall lining, in general, shall be done as per CPWD Specifications, 2019 Volume-I & Volume-II with upto date correction slips as on last date of submission of Bid document.

(b) The vitrified floor tiles of approved make shall have water absorption less than 0.08% shall confirm to IS:15622. The Vitrified tiles of specified sizes shall be used as specified in Schedule of items and relevant schedule of finishes and the sample of tiles shall be got approved from the Engineer-in-charge. Tiles shall be laid in a pattern as per approved architectural drawings.

(c) The Mandatory tests for vitrified tiles shall be got done as per CPWD Specifications, 2019 Volume-I & Volume-II with up-to-date correction slips as on last date of submission of Bid document / relevant BIS Code.

(d) The grouting of joints with pigmented epoxy grouts. Tiles joints shall be as per the pattern provided in Architectural drawings.

a. STONE WORK: -

- The execution of stone work shall be in general as per CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.

- The Stone shall be first quality natural stone of approved make, shade, colour, texture and pattern, free from cracks, cavities, veins, pinholes, stains, patches or other visible defects.
- Stone shall be machine cut to exact dimensions with square and true edges and all exposed edges shall be molded and polished as shown in the approved drawings.
- The granite stones of specified sizes and shade shall be used as specified in Schedule of items and relevant schedule of finishes and the sample of stones shall be got approved from the Engineer-in-charge. The stones shall be laid in a pattern as per approved architectural drawings.
- Stone for Staircase and Entrance Steps, Risers, Ramp at Entrance for Physically challenged shall be in one single piece in approved finish/quality as mentioned in Schedules of finishes, detailed Architectural Drawings or as directed by the Engineer-in-charge. All exposed edges of treads shall be chamfered at site, half or full bull nosing with mirror polishing should be carried at factory. All staircase treads or any entry steps shall have three numbers of “V” grooving for anti-slip purpose and brought to site. All polishing work and laying details for stone work shall be as per CPWD specifications, 2019 Volume-I & Volume- II with upto date correction slips as on last date of submission of Bid.
- The stone shall be laid over 20 mm thick cement mortar bed in proportion 1:4 (1 cement : 4 coarse sand). The mortar bed shall be uniformly spread to required thickness, properly compacted, levelled by maintain required slopes as specified in approved architectural drawings.
- The Joints shall be filled using required grouting material as specified in the drawings by keeping the 3mm spacers between the granite joints. Excess jointing material shall be cleaned immediately after filling.
- The exposed surfaces polishing shall be done as per the approved architectural drawings. If any cracked, chipped, stained or damaged slab shall be replaced with new stones.
- The mortar bed shall be adequately cured for a minimum period of 7 days without disturbing the stone finish.
- After completion of work, the surface shall be thoroughly cleaned by using approved non-acidic cleaners.
- Protective covering shall be provided until handing over of the building.

Granite Cobble stone flooring:

Granite cobble stone of approved size, shade and required strength as per the Schedule of items and approved drawings. Granite cobble stone should be in tapering profile as specified in approved Architectural drawings as approved by EIC.

b. Stainless Steel Railing/Handrails:

(i) The work of Stainless Steel Railing/Composite Railing /Handrails (weldless), in general, shall be done in accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with up-to-date correction slips as on last date of submission of Bid.

(ii) All stainless-steel pipes shall conform to SS 304 grade or as specified in Schedule of items and relevant approved drawings.

(iv) Fixing shall be done by stainless steel expansion bolts/dash fasteners of approved size and make and welding to be done by using organ welding rods and the surface being duly finished and cleaned by K2 passivation, which is nitric acid plus florid acid solution treatment by which the chances of corrosion will be eliminated and any

burn out marks on the metal will also be eliminated.

(v) All stainless-steel material will have to be coated by a solution of Inox to avoid finger in prints and avoidance of settlement of environment / atmospheric dust.

c. WOOD WORK: -

Solid Teak Wood flooring for Staircase:

- The wood work in general shall be carried out as per CPWD Specifications - 2019 Vol. I & II with up-to-date correction slips.
- Providing and installing about 30mm thick approved Solid Teak wood flooring / treads / risers of approved specie, shade and make with tongue and groove joint system as shown in drawings and instruction of approved manufacturer / Engineer in charge; fixed over 12mm thick approved marine ply surface fixed to damp proof dry harden IPS. Ply shall be chemically treated, seasoned and anti-termite treated and making groove/joint around edges as specified in drawing and by the manufacturer etc. all as detailed in technical specification, drawings and that of approved flooring manufacturer etc. to entire satisfaction of the Engineer in charge.
- The Timber shall be of approved quality and well-seasoned. It shall have uniform color, be free from defects such as cracks, dead knots, soft spongy spots and waves of injurious open shapes. Grains shall be reasonably straight. The individual hard and sound knot shall not be larger than 6 sq cm. The aggregate area of all knots shall not exceed 0.5% area of a piece. All timber is sawn unless otherwise stated.
- All timber shall be treated with chemical wood preservatives and be kiln seasoned to IS 1141 and conform to IS 287 for moisture content. It shall be prior to being brought to site and report shall be submitted to the Engineer. All timber to be treated shall be finished to final dimension before it is treated. Treated timber brought to site shall accompany inspection report. In case of fabricated joinery item, it shall accompany along with same.
- The work shall be carried out to in best workmanship manner & as directed by and up to the satisfaction of Engineer in charge. The Contractor shall make sure that the item to be placed is in its perfect state as per the approved drawings. Additionally, the items placed shall not be damaged and shall be free from any dents or scratches. It is the duty of the contractor to make proper arrangements for protection of the items during stacking, transporting, loading/ unloading till handover. The contractor shall get the items inspected and approved by the engineer in charge before placing. Any claim, upon rejection of any item by the Engineer in charge shall not be entertained. The Contractor shall place the item as directed by Engineer in charge at all floors/all heights and all levels.
- The rates quoted by contractor shall be inclusive of all material, labor, insurance, wastages, taxes, transportation, loading, unloading, fixing in position at all floors etc. complete.

Architraves, Glazed Wooden Partition with Doors, Pivoted Wooden Doors, Wooden Windows:

- The items as specified above shall be as specified in the relevant Schedule of items and approved architectural drawings
- The Timber shall be of approved quality as specified in relevant Schedule of items, approved drawings and well-seasoned. It shall have uniform color, be free from defects such as cracks, dead knots, soft spongy spots and waves of injurious open shapes. Grains shall be reasonably straight. The individual hard and sound knot shall not be larger than 6 sq cm. The aggregate area of all knots shall not exceed 0.5% area of a piece. All timber is sawn unless otherwise stated.
- All timber shall be treated with chemical wood preservatives and be kiln seasoned to IS 1141 and conform to IS 287 for moisture content. It shall be prior to being brought to site and report shall be submitted to the Engineer. All timber to be treated shall be finished to final dimension before it is treated. Treated timber brought to site shall accompany inspection report. In case of fabricated joinery item, it shall accompany along with accompany inspection report.
- Timber used shall be treated with 10 years guarantee and approved anti-termite treatment.
- Timber shall be marked as approved prior to being used at site.
- Sizes specified are not indicative and shall be correct finished sizes within allowable tolerances.
- All timber shall be finished to required dimension and texture prior to being treated for chemical preservation.

Plywood:

- Plywood used shall be WBP type, of specified thickness and conforming to IS test as specified.
- Marine ply shall be used in damp and exposed weather location / conditions.
- Veneers of plywood faces to be painted or finished with similar treatment and be totally free from knots, worm and beetle holes, splits, stains of glue or other acceptable defects.
- Plywood face to be natural face finished and shall be totally free from knots, worm and beetle, holes, stains of glue splits or other acceptable defects.

Melamine Polish

- Melamine is an organic compound that is often combined with formaldehyde to produce melamine resin, a synthetic polymer that is fire resistant and heat tolerant. The resin is a versatile material that has a highly stable structure. It is a closed pore polish i.e. it makes the wood non-breathable product that protects wood from mainly hot and cold surfaces placed over it.

Toughened Glass

- Toughened glass specification, sizes and thicknesses shall be as per the Schedule of items and approved drawings. Tempering to be on a roller hearth furnace eliminating tong marks. Minimum requirements are:

Maximum bow : 0.10%
Roller wave : All thicknesses 0.15mm depth maximum between peaks and troughs
Edge dip : 0.25mm maximum

Identification marks should be provided indicating nature and processors. Surface compressive stress in the glass should be minimum 69 N/Sqmm when measured by GASP in accordance with ASTM F218-95 (2000).

WORKMANSHIP

- Timber brought at site shall be as approved by the Engineer in charge.
- No timber shall be painted, tarred, oiled, etc. before its inspection by the representative of Engineer in charge. Any effort to hide the defects by plugging, painting, etc. shall render the piece to be rejected by the Engineer in charge.
- All rejected timber shall be removed from site of work.
- All sawing of timber shall be done in straight lines and planes of uniform thickness.
- All joints shall be tongued and grooved or of the type shown in the drawings specified in the item or as directed by the Engineer in charge. All joints shall be glued with approved water repellent adhesive.
- Joints shall be strong, neat and shall fit without wedging or filling. They shall be pinned with hard wood or bamboo pins of 10- 15 mm dia after the members of the frame are glued and pressed together in a suitable vice-mechanism. Also jointing concealed pins shall be provided.
- Prior to joining, wood members of frame shall be planed smooth and accurate to the full depth. Rebates, roundings, mouldings, etc. as shown in the drawing shall be done before the members are joined.
- No defects which reduce the strength of the connection are permitted at joints, bearing or assembly connections.
- All timber items shall be subjected to inspection by the Engineer in charge prior to any treatment to be carried out. No item shall be installed unless it is approved by the Engineer in charge.
- Woodwork in contact with masonry or concrete shall be painted with hot bitumen collator before being placed in position.
- Glass panels shall be fixed in position as per design with teak wood beading of required sizes as shown in the drawing.
- Surface preparation
Work shall be carried out to specifications as in IS 2338 Part I and II. The system shall be installed as per the schedule for finishing and shall be as per table of IS 2338 Part II "Schedule for finishing wood or wood-based materials".
 - a) Wood to be painted / polished shall be seasoned and free from discoloured sapwood and from large resinous or loose knots.

- b) Nail shall be punched well below the surface to provide a firm key for stopping.
- c) Mouldings shall be carefully smoothed with abrasive paper and the fibres left after matching shall be cleaned and removed.
- d) Flat portions shall be smoothed.
- e) Any knot, resinous streaks or bluish sapwood shall be treated with two coats of pure shellac knotting, applied thinly and extended to about 25 mm beyond the actual area requiring treatment.

- Finishing

- Filling

- a) Filler conforming to IS 345 shall be used to level off, to make smooth, to prevent the excessive penetration of the finish and to fill the open cells,
 - b) For special stain effects colour fillers shall be used.
 - c) On fine textured woods having minute pores that do not require filling, thin varnishes, lacquer or shellac may be used.
 - d) Filler or stain filler shall be applied by hand using hessian or jute rags cross the grain. The filled surfaces shall be dried preferably overnight and smoothed with abrasive paper.

- Staining

- a) Staining of wood shall be restored to create special effects for subsequent clear finish.
 - b) Stains used shall be water-based, spirit-based, or oil-based as approved by the Engineer in charge according to the purpose and location.
 - c) Surfaces shall be kept scrupulously clean and free from greasy finger marks.
 - d) Small cracks or nail holes shall be stopped with fine plaster of Paris or suitable stopping.
 - e) Stains may be applied by brushing and wiping or spraying. Application shall be liberal but without over-staining that may spoil the stained surface.

- Sealing

A suitable seal shall be applied on the filled and sanded surface to prevent absorption by the wood of successive coats of finish and to seal stain and filler and thus preclude their bleeding into the finished coat.

When fully dry, the surface shall be sanded taking care not to cut through at corners and edges. Dust shall be blown off and the surface wiped with a clean rag.

- Polishing

- a) Mix melamine (matt or gloss) base with the catalyst in the specified ratio as per manufacturers specification. Add melamine thinner upto 30% (as specified by the manufacturer) by volume of mixture. Stir it and allow it to mature for 2-3 minutes. The melamine is sprayed, using spray gun pressure of 45-55 psi, from a distance of 7"-10" from substrate.
 - b) Surfaces to be polished shall be prepared to produce a smooth, dry, matt surface.

c) Previous coats or stains, if any, shall be allowed to dry and rubbed down lightly, wiped off and allowed to dry.

d) Polish shall be applied liberally with a spray machine and spread evenly over a portion of the surface with short, light strokes to avoid frothing.

e) Once the polish begins to set, it shall not be retouched. If there is any mistake, the varnish shall be removed and redone.

f) Sufficient time shall be allowed in subsequent coats for the previous coat to harden and dry.

