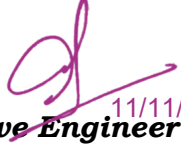




भारतीय प्रौद्योगिकी संस्थान हैदराबाद  
Indian Institute of Technology Hyderabad

**REQUEST FOR PROPOSAL (RFP)  
FOR PROVIDING  
Third Party Quality Assurance (TPQA) Services  
for  
Construction of Precast 2Nos Faculty Housing Tower (G+12), 3Nos Staff  
Housing Towers (G+12) and 3Nos Hostel Blocks (G+6) RCC Structures at IIT  
Hyderabad, Kandi, Sangareddy**

  
11/11/2022  
**Executive Engineer (Civil)**  
**IIT Hyderabad**

**INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD**

**NOTICE INVITING TENDER**

**RFP Reference No. IITH/CMD/CIVIL/RFP/2022-23/01**

Indian Institute of Technology Hyderabad invites on behalf of President of India online bids (e-tendering) ~~Item-rate~~/percentage rate composite bids in *Two Bid System* from specialized agencies/Departments/Organizations/Institutions having similar experience in Government/PSU's/Autonomous building projects as **Third Party Quality Assurance (TPQA) Consultant** for the below mentioned work.

1.1	NIT No.:	<b>IITH/CMD/CIVIL/RFP/2022-23/01</b>
1.2	Name of Work:	<b><i>Providing Third Party Quality Assurance (TPQA) Services for Construction of precast 2Nos Faculty Housing Tower (G+12), 3Nos Staff Housing Towers (G+12) and 3Nos Hostel Blocks (G+6) RCC Structures at IIT Hyderabad, Kandi, Sangareddy.</i></b>
1.3	Estimated Cost: <i>(given merely as a rough guide)</i>	<b>Rs. 1,44,79,200/-</b>
1.4	Earnest Money Deposit (EMD):	<b>Rs. 2,89,600/-</b>
1.5	Period of Completion:	<b>24 Months</b>
1.6	Date of Online Publication/Download of RFP Document	11/11/2022 @1000Hrs
1.7	Last Date and time for Submission of Bids	28/11 /2022 @1500Hrs
1.8	Date and time of Opening of Technical Bids	28/11 /2022 @1530Hrs
1.9	Date and time of Presentation by Bidders/Consultants (Online)	05/12/2022@1500Hrs
1.10	Date and time of Opening of Financial Bids	09/12/2022@1530Hrs
1.11	Cost of Bid Document:	<b>NIL</b>

**How to apply:**

The Tender Document can be downloaded from <https://mhrd.euniwizarde.com> OR Central Public Procurement (CPP) Portal <https://eprocure.gov.in/epublish/app> OR Institute website-<https://www.iith.ac.in/tenders/#Civil%20Works>.

The bid is to be submitted online mode only through the E-procurement portal of <https://mhrd.euniwizarde.com> up to the last date and time of submission of tender. Manual bids shall not be accepted. All quotation (both Technical and Financial) should be submitted online through E-procurement portal of <https://mhrd.euniwizarde.com>.

Any queries relating to the process of online bid submission or queries relating to e-tender Portal in general may be directed to the Helpdesk Support - Phone No. 011-49606060. Mail id: - [helpdeskeuniwizarde@gmail.com](mailto:helpdeskeuniwizarde@gmail.com).

### **INSTRUCTIONS FOR ONLINE BID SUBMISSION:**

The Tender Document can be downloaded from <https://mhrd.euniwizarde.com> OR Central Public Procurement (CPP) Portal <https://eprocure.gov.in/epublish/app> OR Institute website-<https://iith.ac.in/tenders>.

The bidders are required to submit soft copies of their bids electronically on the <https://mhrd.euniwizarde.com> using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the Portal, prepare their bids in accordance with the requirements and submitting their bids online.

More information useful for submitting online bids may be obtained at: <https://mhrd.euniwizarde.com>

### **GUIDELINES FOR REGISTRATION:**

1. Bidders are required to enrol on the e-Procurement Portal with clicking on the link "Bidder Enrolment" on the e-tender Portal by paying the Registration fee as applicable + Applicable GST.
2. As part of the enrolment process, the bidders will be required to choose a unique username and assign password for their accounts.
3. Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the e-Wizard Portal.
4. Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Only Class III Certificates with signing + encryption key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / TCS / nCode / eMudhra etc.) with their profile or bidders can contact help desk for getting the DSC.
5. Only valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC's to others which may lead to misuse.
6. Bidder then logs in to the site through the secured log-in by entering their user ID/password and the password of the DSC / e-Token.
7. The scanned copies of all original documents should be uploaded in **pdf format** on portal <https://mhrd.euniwizarde.com>

8. After completion of registration payment, bidders need to send their acknowledgement copy on help desk mail id [helpdeskeuniwizarde@gmail.com](mailto:helpdeskeuniwizarde@gmail.com) for activation of their account.

### **SEARCHING FOR TENDER DOCUMENTS:**

1. There are various search options built in the e-tender Portal, to facilitate bidders to search active tenders by several parameters like Department name, Tender category, estimated value, Date, other keywords, etc. to search for a tender published on the Online Portal
2. Once the bidders have selected the tenders they are interested in, you can pay the form fee and processing fee (NOT REFUNDABLE) by net-banking / Debit / Credit card then you may download the required documents / tender schedules, Bid documents etc. Once you pay both fee tenders will be moved to the respective 'requested' Tab. This would enable the e-tender Portal to intimate the bidders through e-mail in case there is any corrigendum issued to the tender document.
3. The bidder should make a note of the unique Tender No assigned to each tender, in case they want to obtain any clarification/help from the Helpdesk.

### **PREPARATION OF BIDS:**

1. Bidder should take into account any corrigendum published on the tender document before submitting their bids.
2. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid.
3. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in **PDF/XLSX/PNG etc., formats**. Bid Original documents may be scanned with 100 dpi with Colour option which helps in reducing size of the scanned document.
4. To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, GST, Annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use "My Documents" available to them to upload such documents.
5. These documents may be directly submitted from the "My Documents" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.
6. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that needs to be submitted. Any deviations from these may lead to rejection of the bid.

### **SUBMISSION OF BIDS:**

1. Bidder should log into the website well in advance for the submission of the bid so that it gets uploaded well in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
2. The bidder has to digitally sign and upload the required bid documents one by one as

indicated in the tender document as a token of acceptance of the terms and conditions laid down by IIT Hyderabad.

3. Bidder has to select the payment option as “**e-payment**” to pay the **tender fee / EMD** as applicable and enter details of the instrument.
4. ***In case of Bank Guarantee (BG) bidder should prepare the BG as per the instructions specified in the tender document. The BG in original should be posted/couriered/given in person to the concerned official of IIT Hyderabad before the Online Opening of Technical Bid. In case of non-receipt of BG in original by the said time, the uploaded bid will be summarily rejected.***
5. ***Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard BOQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BOQ file, open it and complete the white Colored (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BOQ file is found to be modified by the bidder, the bid will be rejected.***
6. The server time (which is displayed on the bidders’ dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
7. All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data, which cannot be viewed by unauthorized persons until the time of bid opening.
8. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
9. ***Upon the successful and timely submission of bid click “Complete” (i.e. after Clicking “Submit” in the portal <https://mhrd.euniwizarde.com>), the portal will give a successful Tender submission acknowledgement & a bid summary will be displayed with the unique id and date & time of submission of the bid with all other relevant details.***
10. The tender summary has to be printed and kept as an acknowledgement of the submission of the tender. This acknowledgement may be used as an entry pass for any bid opening meetings.
11. The off-line tender shall not be accepted and no request in this regard will be entertained whatsoever.
12. As per portal norms Tender Processing Fee will be applicable.

**AMENDMENTS OF BID DOCUMENT:**

At any time prior to the deadline for submission of Bids, the department reserve the right to

add/modify/delete any portion of this document by the issuance of a Corrigendum, which would be published on the website and will also be made available to the all the Bidder who has been issued the tender document. The Corrigendum shall be binding on all bidders and will form part of the bid documents.

**ASSISTANCE TO BIDDERS:**

**For any clarification in using <https://mhrd.euniwizarde.com>**

1. Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.

2. Any queries relating to the process of online bid submission or queries relating to e-Wizard Portal in general may be directed to the 24X7 e-Wizard Helpdesk Support.

Please feel free to contact euniwizard helpdesk (as given below) for any query related to e- tendering - Phone No. 011-49606060.

Mail id: - [helpdeskeuniwizarde@gmail.com](mailto:helpdeskeuniwizarde@gmail.com)

The contact number for the helpdesk is 8448288994/86/87/89/88/81/90/92/82

011-49606060, 07903269552, 9355030608, 9055030613, 7903810198, 9355030606, 9315620706, 9355030623, 9355030628, 8800526452, 9205898228, 9122643040, 9355030604

[epochhelpdesk.01@gmail.com](mailto:epochhelpdesk.01@gmail.com), [epochhelpdesk.44@gmail.com](mailto:epochhelpdesk.44@gmail.com), [epochhelpdesk.06@gmail.com](mailto:epochhelpdesk.06@gmail.com)

3. The tender inviting authority has the right to cancel this e-tender or extend the due date of receipt of the bid(s).

4. The bid should be submitted through e-Wizard portal (<https://mhrd.euniwizarde.com/>) only.

## **BRIEF PARTICULARS OF THE WORK**

IIT Hyderabad started functioning since August 2008 from its temporary campus located in Sangareddy district. IIT Hyderabad wishes to make a dream campus, a campus that is built on state-of-the-art professional strategies of planning, architecture, design and construction, with equal emphasis on aesthetics, safety and comfort. It must stand befitting the status of a premier institute, offering a role model for other campuses to emulate. The infrastructure of the campus shall be so developed that it allows natural opportunities for interaction between academics of different disciplines to come together and undertake research on cutting edge interdisciplinary domains.

IIT Hyderabad is planned as a residential campus built on an area of 602 acres to eventually accommodate a total population of 30,000, including 20,000 students with a total built up area of 2.1 million square meters. The campus consists of academic area, residential area for students, residential area for faculty and staff and other support facilities.

The growth of the campus is planned in phases with a corresponding increase in the physical infrastructure and support facilities to accommodate an increase in the number of students in established programs and new programs of the future. IIT Hyderabad campus is envisioned as township that will be self-contained and based on concepts of sustainable development and living.