- Clear finishes for wood surfaces

Clear finishes shall be applied to wood and wood based interior surfaces. They shall be carried out as per IS 2338 part-I. The schedule of finishes shall be as per table of IS 2338 part II "Schedule for finishing wood or wood-based materials".

d. uPVC Windows:

- The frame shall be fabricated from lead-free, UV stabilized, multi-chambered uPVC extruded profiles conforming to EN 12608, of different Series as specified in the Schedule of items and approved drawings and as approved by Engineer-in-Charge.
- Profiles shall be resistant to weathering, corrosion, moisture, fungal growth and termite attack.
- The sash, Mullion couplers, reinforcement detailing will be followed for each type of series of windows/ventilators as specified in the Schedule of items and approved drawings.
- The required, mullions/couplers shall be of compatible reinforced uPVC sections capable of transferring wind loads and operational forces.
- All frame, sash and mullion sections shall be reinforced with galvanized mild steel sections.
- Reinforcement thickness and section size shall be as specified in Schedule of items or approved shop drawings, Galvanization shall be minimum 120 GSM or as per CPWD requirements.
- Reinforcement shall be securely fixed inside uPVC profiles with corrosion-resistant screws.
- Reinforcement shall ensure adequate structural strength against wind pressure and operational loads.

Fabrication & Installation:

- Profiles shall be accurately cut, mitred and fusion welded at corners. Welded joints shall be smooth, neat and watertight. Mechanical joints, where required, shall be properly sealed.
- Necessary drainage slots and ventilation openings shall be factory made.
- Fabrication shall be carried out in factory under controlled conditions.
- The door shall consist of Three-track sliding system, Three-panel arrangement. Two glazed sliding panels with One wire mesh sliding panel.
- The configuration shall permit smooth independent movement of all sliding panels.
- The glazed panels shall be fitted with glass as specified in the Schedule of items or Approved drawings. The glazing system shall include uPVC glazing beads, EPDM

glazing gaskets, Suitable setting blocks and packers with Airtight and watertight fixing arrangement.

- The Glass shall be free from bubbles, waves, scratches and other defects
- The fly-screen panel shall consist of Approved quality insect-proof wire mesh and the Mesh securely fixed in designated fly-screen sash profile, Neatly stretched and free from wrinkles.
- The sliding door shall be complete with the following:
- The Rollers shall be of Adjustable nylon rollers with Stainless Steel Grade 304 roller body heavy-duty construction for smooth operation.
- The Aluminium channel roller track fixed within frame shall be smooth and wear-resistant running surface.
- The handles shall be Zinc alloy (Zamak) powder-coated handles.
- The Locking System shall be Multipoint locking system with smooth operation and secure locking.
- Fasteners shall comprise Stainless Steel Grade 304 screws.
- The door shutters shall open and close freely without binding, rattling or excessive play.
- The gap between frame and surrounding finished wall shall be closed with polyethylene backer rod of approved size including sealing with Weatherproof silicone sealant.

e. Pleated Mesh system (mosquito screen)

Providing and installing of pleated Mesh system (mosquito screen) with aluminium frames. The system shall be manufactured from Jindal Aluminium Alloy 6063-T6 or equivalent, with powder coating by Akzo Nobel or equivalent in approved shade.

The mesh shall be polyester mesh with German technology, woven in 20×20 holes per square inch, configuration using Monofilament Polyester strong yarn (Coated Yarn Thickness: $0.27 \pm 3\%$, Wire Diameter: 0.185×0.135 mm, Weight of Mesh: $47 \pm 5\%$ g/m²), Weave type Warp Knitting, providing 400 holes per square inch (Mesh Density: 20×20 holes per square inch, Colour: Black) and ensuring high transparency. The system shall carry a warranty for a period of 12 months against manufacturing defects from the date of delivery. Installation to be carried out complete as per manufacturer's specifications and approved shop drawings.

The work shall be carried out to in best workmanship manner & as directed by and up to the satisfaction of Engineer in charge. The Contractor shall make sure that the item to be placed is in its perfect state as per the standards established by its manufacturer.

Additionally, the items placed shall not be damaged and shall be free from any dents or scratches. It is the duty of the contractor to make proper arrangements for protection of the items during stacking, transporting, loading/ unloading till handover. The contractor shall get the items inspected and approved by the engineer in charge before placing. Any claim, upon rejection of any item by the Engineer in charge shall not be entertained. The Contractor shall place the item as directed by Engineer in charge at all floors/all heights and all levels.

f. WPC False ceiling

Providing and installing WPC composite false ceiling with made of WPC red wood colour boards (having Density of 1.425 g/cum and Tensile strength of 29 Mps) of approved make fitted on a hollow aluminium joist 50x25x1.5mm as shown in the drawing. The framework shall be anchored to the ceiling / wall at intervals not exceeding 350mm center-to-center using Fischer N8/80 screws. False ceiling boards shall be fixed on the aluminium joists with Corroshield 7x25CSK screws. All exposed aluminium frames shall be covered with powder coated Aluminium L angle, as per the approved drawings etc. all complete as shown in the drawing and as per specifications of approved manufacturer.

WPC boards shall have density of 550-600 Kg/m³ as per DIN 5347. Water absorption < 10 as per DIN 53495, Tensile strength > 15 Mpa as per DIN 53455.

The work shall be carried out to in best workmanship manner & as directed by and up to the satisfaction of Engineer in charge. The Contractor shall make sure that the item to be placed is in its perfect state as per the standards established by its manufacturer. Additionally, the items placed shall not be damaged and shall be free from any dents or scratches. It is the duty of the contractor to make proper arrangements for protection of the items during stacking, transporting, loading/ unloading till handover. The contractor shall get the items inspected and approved by the engineer in charge before placing. Any claim, upon rejection of any item by the Engineer in charge shall not be entertained. The Contractor shall place the item as directed by Engineer in charge at all floors/all heights and all levels.

g. DOOR HARDWARE: -

Tower Bolt: Providing & fixing of specified height mentioned in approved drawings (minimum rod size shall be 10mm) SS 304 SSS finish Tower bolt (barrel type) of approved make in wooden doors with necessary screws etc. complete as approved by Engineer-in-charge.

Material:

SS 304 SSS finish Tower bolt (barrel type) of specified height with minimum rod size of 10mm shall be of high quality as shown in the drawing and as per manufacture's specification.

Workmanship:

Installation of Tower bolt shall be done as per manufacturer's specifications and up to satisfaction of engineer in charge. Loose sample and installed sample shall be approved by engineer in charge.

Mortice dead lock: Providing & fixing Mortice dead lock with 55mm back set, 20mm square for end and prepared for euro profile cylinder including strike plate in SSS Finish of approved make with necessary fittings etc. complete as recommended by manufacturer and as directed by Engineer in Charge.

Material:

fixing Mortice dead lock with 55mm back set, 20mm square for end and

prepared for euro profile cylinder including strike plate in SSS Finish shall be of high quality as shown in the drawing and as per manufacture's specification.

Workmanship:

Installation of Tower bolt shall be done as per manufacturer's specifications and up to satisfaction of engineer in charge. Loose sample and installed sample shall be approved by engineer in charge.

Profile cylinder: Providing & fixing euro profile cylinder about 60mm with key in satin stainless steel with necessary fittings etc. complete of approved make and as directed by Engineer In Charge.

Material:

Euro profile cylinder about 60mm with key in satin stainless steel shall be of high quality as shown in the drawing and as per manufacture's specification.

Workmanship:

Installation of Tower bolt shall be done as per manufacturer's specifications and up to satisfaction of engineer in charge. Loose sample and installed sample shall be approved by engineer in charge.

Lever Handle: Providing and fixing lever Handle with roses, escutcheons, 8mm spindle with fixing screws in SS 304 with SSS finish including necessary fittings etc. complete of as recommended by manufacturer and as directed by Engineer in Charge.

Material:

Lever Handle with roses, escutcheons, 8mm spindle with fixing screws in SS 304 with SSS finish shall be of high quality as shown in the drawing and as per manufacture's specification.

Workmanship:

Installation of Tower bolt shall be done as per manufacturer's specifications and up to satisfaction of engineer in charge. Loose sample and installed sample shall be approved by engineer in charge.

Door stopper: Providing and fixing approved surface mounted magnetic door stopper with fixing accessories, in satin chrome finish etc. complete as recommended by manufacturer and as directed by Engineer In Charge.

Material:

Surface mounted magnetic door stopper shall be of high quality as shown in the drawing and as per manufacture's specification.

Workmanship:

Installation of Tower bolt shall be done as per manufacturer's specifications and up to satisfaction of engineer in charge. Loose sample and installed sample shall be approved by engineer in charge.

h. STEEL WORK: -

The Work shall be carried out as per CPWD Specifications – 2019 with all latest correction slips and as per the direction of Engineer in Charge.

i. FINISHING

(i) All finishing works, in general, shall be done in accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with up-to-date correction slips as on last date of submission of Bid's

(ii) For plastering work PPC may be used.

(iii) All painting material shall have brought to the site of work in the original sealed containers. The material brought to the site of work shall be sufficient for at least 30 days of work. The empty containers shall not be removed from the site till the completion of the work without permission of the Engineer-in-charge.

(iii) Paint Register shall be maintained as per CPWD proforma for periodical verification by the client.

(iv) Contractor needs to refer Detailed Architectural Drawings, elevations, sections (both interior and Architectural related), Schedule of finishes, room data sheet and material palette attached with Bid document for the location and finishing specifications recommended. No deviations in design, pattern, and colour shall be permitted without approval of Engineer-in-charge. Contractor shall provide minimum three samples for each finishing items to Engineer-in-charge for approvals prior to execute the work.

(v) All types of paint, polish, primer to have low VOC content as per the requirement of GRIHA rating.

(vi) All painting finish works will be got done by the Contractor from the approved applicator.

a. Smooth “Exterior Grade” Premium Acrylic Emulsion Paint

This paint shall be done on all exterior building surface, exposed soffits, wherever required as mentioned in Schedules of finishes, room data sheet document & Detailed Architectural Drawings or as directed by the Engineer-in-charge. The work shall be carried out as per CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid.

b. Smooth “Interior grade” Premium Acrylic Emulsion Paint

This paint shall be executed on all internal areas as mentioned in Schedules of finishes, room data sheet document & Detailed Architectural Drawings, material palette or as directed by the Engineer-in-charge, in two or more coats of finishing paint, with one primer over one coat of internal putty. Shade and colour of paint shall be as per material palette. The work shall be carried out as per CPWD Specifications, 2019 Volume-1 and Volume-II with up-to-date correction slips as on last date of submission of Bid. The BIS Codes listed in CPWD specifications 2019 shall form a part of this document with all latest codes.

8. Terracotta Brick Jali:

Providing and fixing Jaali Screen using 2-Hole Round terracotta Bricks, specially manufactured for this work, of size 195 x 60 x 50 mm as per drawing, having average compressive strength 4.12 N/mm², NABL approved, baked at 1050°C with natural gas in automatic kiln. Bricks shall be all weather resistant, 100% asbestos free, termite free, fire resistant, with water absorption not exceeding 20% as per IS 1077. The 2-hole round brick Jaali shall be installed on 16 mm dia MS rods (painted with black enamel paint), arranged in various patterns such as zig-zag, curve, straight, square or rectangular modes as per drawings. The top of the Jaali/screen shall be secured with MS strip 3 mm thick and 40 mm wide (painted with black enamel paint), fabricated with 8 mm dia holes at required locations to receive the 16 mm rods. The rods shall pass through these holes and be welded in position with the strip. At the bottom, the MS strip shall be embedded in PCC for anchorage. 16 mm dia MS rods shall be welded onto an MS strip laid along the span of the brick jaali. The base shall be prepared clear and flat, with rods installed using suitable adhesive around the rod seating for firm fixing. Special Terracotta Adhesive, premium grade, which is same as jaali colour specially made for jaalis, Bricks & cladding shall be used. For heights exceeding 2.4 m, an intermediate MS strip of 10 mm thickness shall be introduced to break the load and ensure structural stability of the jaali. Scaffolding wherever required shall be included. The complete Jaali system shall be designed and executed to resist wind loads as per IS 875 for the relevant zone. Work shall be carried out strictly in accordance with drawings, specifications, and instructions of the Engineer-in-Charge.

The work shall be carried out to in best workmanship manner & as directed by and up to the satisfaction of Engineer in charge. The Contractor shall make sure that the item to be placed is in its perfect state as per the standards established by its manufacturer. Additionally, the items placed shall not be damaged and shall be free from any dents or scratches. It is the duty of the contractor to make proper arrangements for protection of the items during stacking, transporting, loading/unloading till handover. The contractor shall get the items inspected and approved by the engineer in charge before placing. Any claim, upon rejection of any item by the Engineer in charge shall not be entertained. The Contractor shall place the item as directed by Engineer in charge at all floors/all heights and all levels.