The master plan for IIT Hyderabad campus has been developed with modular flexibility for expansion to accommodate the future growth.

Phase-1 Campus Construction was started in January 2012 and completed in April 2019 and Phase-2 Campus Construction has been started in March 2019 and is expected to be completed by March 2023. Now IIT Hyderabad intends to start the construction activities for additional buildings for further development and appoint of the contractor for the same.

### **Building Description:**

<b>Sl. No.</b>	<b>Building Names</b>	<b>No. of Blocks</b>	<b>No. of Floors</b>	<b>Built up Minimum plinth area in sqm</b>
1	FT1A- C Type	1	G+12	17,090.89
2	FT1B- C Type	1	G+12	17,090.89
3	ST1A- E Type	1	G+12	8,886.15
4	ST2A- D Type	1	G+12	10,155.60
5	ST2B- D Type	1	G+12	10,155.60
6	Hostel Blocks	3	G+6	15,096.00
	Total Built up area in Sqm			<b>78,475.13</b>

The proposed Hostel building is of Ground + 6 structure and Faculty and Staff Housing Towers of Ground + 12 structure configuration. Approximate plinth area of all buildings is 78,475.00 sq. m., and the building foot print is 14,538 sq. m, which has 168 rooms of 3 Nos Hostel Blocks with double occupancy and 72 flats each in 2 faculty and 3 staff housing towers. To bring the building to immediate occupancy, it is proposed to adopt precast technology for construction. For Hostels, each floor will have 12 rooms in each wing and 24 rooms in both the wings. For Staff & Faculty Towers, each floor will have 6 flats. No dining hall is proposed for the hostel and the boarders will use the existing central dining facility.

### **1. Aim & Objectives of TPQA:**

The main aim of the TPQA firm is to act as an onsite representative of IITH during construction to achieve high-quality workmanship and finish quality.

### **2. The Objectives are:**

- To monitor that construction is carried out as per the processes, sequencing, and quality control measures mentioned in the agreement between IITH and contractor, and the approved method statements submitted by the Contractor to IITH.
- To inspect the site, generate reports and highlight areas of concern w.r.to quality of materials, workmanship and finishing at all stages of construction and notify the CMD office.
- To inspect, that construction is carried out as per drawings & specifications as approved by EIC.
- To monitor dimensional and geometrical integrity, material and system integrity, performance and constructional integrity and visual and textural integrity.

### **3. Scope of Work**

#### **3.1 Required Services by TPQA Consultant**

TPQA Consultant shall Perform Third Party Quality Assurance role: Under this role TPQA Consultant shall render the following services:

- (a) Ensure the project is executed as per GFC drawings, BoQ description and relevant specifications and bring to the notice of the IIT Hyderabad all non-conformities for ordering corrective action. Flag non-conformities in the site processes in terms of quality of materials used, workmanship and proper up-keep of executed work at site and suggest remedial measures

**Deliverables: Inspection reports listing non-conformities**

- (b) Witness at least 10% of the quality tests performed at on-site and off-site as per approved Inspection Test Plan including participation in collection of samples. Participate in Factory Acceptance Tests for assessing the suitability of material as and when required by Employer.

**Deliverables: Submit Monthly and Quarterly reports on quality checks performed**



(c) Technical audit of works registers to ensure they are maintained in proper format and are updated on regular basis by the contractor and TPQA Consultant.

**Deliverables: Verify the work registers periodically and sign-off as a token of verification. Flag non-conformities noticed in the up-keep of registers and documentation by the Contractor and TPQA Consultant and suggest remedial measures.**

(d) Technical audit of site safety measures adopted by the contractor and TPQA Consultant for conformation to the approved Project Safety plan and stipulations of project GREEN Rating authority.

**Deliverables: Reports on un-safe safety practices prevalent at site and suggest remedial measures.**

(e) Attend periodical review meetings.

### **3.2 Brief Scope of Work**

The tentative brief scope of the work and expected quality assurance and suggested activities which may be modified before award of the work are as under:

- Before the construction, study the processes, sequencing, and quality control measures mentioned in the agreement document between IITH and contractor, and method statements submitted by Contractors to IITH. Offer suggestions / comments, if any, for corrective measures.
- Review contractors work program and advise the need on corrective measures to IITH.
- Develop operating procedures & protocols for Inspection and monitoring workmanship and finishes: The consultant shall develop operating procedures, protocols and formats including hold and witness points that would be used for meeting the objectives. These will include formats for monitoring and reporting; formats for carrying out quality audit including checklist of various components of works, frequency of quality audit at various levels, scheduling of audit, reporting and follow up procedures etc.
- Before the construction, examine all execution / good for construction drawings (architectural, structural, services, infrastructure and landscape etc.), specifications, execution detail, highlight any ambiguity or conflicts which may create challenges in execution and finish to IITH.
- During construction, inspect, document & report if the construction is not being carried out as per drawings & specifications issued by the Architect & other Consultants.
- During construction, undertake inspection, document and submit monthly and quarterly Quality Assurance reports. These reports should highlight any non-conformity, deviation & shortfalls in the processes, sequencing, and method statements w.r.t workmanship & quality control measures.
- Recommend stopping the work to IITH, Contractor & IITH if any instances of deviations from accepted quality of construction materials, workmanship and general quality of works at appropriate stages of construction.

- To highlight works that need to be rejected w.r.t quality of workmanship and finishing at all stages of construction. This includes but not limited to inspection of:
  - a) **Dimensional and geometrical integrity:** Works that are dimensionally inaccurate or out of line and level
  - b) **Material and system integrity:** Inspecting performance standards as applicable for materials, components (such as window-systems/door systems, tiling, fixing protocol for fittings etc.)
  - c) **Performance and constructional integrity at junctions where two different materials meet:** Junctions between two elements (Ex: Expansion joints, false ceiling meets civil edge / frame meets wall etc.
  - d) **Visual and textural integrity of each material and surfaces:** Any foreign materials deposit, defacement of surfaces, blemishes on any surface/component/material (Cement on tile/paint on window frame/scratches on window/blemish on stone etc.).
  - e) Recommend independent Lab testing of any specific lot of materials.
  - f) During the course of construction, undertake unannounced visits to check the quality of Construction at various stages of the Civil, Electrical, HVAC, ELV, Water Supply, Sewage or any other services works. The stages of the inspection for each of the work/ services shall be decided specific to the project awarded, in consultation with IITH and got approved within one month of the issue of letter of intent

### **3.3 Management of Quality System:**

TPQA agency shall monitor the implementation of the 'Quality Assurance Plan' at every stage in the work as per provisions of the CPWD Works Latest Manual (with applicable modifications). Based on inspections on random basis, TPQA shall identify lapses or deficiency in the observance of the plan and submit reports. TPQA shall also propose suitable remedial action if the Quality Assurance Plan is not implemented in spirit and action.

### **3.4 Inspection and Reporting:**

TPQA shall undertake inspection of work and make out an Inspection report setting forth an overview of the status, progress, quality and safety of construction, and conformity of construction works with the approvals accorded by EIC, IITH or the Specifications and Standards.

In a separate section of the Inspection Report, TPQA shall describe in reasonable detail the lapses, defects or deficiencies observed by it in the construction of the project.

### **3.5 PART – A (Civil Works)**

**The Part-A, Civil works as mentioned in the tender shall be executed in co-ordination with and under the guidance of the Executive Engineer (Civil), IIT Hyderabad and his decision regarding TPQA of those items shall be final & binding.**

#### **3.5.1 Below mentioned checks shall be carried out at Precast Factory:**

- **Setting up of Factory:**

TPQA Consultant shall monitor the Factory set up for precast production process for its adequacy to deliver the specified product and highlight the shortfalls to the IITH.

- **Fabrication of Precast Moulds:**

The Moulds for Precast Panel Production fabricated by the Contractor shall be inspected for dimensional and Geometrical integrity as per Shop Drawings

- **Inspection of Raw Materials for Concrete:**

Raw materials for Concrete production shall be inspected randomly and the testing of the same shall be witnessed randomly. Material not meeting the acceptance criteria shall be rejected. Inspection records of all the Raw Materials shall be documented. Apart from the above, Material test reports of the manufactured materials like cement, admixtures etc. shall be verified and stored for review by IIT Hyderabad. All Raw materials shall be sampled at the specified frequency for testing at IIT Hyderabad approved laboratories and the results shall be verified and shall be submitted for review by IIT Hyderabad.

- **Inspection of Reinforcement Steel:**

Material Test Certificates of Reinforcement steel shall be reviewed and batch wise receipts of the same shall be verified and intimated observations for review by IIT Hyderabad. Steel reinforcement shall be sampled as per specified frequency for testing at IIT Hyderabad approved laboratories and the results shall be verified and shall be submitted for review by IIT Hyderabad.

- **Calibration of the Batching Plant and Testing Equipment:**

Calibration of the Batching Plants and all the testing equipment shall be witnessed and verified for the compliance of the same as per BIS Standards.

- **Pre Pour Inspections:**

Following pre pour checks shall be carried out randomly

- i. Mould (Form) shall be checked for dimensions, right angles, alignment and for complete dimensional and geometrical integrity including surface cleaning and

application of form release agent.

- ii. Steel Reinforcement shall be checked with reference to the approved GFC Drawings including placing of cover blocks.
- iii. Dowels tubes, Loop Boxes, Steel Couplers, inserts, lifting's and handling anchors etc. shall be checked with reference to the approved drawings.
- iv. Electrical conduits and any other service provisions shall be checked with reference to the approved drawings
- v. Provision of Recesses and pockets etc. shall be checked with reference to the drawings.
- vi. Any other pre pour checks necessary as per directions of the Engineer in charge

After carrying out above mentioned checks randomly, record of the inspection shall be generated in the form of a checklist duly signed by the contractor and the TPQA Consultant.

- **Concrete Production:**

Following checks shall be carried out randomly

- i. Quality of raw materials and suitability of Plant and equipment shall be checked as mentioned above
- ii. Batch sheets of Concrete shall be checked with reference to the approved mix design.
- iii. Concrete shall be sampled as per approved frequency of testing and concrete cube casting shall be witnessed
- iv. Workability of concrete shall be checked
- v. All above mentioned random checks shall be recorded in the form of a checklist and duly signed by the contractor and TPQA Consultant.