9. Terracotta Decorative Jali:

Providing and fixing Jaali Screen using Terracotta Jaali Screen using Jaali Screen Module of size 220x220x60 -70 MM in various patterns & combinations using like Flower Jaali / Inigma Jaali or other designs based on drawings, having average compressive strength 4.12 N/mm², Jaali Breaking Load 35.0 N/mm to 40.8 N/mm, NABL approved, baked at 1050°C with natural gas in automatic kiln. Bricks shall be all weather resistant, 100% asbestos free, termite free, fire resistant, with water absorption not exceeding 20% as per IS 1077. Each Jaali is been sorted and check the sound quality and durability for its strength & quality. The Jaali screen is executed / installed /assembled using special Terracotta Adhesive which is same

as Jaali color specially made for Jaali, Bricks & cladding. For Spans and heights exceeding 3.0 m, an intermediate MS Frame of 60 x40x3.2 mm shall be introduced to break the load and ensure structural stability of the Jaali, both vertically and horizontally. The MS Frame shall be painted with enamel paint to match the colour of the Jaali and conceal the frame. Cost of the frame and scaffolding if required will be inclusive in this item. The complete Jaali system shall be designed and executed to resist wind loads as per IS 875 for the relevant zone. Work shall be carried out strictly in accordance with drawings, specifications, and instructions of the Engineer-in-Charge.

The work shall be carried out in best workmanship manner & as directed by and up to the satisfaction of Engineer in charge. The Contractor shall make sure that the item to be placed is in its perfect state as per the standards established by its manufacturer. Additionally, the items placed shall not be damaged and shall be free from any dents or scratches. It is the duty of the contractor to make proper arrangements for protection of the items during stacking, transporting, loading/unloading till handover. The contractor shall get the items inspected and approved by the engineer in charge before placing. Any claim, upon rejection of any item by the Engineer in charge shall not be entertained. The Contractor shall place the item as directed by Engineer in charge at all floors/all heights and all levels.

10. Glass Railing:

Providing and installing SS-304 Grade Stainless Steel @ 1050mm high Modular railing system comprising 75x50mm Wooden Handrail of approved quality teak wood with melamine polish, fixed on 25 x 50 mm square SS Pipe with 30x4mm SS Flat. Further 38mm dia SS baluster with glass holding accessories (including top bracket to hold hand railing), along with 10mm thick clear toughened glass of approved make along with glass holding fixtures. The balustrade shall be fixed onto floor with SS circular caps with approved anchor fasteners. Anchor fasteners shall not be visible after installation. Wall thickness of all Pipes shall be taken as 1.5mm along with all visible components developed in High Grade SS etc. complete as shown in the drawing.

Material used shall be mild steel, stainless steel or aluminium with or without combination of concrete, masonry, timber etc.

Timber

Timber shall be of quality as specified in Schedule of items, approved drawings and well-seasoned. When a kind of timber is not specified, good quality teak wood shall be used. It shall have uniform color, be free from defects such as cracks, dead knots, soft spongy spots and waves of injurious open shapes. Grains shall be reasonably straight. The individual hard and sound knot shall not be larger than 6 sq cm. The aggregate area of all knots shall not exceed 0.5% area of a piece. All timber is sawn unless otherwise stated. All timber shall be treated with chemical wood preservatives and be kiln seasoned to IS 1141 and conform to IS 287 for moisture content. Moisture content shall be between 12% to 15%. It shall be prior

to being brought to site and report shall be submitted to the Engineer. All timber to be treated shall be finished to final dimension before it is treated. Treated timber brought to site shall accompany inspection report. In case of fabricated joinery item, it shall accompany along with same. Timber used shall be treated with 10 years guarantee and approved anti-termite treatment. Timber received at site shall be marked and stamped for approval prior to being used at site. Sizes specified are not indicative and shall be correct finished sizes within allowable tolerances.

All timber shall be finished to required dimension and texture prior to being treated for chemical preservation.

Melamine Polish Melamine is an organic compound that is often combined with formaldehyde to produce melamine resin, a synthetic polymer that is fire resistant and heat tolerant. The resin is a versatile material that has a highly stable structure. It is a closed pore polish i.e. it makes the wood non-breathable product that protects wood from mainly hot and cold surfaces placed over it.

Glass Railing system having height of 1050 mm, custom designed to withstand the design wind pressure confirming to IS -875 part III. The design shall accommodate 10mm thick clear toughened glass of approved make & 75x50mm wooden handrail at top for railing with EPDM rubber/ neoprene gasket etc.

Railing fabrication, erection shall be as per approved method by Engineer in charge.

Railing shall be as far as possible prefabricated shifted to site in knock down condition with markings ready to assemble and erect without any special aids.

All joints, assemblies shall be smooth finished with tight hairline joints. All ends shall be closed / capped. All assemblies, fitting & fixture shall be concealed type to the extent possible and exposed once finished as specified in drawings. Assembled railing shall be secured tight with finished surfaces. They shall not damage nor stain base and surroundings.

Securing / anchoring system shall be well grouted with base or jambs. Where required use no shrink compound in addition to metal fasteners. Expansion anchors, expansion shields, toggled bolts etc., shall be used to fix rails with walls basis.

On completion and prior to handover railing shall be touched as required.

Railing shall be protected by the contractor till it is handed over to the Engineer in charge with required protection measures. All cost of protection and maintenance shall be to the contractor's account.

The work shall be carried out to in best workmanship manner & as directed by and up to the satisfaction of Engineer in charge. The Contractor shall make sure that the item to be placed is in its perfect state as per the standards established by its manufacturer. Additionally, the items placed shall not be damaged and shall be free from any dents or scratches. It is the duty of the contractor to make proper arrangements for protection of the items during stacking, transporting, loading/

unloading till handover. The contractor shall get the items inspected and approved by the engineer in charge before placing. Any claim, upon rejection of any item by the Engineer in charge shall not be entertained. The Contractor shall place the item as directed by Engineer in charge at all floors/all heights and all levels.

11. Aluminium Profile Skirting :

Materials:

About 60-75mm high x 5mm thick profiled anodized Aluminium skirting profile as shown in the drawing. Aluminium profile shall be made of aluminium alloy & temper 6063-T6 as per BS: 1474 – 1987 with wooden finish powder coating (with coating thickness of 70 microns, average).

Workmanship:

Clean all the surfaces and make it free of dust, oil and other contaminants, remove sharp projections, etc.

Aluminium profile skirting shall be fixed with Clip on type OR with screw with capping strip along with PVC/PP corners and end caps etc. complete as shown in the drawing.

The work shall be carried out to in best workmanship manner & as directed by and up to the satisfaction of Engineer in charge. The Contractor shall make sure that the item to be placed is in its perfect state as per the standards established by its manufacturer. Additionally, the items placed shall not be damaged and shall be free from any dents or scratches. It is the duty of the contractor to make proper arrangements for protection of the items during stacking, transporting, loading/unloading till handover. The contractor shall get the items inspected and approved by the Engineer in charge before fixing. Any claim, upon rejection of any item by the Engineer in charge shall not be entertained.

12. Calcium Silicate False Ceiling:

- The calcium silicate false ceiling tiles shall be factory manufactured, lightweight, densified with Size: 595 mm × 595 mm, Thickness: 15 mm, Edge Profile: Tegular edge which should be free from asbestos and other harmful materials, Uniform in texture, dimensions, color and finish including resistant to sagging, warping and fungal growth which shall be suitable for installation in high humidity conditions. The tiles shall meet all the performance requirements as specified in the relevant Schedule of items and as specified in the approved GFC drawings.
- The suspension grid shall comprise hot-dip galvanized steel sections with galvanization coating of minimum 120 g/sqm (both sides).
- The size and thickness of main tee runner, Cross Tee and secondary cross tee sections, including perimeter trim suspension system shall meet the specified requirements as specified in the relevant Schedule of items and as specified in the approved GFC drawings
- All exposed surfaces of Tee sections shall be factory pre-painted with polyester baked paint finish.
- Ceiling levels shall be established as per approved drawings. Layout shall be planned

to ensure symmetry and minimum cut tiles at edges.

- Services such as ducts, conduits, piping, cable trays and supports above the ceiling shall be completed before commencement of ceiling work.
- Calcium silicate tiles shall be carefully laid into the grid system without causing damage.
- Tiles shall fit snugly and uniformly within the framework.
- Damaged, chipped, stained or warped tiles shall not be used.
- The necessary cutting, trimming and finishing required for Light fittings, Grilles, Smoke detectors, Sprinkler heads. Access panels and Other electrical and mechanical services shall be neat and properly finished.
- Ceiling shall be perfectly level and free from visible irregularities. The Grid alignment shall be straight and uniform and the Joints shall be tight and even. No sagging, distortion, waviness or displacement shall be permitted.
- The Exposed surfaces shall be clean and free from scratches, stains or dents.

13. Gypsum False Ceiling:

- The Gypsum boards false ceiling shall be 12.5 mm thick tapered edge plain gypsum boards shall conform to IS 2095 (Part-I): 2011. The boards shall be free from cracks, warping, dents, edge damages and manufacturing defects. Density, strength and dimensional tolerances shall conform to relevant standards. The Item shall be executed in line with the detailed specifications specified in Schedule of items and approved drawings.
- The galvanised steel frame work shall consist of factory-made galvanized steel sections manufactured from cold rolled steel sheets with zinc coating of not less than 120 g/sqm (both sides inclusive) conforming to IS 277.
- The size and thickness of perimeter channels, ceiling sections, intermediate channels, Angle hangers, Angle cleats, connecting clips shall meet the specified requirements as specified in the relevant Schedule of items and as specified in the approved drawings.
- The Boards shall be fixed to ceiling sections and perimeter channels using corrosion-resistant drywall screws. The Screw heads shall be slightly recessed without damaging board surface.
- Boards shall be installed in staggered pattern wherever feasible. End joints shall be adequately supported by framing members.
- All joints shall be finished to achieve a monolithic, crack-free and flush surface.
- The treatment shall include:
 - Filling of joints with manufacturer's recommended jointing compound.
 - Embedding approved paper/fibre joint tape centrally over joints.
 - Application of minimum three coats of jointing compound.
 - Finishing width shall extend up to 150 mm on either side of joints.
 - Screw heads and surface imperfections shall be filled and sanded smooth.
 - Finished surface shall be free from visible undulations, ridges, cracks or tool marks.
- The necessary cutting, trimming and finishing required for Light fittings, Grilles, Smoke detectors, Sprinkler heads. Access panels and Other electrical and mechanical services shall be neat and properly finished.
- Ceiling shall be perfectly level and free from visible irregularities. The Grid alignment shall be straight and uniform and the Joints shall be tight and even. No sagging, distortion, waviness or displacement shall be permitted.
- The Exposed surfaces shall be clean and free from scratches, stains or dents. Damaged boards or distorted framing members shall not be used.

14. Modular Kitchen:

- The work shall comprise the design, fabrication, supply, installation, fixing and commissioning of complete modular kitchen units as a single integrated system, in line with the nomenclature mentioned in the Schedule of items and the approved drawings.
- The modular kitchen shall include base units, wall-mounted cabinets, tall units, drawer units, shutters, shelves, partitions, hardware, glass components, handles, support members, fixing systems and all accessories necessary for satisfactory performance.
- The modular kitchen units shall install on a 100 mm high platform. The carcass, partitions, shelves, shutters and structural members shall be fabricated from approved quality of BWR Grade plywood conforming to IS 303 and High Density Fibre Board (HDF) as specified in approved drawings and the thicknesses shall be strictly as indicated in the approved drawings and design details.
All exposed and concealed edges shall be machine-finished and provided with matching PVC edge banding of approved colour and thickness.
- All plywood and board surfaces shall be laminated on both sides. The internal surfaces laminates shall be of 0.8 mm thick and external visible surfaces shall be of 1.0 mm thick decorative laminate as specified in approved GFC's
- Laminates shall be fixed using approved synthetic adhesive under pressure to achieve smooth, bubble-free and warp-free surfaces. No untreated surface shall be left exposed.

Cabinet Construction

- The cabinets shall be factory fabricated using precision machinery and assembled at site.
- Construction shall include side panels, Bottom panels, Top rails, Shelves, Vertical partitions, Back panels, Reinforcing members, Drawer boxes and Service access panels etc.
- All members shall be adequately braced and reinforced to withstand operational loads without sagging, distortion or loosening.
- The intermediate framing, supports and stiffeners wherever required shall be provided, irrespective of whether explicitly shown in drawings, to ensure structural stability and durability.

Shutters

- Cabinet shutters shall be fabricated from approved BWR plywood/HDF board of specified thickness and finished with decorative laminates on both faces as specified in approved GFC drawings.
- Shutters shall be accurately aligned and installed to ensure Smooth operation, Uniform gaps, Proper closing, Distortion-free appearance.