- **Concrete Placing**

Following checks shall be carried out randomly

- i. Workability of concrete shall be checked
- ii. Compaction process of concrete placed in precast panels shall be checked such that the adequate compaction levels are achieved.
- iii. Finishing of precast panels shall be checked while the concrete is in green state.

- **De moulding and Curing**

Following checks shall be carried out randomly

- i. Compressive strength testing of Concrete cubes at the age of 24 hours shall be witnessed and de-moulding of precast panels shall be allowed after achieving required strength
- ii. Marking (Element ID and Date of Casting) on each precast panels shall be checked before stacking them at designated location
- iii. Curing of Precast panels shall be checked for a period of 7 days from the date of

Casting or as per the Directions of Engineer in Charge

- **Post Pour Checks before Dispatch**

Following checks shall be carried out randomly

- i. Precast Panels shall be checked for dimensions, right angles, alignment and for complete dimensional and geometrical integrity including surface finishing.
- ii. All the dowel tubes, electrical conduits etc. shall be checked for any blockages etc.
- iii. The precast panels meeting the acceptance criteria only shall be allowed for dispatch from factory to the construction site.
- iv. Every panel meeting the acceptance criteria shall be tagged and signed by the TPQA Consultant before dispatching to the construction site.
- v. Records of Random Post pour checks shall be maintained in the form of Checklist duly signed by the contractor and the TPQA Consultant.

### **3.5.2 Below mentioned checks shall be carried out at Construction Site for RCC Precast and RCC In-situ Works:**

- **Layout of the Buildings and services**

- i. Orientation shall be checked as per the given plan
- ii. Alignment of the building shall be checked as per the directional coordinates given in the drawings

- **Earthwork:**

Earthwork shall be checked randomly for compliance in line with CPWD Specification and specification mentioned in the Contract awarded to the contractor.

- **Backfilling:**

Suitability of Soil for backfilling shall be checked randomly and backfilling process shall be checked randomly for compliance as per CPWD Specifications and as per the specifications mentioned in the contract awarded to the contractor. Compaction of the backfilled earth shall be checked randomly for percentage of compaction at each layer and subsequent layer shall be allowed for backfilling after achieving specified levels of compaction of underneath layer.

- **Anti-termite Treatment:**

Anti-termite treatment shall be checked randomly for compliance as per relevant BIS Standards and contract awarded to the contractor.

- **Cast in-situ foundation**

Following pre pour checks shall be carried out randomly

- i. The Layout of the foundation shall be checked as per GFC Drawings
- ii. Formwork shall be checked for dimensions, right angles, alignment and for complete dimensional and geometrical integrity including surface cleaning and application of form release agent.
- iii. Steel Reinforcement shall be checked with reference to the approved GFC Drawings including placing of cover blocks.
- iv. Reinforcement Dowels, Steel Couplers etc shall be checked with reference to the approved drawings.
- v. Any other pre pour checks necessary as per directions of the Engineer in charge

After carrying out above mentioned random checks, the record of the inspection shall be generated in the form of a checklist duly signed by the contractor and the TPQA Consultant.

- **Calibration of the Batching Plant, Survey Instruments and Testing Equipment:**

Calibration of the Batching Plants and all the testing equipment shall be witnessed and verified for the compliance of the same as per BIS Standards

- **Concrete Production at Site Batching Plant:**

Following checks shall be carried out randomly

- i. Quality of raw materials and suitability of Plant and equipment shall be checked as mentioned above
- ii. Batch sheets of Concrete shall be checked with reference to the approved mix design.
- iii. Concrete shall be sampled as per approved frequency of testing and concrete cube casting shall be witnessed
- iv. Workability of concrete shall be checked
- v. All above mentioned random checks shall be recorded in the form of a checklist and duly signed by the contractor and TPQA Consultant.

- **Concrete Placing**

- i. Workability of concrete shall be checked randomly before allowing for placing of the same
- ii. Compaction process of concrete placed shall be checked randomly such that the adequate compaction levels are achieved.

- **Checking of Precast Panels received from the factory**

- i. Precast panels received from the factory shall be checked randomly for dimensional and geometric integrity and for any damages in transit and only precast panels meeting the acceptance criteria shall be allowed for erection
- ii. Dowel tubes and Dowel reinforcement bars shall be checked randomly for accuracy of position. The precast panels meeting the acceptance criteria shall only be allowed for erection.

- **Marking of Coordinates for erection of Precast Panels**

The coordinates for erection of precast panels shall be checked randomly before allowing for erection of precast panels and the inspection of the same shall be recorded in the checklist signed by the contractor and the TPQA Consultant

- **Erection of Precast Elements**

Following checks shall be carried out randomly during pre and post erection of precast panels

- i. Survey coordinates shall be checked as mentioned above before allowing for erection
- ii. After placing and securing precast panels in position by means of props, accuracy with reference to survey coordinates, verticality, alignment, right angles, room dimensions, opening dimensions, levels etc. shall be checked.
- iii. The precast panels which are within the permissible limits of tolerances, shall only be tagged and signed by the TPQA consultant for giving clearance for grouting.
- iv. The above mentioned random checks shall be recorded in the checklist and signed by the contractor and TPQA Consultant.

- **Grouting**

Following checks shall be carried out randomly while grouting of precast panels

- i. The erected precast elements meeting the acceptance criteria shall only be allowed for grouting
- ii. The steel reinforcement placed in dowel tubes shall be checked

- iii. The backing mechanism (with Backer rods etc) for the grout shall be checked
- iv. The water powder ratio as per the manufacturer's specification shall be checked randomly
- v. Records of the time of grouting on the tag provided on every precast panel
- vi. The temporary supports in the form of props, jacks etc shall be allowed for removal only after achieving required strength by the hardened Grout. Hence the same shall be randomly checked.
- vii. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Stitching/ Screed Concrete of precast slabs**

Following checks shall be carried out randomly

- i. The Reduced level of the erected slabs shall be checked and the levels shall be within the allowable tolerance for allowing for stitch/screed concrete
- ii. The Batch sheets of concrete shall be checked with reference to the approved mix design
- iii. The workability of the concrete shall be checked
- iv. The Casted portion of the slab shall be checked for curing for a period of 7 days
- v. Post pour levels shall be checked
- vi. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Precast Joints:**

- i. Application of sealant at precast joints shall be checked for compliance as per manufacturer's specification.
- ii. After the curing period of the sealant, all precast joints shall be checked for water tightness by water jetting
- iii. The Tested joints and locations shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Waterproofing of Precast Construction:**

Mother slab of entire floor area including toilets, balconies, corridors, inside area of flats etc. shall be checked by ponding with water for 48 hours for any leakages

- i. Leakage locations shall be marked and noted by the TPQA Consultant



- ii. After grouting the leakage locations, the above marked locations shall be checking for any leakage by ponding with water for 48 hours.
- iii. Waterproofing treatment shall be allowed only after ensuring leak and seepage proof mother slab.
- iv. Waterproofing treatment application shall be checked for surface preparation and coverage as per manufacturers recommendations
- v. Post waterproof treatment, ponding test by flooding with water shall be carried out for 48 hours and if any leakage /seepage found, above mention procedure shall be repeated.
- vi. Entire process of waterproofing treatment shall be recorded in the checklist and duly signed by the contractor and TPQA Consultant.

### **3.5.3 Below mentioned checks shall be carried out at Construction Site for Finishes Works**

- **Material Inspection:**

All Finishes material received at site shall be checked randomly for compliance with the contract document, CPWD Specifications and relevant IS Codes. The same shall be sampled as per specified frequency and tested at IITH approved laboratories. The material failing the acceptance criteria shall be rejected.

- **Masonry Work:**

Following checks shall be carried out randomly

- i. Layout for Masonry work shall be checked for dimensions, right angles, alignment etc before giving clearance for carrying out masonry work
- ii. The masonry work shall be checked for verticality, right angles, alignment etc at each stage of construction, before giving clearance to next stage of construction (i.e at band beam level, lintel level etc)
- iii. The application of block adhesive shall be checked as per manufacturer's specification
- iv. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Plastering Work:**

Following checks shall be carried out randomly

- i. The alignment, Verticality, right angles and the thickness of the plaster shall be checked
- ii. In case of cement plaster, curing for a period of 7 days shall be ensured

iii. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Granite Counters**

Following checks shall be carried out randomly

- i. The shade of the stone slabs shall be checked for uniformity.
- ii. Installation of counters shall be checked with reference to the approved drawings, specifications and methodology
- iii. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Flooring Work**

- Natural Stone Flooring**

Following checks shall be carried out randomly

- i. In case of natural stone flooring, the shade of the stone slabs shall be checked for uniformity.
- ii. Dry laying of the cut stone slabs shall be checked to ensure uniformity of shade, matching of grains/veins etc
- iii. The bed mortar thickness shall be checked with reference to the approved specifications
- iv. Grouting of joints shall be checked with reference to the approved specifications.
- v. In case of flooring in corridors, the slopes towards rainwater outlets shall be checked.
- vi. Post installation checks shall be carried out for checking hollowness, offsets at slab joints, slopes, shade variations etc. if found defective, the work shall be rejected and the flooring shall be redone meeting the approved specifications
- vii. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Tile Flooring**

Following checks shall be carried out randomly

- i. Tiles shall be checked for warpage and any other manufacturing defects before allowing for laying
- ii. Tiles of different batches shall not be allowed for laying together

- iii. The bed mortar thickness shall be checked with reference to the approved specifications
- iv. Grouting of joints shall be checked with reference to the approved specifications.
- v. In case of toilets, balconies, terraces and areas exposed to rain water shall be checked for slopes towards floor traps and rainwater outlets.
- vi. Post installation checks shall be carried out for checking hollowness, offsets at tile joints, slopes, shade variations etc. if found defective, the work shall be rejected and the flooring shall be redone meeting the approved specifications
- vii. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Dado and Cladding works**

- **Tile Dado Works**

Following checks shall be carried out randomly

- i. Tiles shall be checked for warpage and any other manufacturing defects before allowing for laying
- ii. Tiles of different batches shall not be allowed for laying together
- iii. Tile adhesive thickness shall be checked with reference to the manufacturer's specifications
- iv. Grouting of joints shall be checked with reference to the approved specifications.
- v. Post installation checks shall be carried out for checking hollowness, offsets at tile joints, shade variations etc. if found defective, the work shall be rejected and dado work shall be redone meeting the approved specifications
- vi. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Stone Cladding Work**

Following checks shall be carried out randomly

- i. In case of natural stone cladding, the shade of the stone slabs shall be checked for uniformity.
- ii. Dry laying of the cut stone slabs shall be checked to ensure uniformity of shade, matching of grains/veins etc
- iii. Stone adhesive thickness shall be checked with reference to the manufacturer's specifications
- iv. Grouting of joints shall be checked with reference to the approved specifications.