Hardware and Fittings

- The hardware like Stainless steel handles, G-profile aluminium handles, Concealed hinge, Soft-close hinges, telescopic drawer channels, Soft-close drawer, runners, Magnetic catches, Shelf supports, Connecting fittings, Adjustable fasteners, Mounting brackets, Screws, Bolts, Anchors, Fixing cleats, Joining plates, Rubber buffers, Stoppers, All accessories required for complete installation shall be of approved make and quality suitable for modular kitchen applications as mentioned in the Schedule of items / approved drawings and approved make list as specified.

Glass Components

- All glass used in the kitchen shall be of 8 mm thick toughened safety glass, Machine polished edges should be free from scratches, waves and defects.
- Glass shall be fixed using approved hardware as specified in approved drawings/ material make list suitable for kitchen use.

Drawers

- Drawer units shall be fabricated using approved board material and fitted with heavy-duty telescopic channels. Drawers shall operate smoothly without binding or misalignment and shall be capable of carrying intended storage loads.

Installation and Fixing

- All units shall be securely fix to walls, floors, partitions or supporting members as required. The completed installation shall be rigid, level, plumb and free from vibration.
- Necessary provisions, clearances, supports required for installation of Microwave oven, Built-in electric oven, Dishwasher, Hob, Chimney, Other kitchen appliances and Electrical service routing provisions required for appliance integration shall be provided as per the approved drawings.

15. Wardrobes:

The modular wardrobe units of sizes and dimensions shall be as shown in the relevant Schedule of items items and as per the approved drawings. The wardrobe shall be factory manufactured and site installed as a complete unit comprising shutters, drawers, hanging spaces, shelves, partitions, loft storage, hardware and accessories complete in all respects.

The basic framework shall be fabricated using well-seasoned, kiln-dried, chemically treated hardwood members of approved quality, free from warping, knots, cracks and other defects. The hardwood framing shall be adequately sized to provide rigidity and support to the complete wardrobe structure.

The Carcass, shelves, partitions, drawer boxes, top, bottom and side panels shall be manufactured using approved quality BWR/BWP grade plywood of thickness as specified in the approved drawings. The Plywood shall conform to IS 303 (BWR Grade or IS 710 (BWP Grade), as specified. All exposed surfaces shall be finished with approved make decorative laminate of approved thickness, shade, colour and texture as specified in approved drawings. The Internal surfaces shall also be finished with laminate or balancing laminate as specified to prevent warping.

All exposed plywood edges shall be provided with matching hardwood lipping/beading of approved thickness or edge banding as specified in drawings. The wooden lipping shall be neatly finished and polished to match the approved laminate colour.

The wardrobe shall consist of hinged shutters, multiple drawers of two different sizes as shown in drawings with stainless steel hanging rods, Adjustable and fixed shelves, Vertical and horizontal partitions with storage compartments. The loft units also provided wherever indicated including openable maintenance panels secured with mirror screws and decorative caps wherever shown.

The installation of all hardware components like Stainless steel hinges with soft-closing mechanism, Soft-closing telescopic drawer channels, Stainless steel handles, Flush handles for drawers, magnetic catches, rubber buffers, rubber leg glides/lowers, stainless steel hanging rods with end supports shall be as per the approved drawings and from the approved makes list.

The wardrobe shall be erected complete in position strictly as per approved drawings. The entire framework shall be rigidly anchored to walls and/or floor using approved anchor fasteners at regular intervals to ensure stability. All units shall be properly aligned, levelled and plumb. Necessary cut-outs, adjustments and site modifications required for proper installation shall be included. Openable maintenance panels shall be fixed using mirror screws with decorative caps as shown in drawings.

The Decorative laminates shall conform to IS 2046. The laminate make, shades and thickness shall be as per the detailed drawings and specifications and the finish shall be free from bubbles, wrinkles, dents or scratches. The wooden lipping/beading shall receive matching polish. All exposed surfaces shall be cleaned after installation. The moving components including drawers and shutters shall operate smoothly after fixing of laminates without binding or excessive play.

16. Turf Pavers:

SUB GRADE

Construction of subgrade using approved available soil within the IITH Compound, spread the earth layer by layer, mix with water to achieve MDD at Optimum Moisture Content and compacting it with vibratory roller of 8-10 tonnes capacity or plate compactor to required percentage of MDD (IS:2720-Part 8) as per MORTH Clause 305 including all leads and lifts complete.

SUB-BASE CONSTRUCTION

Providing and construction of granular sub base (GSB) of Grading -II of Table 400-1 including mixing in a mechanical mixing plant at OMC, carriage of mixed Material to work site, spreading in uniform layers as per drawing with motor grader on prepared cum subgrade and compacting with vibratory roller to achieve required percentage of MDD (as per IS:2720:Part 8), complete as per Clause 401 of MORTH Specifications and as per approved drawing and as per direction of Engineer in Charge

TRUF PAVERS

- The Precast RCC Turf Paver of Size 500mm × 500mm × 40mm thick manufactured by using machine compaction, with minimum compressive strength: 40 MPa with uniform dimensions, smooth edges and free from cracks, honeycombing or surface defects.
- Sand shall be filled within the cells of the turf paver to the full depth of 150 mm or as specified or where ever grassing is specified in the approved drawings, the top portion shall be filled with fertile topsoil suitable for turf growth.
- Turf pavers shall be laid manually in the approved pattern with proper alignment.
- Units shall be closely butted together maintaining uniform joints.
- Necessary cutting of edge units shall be carried out using mechanical cutters only.
- Alignment shall be checked continuously during laying.
- Filled sand shall be thoroughly compacted and topped up wherever settlement occurs.
- Finished surface shall be true to line, level and slope as shown in drawings.
- Damaged, cracked or chipped pavers shall be removed and replaced.
- The completed pavement shall be protected from traffic until properly compacted and accepted.

17. INTERNAL SANITARY, WATER SUPPLY AND DRAINAGE WORKS:

- (1) All the works shall be carried out as per the Schedule of items nomenclature, approved drawings and in accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with up-to-date correction slips as on last date of submission of Bid.
- (2) The entire responsibility for execution of Sanitary, Water Supply and Drainage works including the protection of the sanitary and water supply fittings and other fittings and fixtures against pilferage and breakage during the period of installation and thereafter until the building is handed over, maintaining highest standard of Quality and Workmanship, shall rest on the Contractor.
- (3) The Contractor shall furnish all labour, materials and equipment, transportation and incidental necessary for supply, installation, testing and commissioning of the complete Plumbing / Sanitary system as described in the Specifications and as shown on the drawings. 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.
- (4) For the work of water supply and sanitary installations, the Contractor shall engage the approved plumbers for execute the work in professional way. For quality control & monitoring of workmanship, Contractor shall assign responsibility to site engineer for ensuring strict quality control, adherence to approved drawings, specifications and ensuring top class workmanship for the installation.
- (5) The Scope of work shall include the cost of cutting holes in walls, floors, RCC slabs etc. Wherever required and making good the same for which nothing extra shall be paid.
- (6) Providing & fixing CP Brass caps /extension pieces wherever required for CP Brass fixtures shall be done for corresponding CP Brass fittings. Nothing extra shall be paid on this account.
- (7) The Contractor shall examine all architectural, structural, plumbing, electrical and other services drawings before starting the work for addressing any discrepancies and obtain clarifications from all stakeholders. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Engineer-in-charge without additional cost to the department.
- (8) Samples of all materials like valves, pipes and fittings etc. shall be submitted to the Engineer-in-charge prior to procurement for approval and retention by Engineer-in-charge In-Charge and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed a mockup or sample installation shall be carried out for approval before proceeding for further installation without any extra cost.
- (9) All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be in conformity with list of approved manufacturers as per the Bid document.

(10) Balancing of all water systems and all tests as per for the CPWD Specifications shall be carried out by the Contractor through a specialist group, in accordance with the Specifications and Standards. The installation shall be tested and shall be commissioned only after approval by the Engineer-in-charge In-Charge. All tests shall be carried out in the presence of the representatives of the Engineer-in-charge and nothing extra shall be payable on this account.

(11) The Contractor shall submit completion plans for water supply, internal sanitary installations and building drainage work prior to proceeding for the work.

(12) The uPVC SWR /CI/PVC pipe and GI pipe etc. wherever necessary, shall be fixed to RCC columns, beams etc. with rawl plugs and nothing extra shall be paid for this.

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

(14) The Contractor shall bear all incidental charges for cartage, storage and safe custody of materials and shall construct suitable godowns, yards at the site of work for storing materials so as to be safe against damage by sun, rain, fire or theft etc., at his own cost and also employ necessary watch and ward establishment for the purpose at his own cost.

(15) 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 Schedule of Finishes, specifications, elsewhere in this Bid document & drawings. The quoted rates shall be deemed to be all inclusive for a complete item fit for use including all materials, labour, T&P, specials, equipment, testing & commissioning etc. Accessories shall include proper fixing arrangement, brackets, nuts, bolts, screws and required connection pieces. Nothing extra whatsoever shall be payable on this account.

(16) Fixing screws shall be half round head chromium plated brass screws with C.P. washers where necessary or otherwise as provided in the item.

(17) Porcelain sanitary ware shall be glazed vitreous china of first quality free from warps, cracks and glazing defects and shall be specified in Schedule of items nomenclature and approved drawings.

(18) Horizontal pipes running along ceiling shall be fixed on structural adjustable clamps of approved design. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them and are properly secured.

(19) Slotted angle/channel supports on walls shall be provided wherever shown on drawings. Angles/channels shall be of sizes shown on schedule of items and approved drawings. Angles/channels shall be fixed to brick/block 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.

(20) Wherever M.S. clamps are required to be anchored directly to brick/block walls, concrete slabs, beams or columns, nothing extra shall be payable for clamping arrangement and making good with cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size) or as directed

by the Engineer-in-charge.

(21) Rates for all items quoted shall be inclusive of all work and items given in the above-mentioned specifications and Schedule of finishes and applicable for the work under floors, in shafts or at ceiling level at all heights and depths. All rates are inclusive of cutting holes and chases in RCC and masonry work and making good the same. All rates are inclusive of pre-testing and on site testing of the installations, materials and commissioning.

(22) Cleaning and Disinfection of Pipelines: -

On completion of hydraulic tests and before a pipe is disinfected, it shall be proved to be free from obstruction, debris and sediment by scouring or by any other process which the Engineer-in-charge may prescribe. Upon satisfactory completion of testing and cleaning, the pipelines shall be disinfected as ordered. Chlorine solution shall be applied at the charging point as the pipeline is being filled and dosing shall be continued until the pipeline is full and at least 50 parts of chlorine per million parts of water have been made available and distributed evenly. If ordinary bleaching power is used, proportions will 150 gms of power to 1000 litre of water. If a proprietary brand is used, the proportion shall be as specified by the manufacturer. The treated water shall be left in pipeline for a period as directed but not exceeding 24 hours chlorine residual tests shall be taken at various points along the pipeline. The disinfection process shall be repeated until the sample of water taken from the pipeline are seems to be fit for human consumption.

(23) Opening, cut out in slabs, beams as required shall be left out by inserting PVC spouts of required size before casting of RCC members. Nothing extra shall be paid on this account.

General Requirements:

(i) All materials, sanitary fixtures and fittings shall be new and of best quality as per the Schedule of items and approved drawings and subject to the approval of Engineer- in-charge. Wherever particular makes are mentioned, the choice of selection shall remain with the Engineer-in-charge.

(ii) Chromium plated fittings shall be cast brass chromium plated of the best quality as specified in Schedule of items and approved drawings.

(iii) All Appliances, fittings and fixtures shall be fixed in a neat workman like manner true to level 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 at proper location and height. Faulty locations shall be made good and any damage to the finished floor, plaster, paint, insulation shall be made good by the Contractor at his own cost.

(iv) Sanitary appliances, subject to the type of appliance and specific requirements, shall be fixed in accordance with the relevant standards and the following:

(a) Contractor shall, during the entire period of installation and afterwards protect the appliances by providing suitable cover or any other protection so as to absolutely prevent any damage to the appliances until handing over. (The original protective wrapping shall be left in position, for as long as possible).

(b) The appliance shall be fixed in a manner such that it will facilitate subsequent removal if necessary.

(c) All appliances shall be securely fixed. Manufacturers' brackets and fixing methods shall be used wherever possible. Compatible rust- proofed fixings shall be used. Fixing shall be done in a manner that minimizes noise transmission.

(d) Appliances shall be fixed true to level, firmly fixed to anchor or supports provided by the manufacturer and additional anchors or supports where necessary.

(v) Sizes of Sanitary fixtures given in the Schedule of items and approved drawings are for identification with reference to the catalogues of makes considered. Dimensions of similar models of other makes if allowed may vary the dimensions and the similar and equivalent as approved by EinC shall be provided and no claim for extra payment shall be entertained nor shall any payment be deducted on this account.