- v. Post installation checks shall be carried out for checking hollowness, offsets at slab joints, shade variations etc. if found defective, the work shall be rejected and the cladding redone meeting the approved specifications
- vi. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Thermal Insulation Works**

Following checks shall be carried out randomly

- i. Resin bonded rock wool and material for Wall Paneling shall be checked for conformance to relevant IS Code and specifications on receipt of Material
- ii. Wall paneling and Fixing of thermal insulation material shall be checked as per approved methodology and specifications
- iii. Post installation checks shall be carried out on installed wall paneling
- iv. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **False ceiling works**

Following checks shall be carried out randomly

- i. Material for False Ceiling shall be checked for conformance to relevant IS Code and specifications on receipt of Material
- ii. Installation of the Grid shall be checked with reference to the approved drawings and specifications
- iii. Fixing of Gypsum boards shall be checked with reference to approved drawings, methodology and specifications
- iv. Post installation checks shall be carried out on installed false ceiling and shall be checked for level, alignment, joints and undulations etc. Application of putty shall not be allowed until the blemishes as mentioned above are rectified.
- v. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Putty and Painting Works**

Following checks shall be carried out randomly

- **On Concrete Surface**

- i. The concrete surface shall be checked for any undulations, offsets and any other blemishes etc. Before allowing for application of putty it shall be ensured that the concrete surface is free from any defects as mentioned above. There shall be no undulations visible after application of putty.

Application of Texture / Painting shall be commenced only after satisfaction of Engineer In charge regarding the surface appearance.

- ii. All the adjacent surfaces where the paint terminates shall be checked for proper protection. Putty/Painting shall be allowed only after ensuring the protection of adjacent surfaces from putty/paint marks.
- iii. Coverage of putty and texture / paint shall be checked as per manufacturer's specifications
- iv. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

➤ **On Plastered Surface**

- i. The plastered surface shall be checked for any undulations and any other blemishes etc. Before allowing for application of putty it shall be ensured that the surface is free from any defects as mentioned above. There shall be no undulations visible after application of putty. Application of Texture / Painting shall be commenced only after satisfaction of Engineer In charge regarding the surface appearance.
- ii. All the adjacent surfaces where the paint terminates shall be checked for proper protection. Putty/Painting shall be allowed only after ensuring the protection of adjacent surfaces from putty/paint marks.
- iii. Coverage of putty and texture / paint shall be checked as per manufacturer's specifications
- iv. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

• **Metal, Wooded and FRP Doors:**

Following checks shall be carried out randomly

- i. Door construction shall be checked as per approved shop drawings
- ii. Door installation shall be checked as per approved shop drawings
- iii. Ironmongeries shall be checked with reference to the approved make and model
- iv. Post installation checks shall be carried out and Proper functionality of the doors shall be ensured
- v. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

• **UPVC Windows, Sliding Doors and Ventilators**

Following checks shall be carried out randomly

- i. UPVC Materials received at site shall be checked as per approved shop drawings

- ii. The Toughening process shall be checked for glass and the material received shall be verified.
- iii. UPVC Windows, Sliding Doors and Ventilators construction and installation shall be checked as per approved shop drawings
- iv. Post installation checks shall be carried out and Proper functionality of the UPVC windows, sliding doors and ventilators shall be ensured.
- v. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **MS Grill**

Following checks shall be carried out randomly

- i. Slag blasting and primer application process shall be witnessed at the factory
- ii. MS Grill Fabrication and installation shall be checked with reference to the approved shop drawings
- iii. Coverage of paint shall be checked with reference to the manufacturer's specifications and technical specifications
- iv. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **SS Railing**

Following checks shall be carried out randomly

- i. SS Material received at site shall be checked for grade of SS, thickness, dimensions and surface finishing of welded joints
- ii. The Toughening process shall be checked for glass and the material received at site shall be verified.
- iii. SS Railing Fabrication and installation shall be checked with reference to the approved shop drawings
- iv. Post installation checks shall be carried out on installed SS Railing
- v. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Internal and External Plumbing Works**

Following checks shall be carried out randomly

- i. Pipes for carrying out plumbing works shall be checked for approved make and specification on receipt of material
- ii. Installation of pipes shall be checked with reference to the approved shop drawings.

iii. Installed pipes shall be checked for leakages, slopes etc as per the approved methodology before concealing them

iv. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **CP and Sanitary Installations**

Following checks shall be carried out randomly

i. CP and Sanitary material received at site shall be checked for approved make and model before allowing them for installation

ii. Installation of CP and Sanitary fixtures shall be checked as per approved shop drawings, approved methodologies and manufacturer's specifications.