Sanitary Fixtures

(i) EWC, wash basins, faucet, toilet paper holder, soap dispenser, coat hook, grab bars etc. shall be of premium quality of approved make, as mentioned in Schedule of items, Schedules of finishes & approved Architectural Drawings, material palette or as directed by the Engineer-in-charge considering requirement of space, location complete in all respects including accessories, labour, workmanship etc.

(ii) Colour, shade, shape, size shall be as decided by the Engineer-in- charge.

(iii) All appliances, fixtures and fittings shall be tested before and after installation. Water seals of all appliances shall be tested.

Internal Drainage

(i) The internal drainage system shall be executed as specified in Schedule of items nomenclature and as specified in approved drawings. Internal drainage pipes shall be of uPVC SWR pipes conforming to IS 13592:1992 and SWR moulded fittings conforming to IS 14735, including bends, tees, junctions, offsets, crosses, cowls, access door fittings and all other necessary accessories. The pipes and fittings shall be joined using approved ring-fit joints with elastomeric rubber rings or approved solvent cement as specified.

(ii) The work shall include providing and fixing angle supports, G.I. bat holders, clamps, brackets and all necessary supporting arrangements at required intervals. The item shall also include cutting chases/holes in walls, floors, slabs and other structural members wherever required for laying the pipelines, and making good the disturbed surfaces to match the original finish, complete in all respects as directed by the Engineer-in-Charge.

(iii) The item includes testing, commissioning and ensuring leak-proof performance of the complete SWR piping system.

(iv) Without restricting to the generality of the foregoing, the soil, waste, vent, rain water pipe system shall include the following:

(a) Soil, waste and vent pipes, Vertical and Horizontal and fittings, joints, clamps and connection to sewer line as shown in the approved drawings.

- (b) Floor traps, Cleanout plugs and inlet fittings.
 - (c) Waste pipe connection from all fixtures i.e., wash basins, sinks and urinals.
 - (d) Rain water pipes & fitting (Terrace Rain Water and Balcony Drain).
 - (e) All pipe fittings exposed on wall shall be painted with two or more coat of desired shade and colour.
 - (f) Testing of all pipes shall be as per relevant codes.
- (v) The scope also include access doors/opening for clean out, accessible for maintenance including MS ladder, platform etc. at suitable locations with primer and painting complete.
- (vi) The soil, waste system above ground has to be planned as “Two Stack System” [Double Stack System] as defined in IS: 5329 having separate pipes for waste from wash basins, showers, bath tub, sinks, Floor drains, AHUs, condensate drain and separate pipe for soil discharge. All piping work shall be executed as per CPWD Specification, 2019 Vol. I & Vol. II with upto date corrections with as on last date of submission of Bid, and shall be got tested

Water Supply work:

- (i) Work under this section consists of providing and fixing, pipes and fittings all labour, materials equipment and appliances necessary and required for water supply system (Domestic Water Supply (Internal) + Flushing Water Supply (Internal) as required as per design and water supply system.
- (ii) Without restricting to the generality of the foregoing, the water supply system shall include the following:
- (a) Pumping supply from Domestic / Flushing/ RO/ Soft Water/ Irrigation/Water/ Under Ground Tank to all fixtures/appliances.
 - (b) Connections to all fixtures etc.
 - I. Ball valve/butterfly valve/Non Return valve/Pressure Reducing Valve/Water Meter.
 - a. All supports made of galvanized iron.
 - b. All concealed pipes fittings bends for water supply shall be of CPVC of appropriate grade of required diameter as per the approved Schedule of items, approved drawing & design. The scope includes all CPVC plain and brass threaded fittings such as tees, elbows, couplers, reducers, unions, adaptors, bends, and other accessories as required for smooth flow of water supply pipes with equitable and proper distribution of pressure.
 - c. All Exposed pipes and fitting for water supply shall be of medium grade G.I. pipes conforming to relevant IS codes as per the approved Schedule of items, drawings & Designs. The G.I. fittings such as sockets, elbows, tees, unions, nipples, bends, reducers, plugs, etc., including clamps,

supports, cutting and chasing in walls wherever required, making good the damaged portions, testing for leakages, and commissioning complete. Pipes shall be fixed exposed on walls with approved clamps and accessories as directed by the Engineer-in-Charge.

(iii) Ball Valves:

Providing and fixing brass ball valve of required size approved quality as specified in Schedule of items and approved drawings, suitable for high- or low-pressure applications, complete with plastic float arrangement where required. The item shall be of standard make, corrosion resistant, and suitable for potable water supply.

The work shall include supply, fixing in position, jointing with threaded ends, testing for leak proof performance, and commissioning complete as per specifications and directions of the Engineer-in-Charge.

(iv) Butterfly Valve:

Supplying, fixing, testing, and commissioning of butterfly valve of PN 16 rating as specified in Schedule of items and approved drawings with bronze/gunmetal seat, duly ISI marked and conforming to IS 13095. The item shall include all necessary nuts, bolts, washers, and rubber gaskets required for installation.

The valve shall be suitable for water supply applications and shall be tested for satisfactory operation and leak tightness.

(v) Gunmetal Air Release Valve:

Providing, fixing, testing, and commissioning of gunmetal single acting air release valve of required size as specified in Schedule of items and approved drawings with screwed inlet, suitable for working pressure up to 10 kg/cm², including all necessary fittings and accessories required for proper installation and functioning.

(vi) Electronic Water Meter:

Providing, fixing, testing, and commissioning of electronic water meter of required sizes as specified in Schedule of items and approved drawings with direct reading display in kilolitres (KL), conforming to ISO 4064 standards, suitable for Class A or Class B installation.

The item shall include all necessary fittings such as flanged or socketed tail pieces, reducers, nuts, bolts, washers, and gaskets, including testing charges and obtaining test certificates from municipal authorities wherever required.

(vii) Motorized Butterfly Valve with Float Sensors:

Providing and fixing motorized butterfly valve of required sizes as specified in Schedule of items and approved drawings suitable for 240V operation, equipped with float type level sensors for automatic operation.

The system shall be designed to open the valve when water level is low and close when water level is high in storage tanks. The scope includes control panel, sensors, electrical cables (4C x 1.5 sqmm or 3C x 1.5 sqmm as required), conduits up to junction box (approx. 6 m), and all accessories required for complete installation, testing, and commissioning.

(viii) MS Fabricated Hot Dip Galvanized Puddle Flange:

Providing and fixing MS fabricated hot dipped galvanized puddle flange assembly as specified in Schedule of items and approved drawings.

The work includes cutting holes in MS plates, inserting pipes, welding (arc welding), and providing leak-proof joints. The assembly shall be installed with TEK welded joints in RCC tank walls/slabs including reinforcement detailing, shuttering cutouts during casting, and all necessary civil coordination.

(ix) Pressure Reducing Station (PRS):

Providing and fixing pressure reducing stations of different sizes for cold water supply as specified in Schedule of items and approved drawings.

The system shall be capable of reducing pressure from inlet pressure to 2.5–3.0 kg/cm² or as required at site. The complete assembly shall be tested to a minimum pressure of 10 kg/cm² and shall include all flanges, unions, nuts, bolts, washers, and accessories required for complete installation, testing, and commissioning.

18.0 DEVELOPMENT WORKS AND BULK SERVICES

External Sewerage & Drainage System:

- (i) The Sewerage & drainage pipeline shall be of Double Wall Corrugated (DWC) HDPE with a corrugated outer surface and smooth inner bore as specified in Schedule of items and approved drawings. The Pipe shall conform to IS 16908 (Part 1): Plastic Piping Systems for Non-Pressure Underground Drainage and Sewerage – Polyethylene (PE) or the latest applicable revision. The pipe shall have a minimum ring stiffness of SN-8 (8 kN/m²). The pipe shall be manufactured from virgin HDPE resin of approved quality.
- (ii) The pipe shall be resistant to corrosion, chemicals, abrasion, impact and underground environmental conditions. The internal surface shall be smooth to facilitate easy flow and minimise friction.
- (iii) The pipe shall be free from cracks, blisters, pinholes, deformation and manufacturing defects.
- (iv) Pipe joints shall be made using manufacturer-approved HDPE couplers of matching size. The Couplers shall be supplied complete with EPDM/Nitrile rubber sealing rings suitable for

watertight joints. The Rubber sealing rings shall be of approved quality and resistant to ageing, water, chemicals and soil conditions.

- (v) All accessories shall be compatible with the pipe system and recommended by the pipe manufacturer.
- (vi) Pipes shall be stored on level ground with adequate supports. Direct exposure to excessive heat and mechanical damage shall be avoided. Damaged or defective pipes and fittings shall not be used.
- (vii) The trench bottom shall be properly levelled, dressed and compacted.
- (viii) The trench shall be free from loose soil, debris and standing water before laying the pipe.
- (ix) Pipes shall be laid true to the required line, level and gradient as shown on the approved drawings. The pipe shall be properly supported throughout its length. Care shall be taken to prevent entry of dirt, stones or foreign material inside the pipe during installation. Open ends shall be sealed whenever work is interrupted.
- (x) Pipe ends shall be cleaned thoroughly before jointing. Rubber sealing rings shall be properly seated in the designated grooves. Couplers shall be aligned accurately and pushed fully using approved methods without damaging the sealing rings. The lubricant recommended by the manufacturer shall be used wherever required.
- (xi) The Joints shall be straight, watertight and free from leakage.
- (xii) Any defective pipe or joint shall be removed and replaced with new ones. at the contractor's cost.
- (xiii) The invert level of Sewerage systems shall be as per approved design keeping minimum gradient for self-cleaning velocity.
 - (i) Necessary Manholes/inspection/ intercepting chambers and required safety footrest and SFRC covers of require size shall also be included wherever required as per Schedule of items and shown in approved drawings.
 - (ii) The cutting, supply and filling of earth to maintain levels of ground in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.
 - (iii) The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water supply pipes, sluice valve chambers, existing sewerage pipes, manholes, drainage

pipes and chambers, communication cables, power supply cables etc. met during the course of excavation shall be properly supported and adequately protected, so that these services remain functional. However, if any service is damaged during excavation, it shall be restored in a reasonable time.

- **External Water Supply Network (Filtered and Unfiltered):**

- (i) All External water supply pipes and fitting shall be of G.I. pipes conforming to relevant IS codes as per the Schedule of items, approved drawings & Designs.
- (ii) Construction of all cross drainage works that falls within the alignment of the water supply network as per approved layout plan of the campus, which are essential and necessary to keep the water supply network in position as per the approved layout.
- (iii) Water supply network should cater to the needs of supplying water from the existing bulk water supply peripheral grid to proposed RCC UG Sumps and from there to proposed RCC Terrace Water Storage Tanks and from there to exposed surfaces of the shafts to till connection to the concealed cPVC lines in the wash rooms.
- (iv) Excavation of trench for laying Pipes and refilling after laying pipes as per relevant Schedule of items /approved drawings or CPWD specifications.
- (v) Installation of gunmetal gate valves, butterfly valves, air release valves and Non return valves shall be as per relevant Schedule of items and approved drawings or CPWD specifications.
- (vi) All pipe work shall be laid properly so that it remains completely watertight, thereby avoiding wastage of water, damage to property and the risk of contamination of the water is eliminated.
- (vii) Necessary inspection chambers are also to be in place wherever required as per Schedule of items and approved drawing.

- **Storm Water Drains:**

1. Laying of Storm water drain uPVC SWR pipes as specified in relevant Schedule of items and approved drawings. The drains are to be connected to the rain water harvesting sump/pits or existing storm water drains/outfalls.
2. Necessary inspection/ intercepting chambers shall be constructed as specified in relevant Schedule of items and approved drawings.
3. The cutting, supply and back filling of earth to maintain levels of ground in position as per the approved layout plan shall be considered as included in the scope of work.
4. The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining

service lines. Water supply pipes, valve chambers, existing sewerage pipes, manholes, drainage pipes and communication cables, power supply cables etc. so that these services remain functional. However, if any service is damaged during excavation shall be restored in reasonable time.

5. The storm water drain shall be constructed wherever necessary to collect the surface water with perforated drain covers of appropriate size as per design with necessary reinforcement complete as per the relevant Schedule of items and approved drawings

19. RCC Underground and Overhead water storage tanks:

1. The water storage tanks for overhead and underground shall be constructed as detailed below as per the relevant Schedule of items and approved drawings.
 - a. Underground RCC water storage tank capacity: 11,000 Lit
 - b. Overhead RCC water storage tank capacity: 11,000 Lit.

Both the water storage tanks should have internal separation for Domestic water and STP Treated water for flushing and gardening purposes.

2. To make the tanks water tight against seepage and leakage, the tanks shall apply crystalline water proofing treatment as specified in the relevant Schedule of items and approved drawings.
3. After completion of water proofing works, the Contractor shall have to fill the tanks with water to show that it is completely watertight. The tanks shall be kept filled for a minimum period of three days (or as desired by the Engineer in charge) and no leakage, seepage or dampness shall be there in the tank. Nothing extra shall be paid for arranging the water and for filling it in the tanks for testing of making other arrangement.
4. If any leakage, seepage or dampness is observed during testing, necessary rectification shall have to be done by the Contractor at his own cost and the tanks shall be re-tested in the manner stated above. Nothing extra shall be paid for arranging the water and for filling it in the tanks for re-testing.
5. After water proofing treatment and testing of water tanks, the internal surface of the water tanks (Flooring and walls) shall have mat finish vitrified tiles of approved make shall be executed as per CPWD Specifications, 2019 Volume-I & Volume-II with up-to-date correction slips.
6. The water proofing treatment shall have warranty as mentioned in Water Proofing Sub-Head.
7. The tiles shall be of approved make and shall generally conform to relevant ISO standards. The tiles of specified sizes shall be used and sample of tiles shall be got

approved from the Engineer-in-charge.

8. Contractor to obtain prior approval of Engineer-in-charge for tiles make, sizes, shade and colour as per Architectural drawings and material palette before bringing it to site. The tiles shall be laid as specified in the Schedule of Finishes including laying of tiles and grouting of tile joints with pigmented epoxy grout of food grade.
9. After completion of the construction work, the Terrace tank, underground tank and pipe lines shall be fully disinfected before commissioning.
10. The Contractor shall make all necessary connections of Inlet, Outlet, Overflow pipes as per the relevant Schedule of items and as per the detailed approved drawings.

20. HORTICULTURE

1.0 General:

1.1 Scope : Contractor to furnish all materials, labor and related items necessary to complete the work indicated in relevant Schedule of items and approved drawings and also to make provision of storage, security of material on site.

2.0 Materials :

Topsoil or good earth shall be a friable loam, typical of cultivated topsoil of the locality containing at least 2% of decayed organic matter (humus). It shall be taken from a well-drained arable site. It shall be free of stones, earth clods, sticks, roots or other objectionable extraneous matter or debris. It shall contain no toxic material. No top soil shall be delivered in wet condition. Top soil available on Site may be used if suitable for land scaping works.

3.0 Earthwork:

Rough Grading:

Rough Grading of all areas within the project, including cut and fill sections and adjacent transition areas, shall be reasonably smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable except as otherwise specified. All ditches, swales, and gutters, shall be finished to drain readily. Unless otherwise indicated on drawings, the sub-grade shall be evenly sloped to provide drainage away from the building walls in all directions at a grade of not less than 1 in 50 provide rounding at top and bottom of banks and at other breaks in grade as specified in the approved drawings.

3.1 Backfill & Fill:

A. General:

Place soil material/murram acceptable for landscaping work, in layers to required sub-grade elevations, for each classification listed below.

1. Under grassed areas, use satisfactory excavated or borrows material.

2. Backfill and fill materials are to be placed to layers not more than 20 cm in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum density for each area classification. Do not place backfill or fill material on surfaces that are muddy.

3.2 Lawn or Unpaved Areas:

Compact top 15 cm of sub-grade and each layer of backfill or fill material at 90% maximum density.

3.3 Finish Grading:

A. If finished grades shown by spot elevations conflict with those shown by contours, spot elevations shall be used. Unless indicated, outside of buildings shall be given uniform slopes between points for which finished grades are shown or between such points and existing established grades, except vertical curves or rounding shall be provided at abrupt changes in slope. Do all grading require bringing entire project area to underside of respective surfacing or paving base as determined by the finished grade as directed by Engineer-in-charge.

B. The contractor is responsible for bringing down all the grades to the finished contours and elevations shown. The soft & hard areas of the soil shall be 2-3 cm uniformly below paving level.

C. All grading and landscaping under this contract shall be done to provide adequate drainage and to prevent the pounding of water.

D. The Contractor shall uniformly distribute the top soil to the required depth over the entire site area to be grassed. Where top soil is spread directly over rock or gravel surfaces depth of the top soil shall be a minimum 20 cms.

4.0 Grassing :

4.1 Preparation:

Area to be grassed shall be prepared to a minimum depth of 300 mm on ground and / or to available depth on slab with good earth mixed with manure in ratio 3:1 with neem cake, approved insecticide powder, coco pit and fertilizers based on the requirement.

During period prior to planting the ground shall be maintained free from weeds. Grading and final leveling of the lawn shall be completed at least two weeks prior to the actual sowing, Regular watering shall be continued until sowing by dividing the lawn area into portions of approx. 5 mts square by constructing small bunds to retain water. These 'bunds' shall be leveled just prior to sowing of grass plants. At the time of actual planting of grass, it shall be ensured that the soil has completely settled.

4.2 laying lawn carpet

Mexican Carpet grass as specified in the relevant Schedule of items and as per the approved drawings shall be laid on evenly prepared firm surface with uniform thickness which shall be free of weeds, pest etc. The joints shall be filled with mixture of garden soil & manure, rolled over at appropriate time to form uniform carpet of grass.

4.3 Maintenance

As soon as the grass is approximately 3cm high it shall be rolled with a light wooden roller - in fine, dry weather and when it has grown to 5 to 8cms above the ground, weeds must be removed and regular cutting and rolling must be begin. A top-dressing of Fertilizer shall be applied when the grass is Sufficiently secure in the ground to bear the mowing machine, the blades must be raised an inch above the normal level for the first two or three cuttings. That is to say, the grass should be cut so that it is from 4 to 5 cms in length, instead of the 3 cm necessary for mature grass.

Water shall be applied at least once in three days during dry weather. During Monsoon, in the absence of rain, the lawn shall be watered every three days soaking the soil through to a depth of at least 20cms. Damage, failure or dying back of grass due to neglect of watering especially for seeding out of normal season shall be the responsibility of the contractor. Any shrinkage below the specified levels during the contract of defects liability period shall be rectified at the contractor's expense. The contractor is to exercise care in the use of rotary cultivator and moving machines to reduce to a minimum the hazards of flying stones and brickbats. All rotary mowing machines are to be fitted with safety guards.

4.4 Rolling:

Lawn mower with roller shall be used periodically, taking care that the lawn is not too wet and sodden.

5. Shrubs/Hedges

The planting bed shall be excavated uniformly to a depth of 600 mm below existing ground level. The bottom of the excavation shall then be loosened and trenched to an additional depth of 300 mm without removing the soil. The excavation shall be carried out carefully to maintain the specified width, depth, and alignment. The Stones, roots, rubbish, and unsuitable materials encountered during excavation shall be removed completely.

The soil shall be mixed uniformly with approved sludge or well-decomposed manure in the ratio of 8:1 (Eight parts of stacked volume of excavated earth and One part of stacked volume of sludge/manure). The Mixing shall continue until a homogeneous soil-manure mixture is obtained throughout the entire bed. The improved soil mixture shall be placed back into the excavated bed in layers, each layer shall be lightly compacted by watering and settling to eliminate air pockets without excessive compaction. The finished bed shall be brought to the required finished level allowing for normal settlement.

The shrubs and ground covers as specified in the relevant Schedule of items and as per the approved drawings shall be laid in the prepared beds and additional earth shall be filled and watering shall be continued to ensure proper growth of shrubs/edges. These shall be kept neatly maintained and must be cut regularly with the edging shears to maintain properly.

Water shall be applied at least once in three days during dry weather. Watering whenever done should be through and should wet the soil at least up to a depth of 20cms. Prior to regular mowing the contractor shall carefully remove rank and unsightly weeds.

6. Trees

Pits shall be excavated to 900 mm diameter and 900 mm depth at locations shown on approved horticulture drawings or as directed by the Engineer-in-Charge.

The sides of the pit shall be vertical and the hard clods shall be broken, and loose soil at the base shall be lightly loosened to facilitate root penetration. Stones, roots, rubbish, and unsuitable materials encountered during excavation shall be removed from the pit.

The soil shall be mixed uniformly with approved sludge or well-decomposed manure in the ratio of 2:1 (Two parts of stacked volume of excavated earth and One part of stacked volume of sludge/manure).

The plants as specified in the relevant Schedule of items and as per the approved drawings shall be brought to the site and kept aside. The Plants shall be healthy, true to species. The Polybags, containers, wrapping materials, and bindings shall be carefully removed before planting. The plant shall be positioned centrally in the pit with the root collar at finished ground level. The roots shall be spread naturally without bending or crowding. The damaged or broken roots if any shall be neatly trimmed before planting.

The prepared soil-manure mixture shall be placed around the root system in layers. The soil shall be lightly firmed around the roots to eliminate air pockets without excessive compaction. The remaining pit shall be filled to finished ground level. A watering basin shall be formed around each plant to facilitate irrigation. Each pit shall be thoroughly flooded with water. Additional soil mixture shall be added wherever settlement occurs. The watering shall continue until complete settlement of the backfill is achieved.

LIST OF APPROVED MAKES

LIST OF APPROVED MAKES

This section gives list of approved makes which are to be considered by the bidder while quoting, as these make reflect the selected products and would remain first choice during execution also. The contractor shall submit the samples of all the materials before procurement.

CIVIL Works

Material / Item	Approved Make
Cement OPC/ PPC	Ultratech, ACC, Lafarge, Bharathi, Zuari.
White cement-based putty	Birla, JK
Reinforcement Steel	SAIL, TATA (TISCO), RINL, JINDAL
Ready Mix Concrete	Ultratech, ACC, RDC Concrete
AAC Blocks	Xtralite from Ultratech, Aerocon from HIL, ECOREX, BILTECH
AAC block joining mortar	Fixoblock xtralite from Ultratech, Smartfix from Aerocon, MYK Laticrete, Ardex Endura
Anchor Fastener, Rebar, Chemical/ Mechanical fastener, Core – cutting, Dry stone cladding clamp, Expandable fasteners	Hilti, Fischer
Anti-Termite Treatment (ATT)	Hilban from HIL, DE - Nocil, Bayer, Biflex-TC from FMC,
Adhesive For Wood Work	Ardex Endura, Laticrete, Pidilite,
Air transfer grills	Trox, Ruskin Titus, Systemair India
Aluminium Accessories	Classic/ Argen/ Oxford/ Nulite/ Crown/ EBCO
Aluminium composite panel	Alucobond, Alstone, Alubond, Eurobond, Aludecor, Alstrong
Aluminium Sections	Hindalco, Jindal, Bhoruka, Indalco
Aluminium System Windows	Kaluco, Technal, Domal, ALCOI, Eternia from Hindalco, Alumak,
Aluminium Systems Glazing/ Curtain wall (Façade system)	Schuco, Reyners, Kawneer, Bhoruka
Aluminium D/W hardware	Alualpha, Lavaal, Giesse, Cotswold, Securistyle, Polismar
Aluminium Louvers	Hunter Douglas, Armstrong, Luxalon
Backer Road	Supreme, Fosroc
Calcium Silicate board / Tiles	Hilux, Aerolite, Pamtech, Promatech
Chemical Admixtures & Additives	BASF, Pidilite, Sika, Fosroc, Ecmas, Bal-Endura, MC Bauchemie, MYK Schomburg,

Crystalline Integral Waterproofing & Other Water proofing compound	Penetron, BASF, Fosroc, Sika, Pidilite
Commercial ply & Board	Greenply, Archidply, Century, Duroply, Uniply, Kitply
Concrete Cover Blocks	Astra, Ramtec or approved equivalent. For exposed concrete only pointed type shall be approved
Door Locks, Access Control Lock	Dorma (XLC), Geze, Kich, Hafele, Assa Abloy (Yale)
Door Closer	Dorma (XLC), Hafele, Yale, Geze
Door Hardware (other than Floor spring, Closer, Locks)	Dormakaba, Kich, Hafele,yale,
Door Seal – Wool pile Weather Strip	Reddiplex, Osaka rubber, Enviro Sealz, Anand or equivalent
Double Side Tape, Decorative Tape	3M or equivalent
EPDM Gaskets	Anand, Osaka Rubber, Roop, Bohra, Hanu, Maharashtra polymer,
Epoxy Grout/ Cementitious Grout for Flooring	Ardex Endura, MYK Laticrete, Kerakoll, Pidilite,
Glass, Tinted Glass, High Performance Glass, Reflective Glass	Saint Gobain, Asahi, Pilkington,
External Paving Tiles (Cement based)	Pavit, Basant baton, Vyara, Ultra, Eurocon, Super
Floor Springs	Dorma (XLC), GEZE, Haffle, Assa Abloy (Yale)
Flush Door Shutter (Factory pressed laminated)	Century, Greenply, Duroply, Kitply, Uniply, Anchor
Furniture Hardware	Hettich, Hafele
Floor Drain	Neer, ACO, GMGR
GRC JALI	Birla GRC, MS Engineers, Ionex engineering co
Glass Processing	Saint Gobain, Fuso, Asahi,
Grab Bars and Disabled Hardware	Cera, Jaquar, Hindware, Dorma
Gypsum plaster	Stain Gobain, Perma board or approved equivalent,
Gypsum Board	Gyproc by Saint Gobain, Knauf, USG Boral
Glass Bricks / Glass Blocks	SPG corportation, Float Glass Center
GI channels	Gypsteel, Anutone, Hillpoint, Diamond Frames.
Laminates	Marino, Century, Greenlam, Formica, Sunmica,
Laminated Shuttering Ply	Green Ply , Centuryply, Archidply
Laminated wooden slats	Armstrong, Hillpoint, Anutone, Aerofiber, Tranquil
Masking Tapes	3M, Sun Control, Wonder Polymer. Essentra
Mirrors	Saint Gobain, Modi Guard (Gujarat Guardian), Asahi, HNG, Pilkington
Non shrink cementitious precision (anchoring) grout	Fosroc, Sika, Ardex Endura, BASF, MYK Laticrete
Patch Fitting	Dorma (XLC), Haffle, Geze, Hettich

PAINT - Cement Based	Nippon, Berger Paints, Asian paints, ICI Dulux, Nerolac
Paint - Acrylic, Synthetic Enamel, Acrylic emulsion- interior and exterior	Nippon, Asian Paints, Akzo Nobel (Dulux), Berger, Nerolac, Jotun
Paint - PU paint, epoxy paint and primer	Asian, Nippon, ICI, Berger, Jotun
Paint - Texture Paints (Interior, Exterior)	Asian, Jotun, ICI Dulux, Berger, Nippon
PVC trims	Sanjay Polymer, Tubes & Tubings, or equivalent
Parapet Drain	NEER, chilly, Camry
Pivot Assembly	FRITSJURGENS
Polish for wooden work	MRF, Asian
Precast concrete tiles, CC Paver blocks, Turf Paver, Grass/ Grid Pavers, gratings, kerb, Drain cover etc.	Super Decorative floorings, Ultra Tiles, Basant betons, Vyara, Raise Stone, Unistone, Nimco, Weatherstone building blocks
Polysulphide Sealant	Fosroc, Dow corning, Sika, MC-bauchemie
Plain gypsum plaster board	Gyproc, USG Boral, Knauf Gypsum.
Perforated gypsum plaster board	Gyproc, Knauf Danoline, Anutone
Rock wool Insulation	UP Twiga, Rockwool India, Lloyd, Ecophone, Knauf,
Stainless Steel	SAIL, Jindal, TATA
Silicone Sealant	Wacker, Dow Corning, GE momentive, MC-bauchemie, Pidilite
Signage vinyl sticker	Claude Neon, Prolite 3M
Silicon Gaskets	Sree Gaurav, Roop
Stainless Steel Bolts, Washers and Nuts, Pressure plates, screws	Kundan, Puja, Atu, GKW, knettlefoldl
Stainless Steel Friction Stay	Hefele, Hettich, Dorma, Giesse, Securistyle, Cotswold,
Suspension system (Grid & Board)	Armstrong, Saint Gobain, USG Boral, Knauf, Anuton
Structural steel items	SAIL, TATA (TISCO), RINL, Jindal steel & Power (JSPL) for structural purpose and other approved equivalent for non-structural work
Tiles/ Stone Adhesive	Pidilite, MYK- Latricrete, Ardex Endura, KeraKoll, Ultratech
UPVC doors and windows	Fenesta, NCL Veka, SAINT GOBAIN, APARNA VENSTER
Vitrified / ceramic Tiles	Kajaria, RAK, Restile, Somany, Jhonson, Asian or approved equivalent
Vitrified Tiles (Moroccan Pattern)	Oro Ceramics or equivalent

Veneer - Natural	GreenLam, Centuryply, Archidply
Veneered plywood	Greenply, Centuryply, GreenLam, Anchorply
Veneered wooden slats	Hillpoint , Anutone, Topakustik Tranquil
Aluminium Skirting (Wooden Finish) Clip On types	Alucraft Profile Skirting Wooden Finish, Baseline Enterprise
RCC Hume Pipes	Sri Venkateswara Spun Pipes, Chaitanya Spun Pipe Company, Ganpati Spun Pipe Co, Sri Srinivasa Spun Pipe Industry, Vishnu Spun Pipes or any other local approved manufacturers.
WPC False Ceiling Profile Panels	Everwood Strata Red Wood, Hardyplast WPC fluted panels
Terracotta Bricks, Terracotta Jaali, Terracotta roof tiles, Terrocotta Brick Screen	Mitti King, Nouvocotto
Kitchen Modular and Fit out including Carcass, Cabinets, Shutters, Hardware, Handles, Glass, Shelves All complete as per drawings	Sleek Kitchens, Häecker Kitchens, Godrej Interio (Interio by Godrej).
Pleated Net Window	Royal Mesh, Insect Shield, Phiper.
Sink Unit	Nirali, Jayna, Hindware, Dimond, Futura or CUSTOM FABRICATED
Wardrobe / Modular kitchen - Hardware SS butt hinge D type handle Anchor fastner Adjusable pvc leg lows Telescopic channel Dead bolt drawer lock Magnet catches L hinges Tower bolt in wardrobe Wardrobe hooks Desk port Mirror brands Soft closing hinges for shutter Soft closing hydraulic hinges for shutter Button screw with cap	Hettich, Hafele, Blum Hettich, Hafele, Blum Hilti, Fishcer Kay pee enterprises, Tsv Solutions, Swift marketing Hettich, Godrej Hettich, Godrej, Dorset Hettich, Hafele, Sugatsune Elegant hardware, Platinum hardware, Mexx Hafle, Platinum hardware, Blum Hettich, Hafle, Hettich, Ebco Saint gobin, Modi guard Hettich, Hafle Hettich, Hafle Ebco
Sanitary Ware, CP Fittings & Washroom Accessories	
European Water Closet	Jaquar/Hindware / TOTO / Kohler / Parry ware / Cera
Concealed Cistern	Jaquar/Hindware / TOTO / Kohler / Parry ware / Cera
Wash Basin	Jaquar/Hindware / TOTO / Kohler / Parry ware / Cera

Under Counter White	Jaquar/Hindware / TOTO / Kohler / Parry ware / Cera
Divyang Toilet Set	Hindware / Jaquar
C.P. Brass Faucets & Fittings	Jaquar / Hindware / Kohler/ Parryware
Wash room accessories	Jaquar / Hindware / Kohler/ Parryware
S.S. Floor Drain Grating Cover	Chilly / Neer / Futura/Camary
Internal Drainage Pipes & Fittings	Astral / Supreme / Ashirvad
P.P. Pipes & Fittings	Astral Silencio / Huliote / Poloplast / Rehau
Brass Floor Clean Out	Chilly / Camry / Neer
Air Admittance Valve	Ashirvad / Astral / Supreme
G.I. Perforated Strip	NECO / Kapilansh / Saint Gobain
G.I. Rubber Coated U-Clamps	Ashirvad / Astral / Supreme
G.I. Rubber Coated O-Clamps	Astral / Chilly / Intellotech
G.I. Threaded Rods	Hitech / Tata
C.I. Parapet Drain	Neer/GMGR/ACO
Water Supply Pipes & Fittings	
CPVC Water Supply Pipes	Astral / Supreme / Ashirvad
G.I. Pipes	Tata / Zenith / Jindal
HDPE Pipes	Jain Irrigation / Supreme / Oriplast / Nagarjuna
D.I. Pipes	JINDAL SAW, SUPRA, Neco / Welspun
DWC-SN8	Supreme, Alom poly extrusion limited, Giga pipe system, technoplast
M.S Pipes	TATA, JINDAL, JINDAL STAR
C.I. S/S Class LA Pipes	KESORAM, ELECTROSTEEL
Gully Trap	ASTRAL, SUPREME
G.I. Fittings	drp 'm', unik, zoloto 'm', sant, bhara forge
Butt Welded/Forged Welded Fittings	vs forge, true forge, bhara forge or equivalent

C.I double flanged Sluice valves & check valves	kirloskar, audco, sant, lehry, leader / castle
C.I double flanged non return valves (50mm dia and above)	kirloskar, audco, advance, lehry, leader / castle
Dual Plate/ Single Plate Type Non-return valves designated to A.P.I. 594 & 598	audco, sant, ksb, leader / castle
Pipe Insulation	Armaflex / Thermaflex
CPVC Ball Valve	Ashirvad / Astral / Supreme
Pressure Reducing Valves, Gun Metal Ball Valve, Gun Metal Wheel Operated Sluice Valve, Gun Metal Gate Valve, Gun Metal Butterfly Valve and Gun Metal Non-Return Valve	Zoloto / Sant / Varie/ Leader
Electrically Operated Actuator Valves	Zoloto / Sant / Equivalent
Cast Iron Y Strainer	Zoloto / Sant/ Leader
Water Meter	Krohne / Dwyer / Kritsnam
Air Release Valve, Pressure Gauge,	Zoloto / Sant/ Leader
Water Level Sensor / Indicator	Honeywell / Wika / Seimens
Pipe Clamps and Support	Intellotech / Fischer / Hitech / Hilti
Motorised valve	danfoss, belimo, honeywell, advance
Digital water metre (electronic type) bms comptiable	iota, fobe marshall, krohne, kranti, dasmesh
Horizontal soil/ waste hanging supports	Chilly, camry, hi tech or equivalent
C.i./di manholes cover & frame	Neco, rif, bic
Sfrc manhole cover & gratings	Kk, daya spun/equivalent
Plastic encapsulated foot rungs	Kgm, omp plast, indo, sunrise rubber, bothra industries, deesawala rubber industries
Dash fasteners	hilti, fisher/eqivalent
Anti corrosive bitumastic paint	Anti corrosive bitumastic paint
Pipe anti corrosive protection (pipe coat material)	Pypkote, coalteck, tapex
Hot water insulation	Thermaflex, vidoflex, supreme, armaflex, k-flex. aero flex
C.I. LA fittings/ Double flanged fittings specials	Jay hiwa, national/equivalent

LIST OF PLANT AND EQUIPMENTS

LIST OF PLANT AND EQUIPMENTS

REQUIREMENTS OF PLANT AND EQUIPMENT AT SITE

Sl. No.	Equipment	Numbers
1.	Needle Vibrators.	3
2.	Screed leveler.	1
3.	Plate Vibrator	1
4.	Reinforcement cutting machine.	1
5.	Power driven earth rammer (Soil compactor).	1
6.	Total station.	1
7.	Auto Level	2
8.	Water tanker (Minimum capacity of 5000 liters)	1
9.	Welding machine 400 Ampere	1
10.	Centrifugal mono block water pump minimum capacity 2 HP	1
11.	Vibratory roller	1
12.	Drilling machine	2 Nos.
13.	Shuttering with necessary props	As per requirement
14.	Double steel scaffolding and staging materials	As per requirement
15.	Air compressor	1 No.
16.	DG set of minimum capacity 62.5 KVA.	1
17.	Good quality Camera for taking photographs and video recording of major activities for record purpose and for quality assurance.	1 No.
18.	Any other machinery required for completion of the work as per decision of Engineer-in-charge.	As per Actual Requirement

Note: 1. The above list is only indicative and not exhaustive. The Bidder may be required to deploy more T&P as per requirement of work.

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

LIST OF ESTABLISHING SITE LAB AND
TESTING OF MATERIALS

LIST FOR ESTABLISHING SITE LABORATORY AND TESTING OF MATERIALS

Equipment for conducting necessary tests (as per CPWD Specifications 2019 Volume-I) shall be provided and installed at site. The following laboratory equipment should be in general or as and when required be set up at site laboratory: -

Sl. No.	Equipment	Numbers
1.	2000KN compression testing machine, electrical cum- manually operated	1
2.	Slump cone, steel plate, tamping rod, steel scale, scoop	2
3.	Vicat Apparatus with Desk pot	1
4.	Pumps and pressure gauges for hydraulic testing of pressure	1
5.	Graduated glass measuring cylinder of various capacity	As per requirement
6.	Sets of sieves for testing of coarse and fine aggregate.	1 set each.
7.	Cube moulds size 150mmx150mmx150mm	30 Nos
8.	Hot air oven temp. Range 50°C to 300°C-sensitivity 1 degree	1
9.	Electronic balance 600gx0.1g., 10kg and 50 kg	1 No. each
	Digital thermometer up to 150oc	1
11.	Measuring jars 100ml, 200ml, 500ml	2 Nos each size
12.	Gauging trowels 100mm & 200mm with wooden Spatula 100mm & 200mm with long blade	2 Nos each
13.	Vernier calipers 6" & 12" size	1 No. each
15.	Digital PH meter least count 0.01mm	1 No.
16.	GI tray 600x450x50mm, 450x300x40mm,	2 Nos each
17.	Screw gauge 0.1mm-10mm, least count 0.05	1 No.
18.	Measuring cylinder TPX or Poly propylene capacity 100 ml, , 250 ml, 500 ml and 1000 ml	2 Nos each
19.	Pyrex, corning or Borosil beakers with cover capacity 100ml, 200ml, 500 ml.	As per requirement
20.	Wash Bottles capacity 500 ml	As per requirement
21.	Measuring tape (5 metre, 15 metre and 30m)	Each 1 no.
22.	Wheel Barrow	As per
23.	Field Density Test Apparatus by core cutting	1 set

Note: 1. The above list is only indicative and not exhaustive. The Bidder may be required to deploy even more Equipment based on the requirement at site.

2. If the contractor does not establish site lab or if some of the equipment's are not established at site lab, the corresponding tests shall be conducted at approved third party lab as approved by Engineer-in-charge.

LIST OF MANDATORY TESTS

Sub Head: Mortars

LIST OF MANDATORY TESTS

<i>Material</i>	<i>Clause</i>	<i>Test</i>	<i>Field/ laborator y test</i>	<i>Test procedure</i>	<i>Min. quantity of material for carrying out the test</i>	<i>Frequency of testing</i>
1	2	3	4	5	6	7
Water	3.1.1	(i) pH Value (ii) Limits of Acidity (iii) Limits of Alkalinity (iv) Percentage of solids (a) Chlorides (b) Suspended matter (c) Sulphates (d) Inorganic solids (e) Organic solids	Lab Test	IS 3025	-	Water from each source shall be got tested before the commencement of work and thereafter once in every three months till the completion of the work. Water from municipal source need be tested only once in six months. Number of Tests for each source shall be 3
Cement	3.1.2	(a) Physical requirement (i) Fineness (ii) Soundness (iii) Setting time (Initial & Final) (iv) Compressive Strength (v) Consistency of standard cement paste	Lab Test	IS 4031	Each lot	Every 50 tonnes or part thereof. Each brand of cement brought to site shall be tested as per this frequency.
Sand	3.1.3.1	Organic impurities	Field	IS 2386-Part-2	20 cum	Every 40 cum or part thereof or more frequently as decided by Engineer-in-Charge.
	3.1.3.2	Silt Content	Field	IS 2386-Part-2	20 cum	-do-
	3.1.3.4	Particle size distribution	Field or Laboratory as decided by the EIC	IS 2386-Part-1	40 cum	40 cum or part thereof

1	2	3	4	5	6	7
Sand	3.1.3.5	Bulking of Sand	Field	IS 2386-Part-3	20 cum	Every 40 cum or part thereof or more frequently as decided by Engineer-in-Charge.
Fly Ash	3.1.5 & 3.1.5.1	Total chloride in percent by mass, max.	Lab	IS 12423	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge
		Loss of ignition in percent by mass, max.	Lab	IS 1727	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge
		Fineness, specific surface in m^2/kg /	Lab/field	Blaine's permeability method	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge
		Compressive strength at 28 days in N/mm^2 , Min.	Lab.	IS-4031	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge

CONCRETE WORK

LIST OF MANDATORY TESTS

<i>Material</i>	<i>Clause</i>	<i>Test</i>	<i>Field/ laboratory test</i>	<i>Test procedure</i>	<i>Min, quantity of material for carrying out the test</i>	<i>Frequency of testing</i>
1	2	3	4	5	6	7
Ready Mix Concrete from RMC	Coarse Aggregates		RMC Plant Lab	IS 2386	50Cum	Test reports to be given by the RMC producer at every RMC supply of 100cum or part thereof
	Fine Aggregate		RMC Plant Lab	IS 2386	50Cum	-do-
	Cement		RMC Plant Lab	IS 4031	50Cum	-do-
	Fresh concrete	Slump test	Field/lab	IS 1199	10Cum	One test for 50cum for RCC work including in all other locations RCC done in a day is less than 50cum. Test may be carried out as per the directions of Engineer In-Charge.
		Concrete Cube	Lab	IS 516	10Cum	1 to 100Cum - 1 sample for every 25cum or part thereof. 101cum and above- 4 plus one additional sample for each additional 50cum or part thereof. (each sample consists of 3 cube specimens)

Steel for Reinforced cement concrete	5.1.3	(A) Physical Test and chemical tests				(a) For consignment below 100 tonnes	(b) For consignment over 100 tonnes
						(i) under 10 mm dia, one Sample for each 25 tonnes or part thereof	(i) Under 10 mm dia, one sample For each 40 tonnes or part thereof
						(ii) 10 mm to 16 mm dia one sample for each 45 tonnes or part thereof	(ii) 10 mm to 16 mm, one sample for each 50MT or part thereof.
						(iii) over 16 mm dia one sample for each 50 tonnes or part thereof	(iii) over 16 mm dia, one sample for each 75 tonnes or part thereof.

LIST OF MANDATORY TESTS – Masonry Work

Sl. No.	Material	Clause	Test	Field/ laboratory Test	Test Procedure	Frequency of testing
(i)	Bricks/Brick Tile	6.1.3, 6.1.4, 6.1.5	Testing of Bricks/Brick Tiles for dimensions, Compressive strength, Water absorption and efflorescence	Laboratory	IS 3495 Part-1 Part-2 Part-3 IS 1077	One test for 50,000 no's or part thereof (Min. qty. 2000nos)
(ii)	Sewer Bricks	6.1.4	Dimensions, Compressive strength, Water absorption And Efflorescence	Laboratory	IS 6441:Part-1 & Part-5 IS 3346 :Part-3 IS 6441 – Part-3	One test for 100 cum or part thereof (Min. qty. 5cum.)

CLADDING WORK**LIST OF MANDATORY TESTS**

<i>Material</i>	<i>Clause</i>	<i>Test</i>	<i>Field/ Laboratory Test</i>	<i>Test</i>	<i>Minimum quantity of material/ work for carrying out the test</i>	<i>Frequency of testing</i>
Granite		(i) Moisture	Lab	IS 1124	Min. Qty. 100 Sqm.	One test for 500 Sqm. or part thereof.
		(ii) Specific Gravity	Lab	IS 1122	-do-	-do-

WOOD WORK & P.V.C. WORK**LIST OF MANDATORY TESTS**

<i>Material</i>	<i>Clause</i>	<i>Test</i>	<i>Field/ Laboratory Test</i>	<i>Test Procedure</i>	<i>Min, Quantity of Material for carrying out the test</i>	<i>Frequency of Testing</i>
1	2	3	4	5	6	7
Timber	9.1.6	Moisture content	Field (by moisture meter) laboratory test as required by Engineer-in-Charge	IS 1708-Part-1	1 cum	Every one cum or part thereof.
Flush door	9.7.10	1. End immersion Test 2. Knife test 3. Adhesion Test 4. Screw withdrawal resistance test	Laboratory	IS 4020 Part-13 to 16	26 shutters	As per sampling and testing specified in clause 9.7.11
Mortice Locks	9.15.13	Testing of spring	Laboratory	IS 2209	50 Nos	100 or part thereof.
PVC Door shutter						

STEEL WORK

LIST OF MANDATORY TESTS

Material	Clause	Test	Field/ laboratory test	Test procedur e	Min. quantity of material for carrying out the test	Frequency of testing
1	2	3	4	5	6	7
Steel	10.1.1	(a) Tensile strength (b) Bend test	Laborator y	IS 1599 IS 1608	20 tonne	Every 40 Tonne or part thereof.
Steel tubular pipes	10.13	(a) Tensile Test (b) Bend Test (c) Flattening Test	Laborator y	IS 1608 IS 2329 IS 2328	8 tonne	Every 15 tonne or part thereof

Flooring Work

LIST OF MANDATORY TESTS

Material	Clause	Test	Field/ Laboratory Test	Test Procedure	Min. quantity of material for carrying out the test	Frequency of testing
1.	2.	3.	4.	5.	6.	7.
Pressed Ceramic tiles (for floor)	11.4,11.5& 11.16	1. Dimension s and surface quality 2. Physical properties 3. Chemical properties	Laborator y	I S: 13630 Part-2 Part3 Mohs scale Part 6, Part7 and Part8	5000 Nos.	10000 Nos. or part thereof

Minimum quantity of tiles for carrying out the test and frequency of test shall be as specified in the list of Mandatory Test. The number of tiles selected for each mandatory test shall be as follows”

- | | |
|---|------------|
| (a) For conformity to requirements on shape and dimensions,
wearing layer, and general quality | - 12 tiles |
| (b) For wet transverse strength test | - 6 tiles |
| (c) For resistance to wear test | - 6 tiles |
| (d) For water absorption test | - 6 tiles |

LIST OF MANDATORY TESTS- GSB

Material	Test	Field/ Laboratory Test	Test Procedure	Frequency of Testing
Granular Sub Base (GSB)	(i) Gradation	Field	IS:2386 (Part 1)	One test per 400 cu.m.
	(ii) Atterberg limits	Laboratory	IS:2720 (Part 5)	One test per 400 cu.m.
	(iii) Water absorption	Laboratory		One test per 400 cu.m.
	(iv) Density of compacted layer	Laboratory		One test per 1000 cu.m.
	(v) Deleterious constituents	Field	IS:2386 (Part 2)	As required
	(vi) Soundness test	Field	IS:2386 (Part 5)	Same as mentioned under serialNo. 8
	(vii) CBR	Laboratory		As required

LIST OF MANDATORY TESTS- WMM

Material	Test	Field/ Laboratory Test	Test Procedure	Frequency of Testing
Wet Mix Macadam	(i) Aggregate Impact Value or Los Angeles Abrasion value	Laboratory	IS:2386 (Part 4)	One tests per 1000 cu.m of aggregate
	(ii) Grading of aggregate	Field	IS:2386 (Part 1)	One tests per 200 cu.m of aggregate
	(iii) Combined Flakiness and Elongation Indices	Laboratory	IS:2386 (Part 1)	One tests per 500 cu.m of aggregate
	(iv) Atterberg limits of portion of aggregate passing 425 micron sieve	Laboratory	IS:2720 (Part 5)	One tests per 200 cu.m of aggregate
	(v) Density of compacted layer	Field		One set of three tests per 1000sq.m.
	(vi) Water absorption of aggregate	Laboratory	IS:2386 (Part 3)	Once in a month
	(vii) Deleterious material	Field	IS:2386 (Part 2)	As required, once in a month

Apart from mandatory tests specified above, Tests required for conformance of various materials becoming part of permeant structure shall be carried out as per relevant IS Codes. The Engineer-in-Charge may at his discretion, call for any additional tests that he may consider necessary. Sampling, procedure and computations for such test shall be done in accordance with Relevant IS Codes, ASTM, EN Standards.

GUARANTEE BONDS

ANNEXURE-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 PRESIDENT OF INDIA (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 **05 (Five) years from date of completion of entire project.**

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 five 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

thereunder then the GUARANTOR will indemnify the Principal and his successors against all loss, damage, cost, expense or otherwise which may be incurred by him by reason of any default on the part of 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 Obligorand by and for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

Signed, sealed and delivered by OBLIGOR in the presence of

- 1.

- 2.

Signed for and on behalf of THE PRESIDENT OF INDIA by in the presence of

- 1.

ANNEXURE-II

**GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR
REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF
SANITARY INSTALLATIONS / WATER SUPPLY / DRAINAGE
WORK AND ALUMINIUM WORK/FIRE CHECK DOORS**

The agreement made this..... day of.....Two Thousand
..... between

.....S/o(hereinafter called
the GUARANTOR on the one part) and the PRESIDENT OF INDIA (hereinafter
called the Government on the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called
the Contract) datedand made between the
GUARANTOR ON THE ONE PART AND the Government on the other part, whereby
the contractor inter alia, undertook to render the work in the said contract
structurally stable, leak proof and sound material, workmanship, anodizing,
colouring, sealing etc.

AND WHEREAS THE GUARANTOR 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 / Powder coat colouring
and finishing for **5 (Five) years from date of completion of entire project.**

NOW THE GUARANTOR hereby guarantee that work executed by him will be free
from any leakage, seepage, cracks in pipes and guaranteed against faulty
material and workmanship, defective galvanizing for five 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 and in
case of any defect to satisfaction of Engineer-in-Charge at his cost and shall
commence the work for such rectification within seven days from the date of issue
of the notice from the Engineer-in-Charge calling upon him to rectify the defects
failing which the work shall be got done by the Department by some other
contractor at the 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 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.

Further, (i) the collateral damages caused due to any defective work, shall be borne by the Contractor and (ii) Any incidental works which are to be done for rectification and restoring the same to original condition, shall be borne by the Contractor.

IN WITNESS WHEREOF these presents have been executed by the obligator.....

..... and..... by
..... for and on behalf of the PRESIDENT OF INDIA
on the day, month and year first above written.

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

1.....2.

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

1..... 2.