iii. Post Installation checks shall be carried out and functionality of all CP and Sanitary fixtures shall be ensured

iv. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **External Sewage Works**

Following checks shall be carried out randomly

i. Pipes for carrying out sewerage works shall be checked for approved make and specification on receipt of material

ii. Installation of pipes shall be checked with reference to the approved shop drawings.

iii. Construction of chambers shall be checked with reference with the approved drawings and methodology

iv. Installed pipes and chambers shall be checked for leakages, slopes etc as per the approved methodology before concealing them

v. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Cement Concrete Roads Works**

Following checks shall be carried out randomly

i. The compaction of subgrade layer shall be checked and only after attaining the specified degree of compaction, subsequent layers in road construction shall be allowed for laying.

ii. GSB and WMM material received at site shall be checked for their compliance with relevant IS and MoRTH standards

iii. Each layer in road construction shall be checked for degree of compaction as per relevant BIS codes and after attaining specified degree of compaction, subsequent layer shall be allowed for laying.

- iv. Concrete production and Placing shall be checked as mentioned in Sl no 2.7 and 2.8 above
- v. Vacuum dewatering process shall be checked with reference to the approved methodology
- vi. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant

- **Paved Area Works**

Following checks shall be carried out randomly

- i. The compaction of subgrade layer shall be checked and only after attaining the specified degree of compaction, subsequent layers in road construction shall be allowed for laying.
- ii. GSB material received at site shall be checked for their compliance with relevant IS and MoRTH standards
- iii. CC Paver blocks material received at site shall be checked with reference to the approved methodology and specifications
- iv. Each layer of construction shall be checked for degree of compaction as per relevant BIS codes and after attaining specified degree of compaction, subsequent layer shall be allowed for laying.
- v. Paved area shall be checked for proper installation, compaction and slopes during installation
- vi. Post installation checks shall be carried out for proper compaction and slopes
- vii. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant.

- **Parking /Industrial Tile Work:**

Following checks shall be carried out randomly

- i. The compaction of subgrade layer shall be checked and only after attaining the specified degree of compaction, subsequent layers in road construction shall be allowed for laying.
- ii. Tile material received at site shall be checked for their compliance with reference to approved make and relevant IS Codes
- iii. PCC and Grade slab concrete shall be checked as per Sl no 2.7 and 2.8. Reinforcement in grade slab shall be checked with reference to the approved drawings. Curing of Grade slab shall be ensured for a period of 7 days.
- iv. Fixing process of Parking Tiles shall be checked for thickness of mortar and slopes etc as per approved methodology.



- v. Post installation checks shall be carried out for proper installation and slopes
- vi. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant

- **Polycarbonate Sheeting work**

Following checks shall be carried out randomly

- i. MS Material and Polycarbonate sheets received at site shall be checked for conformance to Specifications and IS Codes
- ii. MS Frame work for installation of Polycarbonate sheets shall be checked for slopes
- iii. Polycarbonate sheets installation shall be checked with reference to the approved methodology and drawings
- iv. Post installation checks shall be carried out and the completed work shall be checked for any leakages by water jetting
- v. The above mentioned random checks shall be recorded in the checklist and duly signed by the contractor and TPQA consultant

- **Horticulture Works**

Following checks shall be carried out randomly

- i. Plants and Grass received at site shall be checked with reference to the approved species, drawings and specifications
- ii. Horticulture works shall be checked with reference to the approved drawings and methodology.
- iii. Random Checks on Horticulture works shall be recorded in the checklist and duly signed by the contractor and TPQA consultant

**Note:**

1. The above mentioned checks are only indicative and not exhaustive. The TPQA Consultant has to develop a robust quality control and assurance plan, Inspection and testing plan for ensuring compliance of technical specifications, GFC and Shop drawings, methodologies and relevant BIS Codes. Nothing extra shall be paid on this account.
2. **Random Checks/Verifications:** It means that the Civil and Electro-mechanical items executed by Contractor shall be verified and witnessed by the TPQA consultant to an extent of 10% of the quantum of that particular item/category as mentioned at scope of work.
3. The Quality Assurance Plan, which is in line with the CPWD Quality Assurance Policy shall be submitted by TPQA consultant within 15 days after issue of LoA to them.

### **3.8 PART – B (Electro-Mechanical Works)**

**The Part-B, Electro-mechanical works as mentioned in the tender shall be executed in co-ordination with and under the guidance of the Executive Engineer (Electrical), IIT Hyderabad and his decision regarding TPQA of those items shall be final & binding.**

#### **3.8.1 Check List for Electro Mechanical Systems During Construction:**

##### **Internal EI:**

1. Conduit laying – Check quality of material. Dia of conduit to be as per specs. Jointing of conduit to be checked, fish wires to be drawn in the conduits, to clear any obstructions.
2. Wiring – Check quality and size of wires. Check termination (lugging) of wires. Ensure that there are no joints in the wiring.
3. Check for random insulation.
4. Check earth electrode laying. Check earth resistance.
5. Check switch boards fixing/ alignment. Marking of circuit on Switch boards.

##### **DBs:**

1. Check alignment
2. Check termination of Incoming and Outgoing wires/ cables.
3. Fixing of components.
4. Specifications of DBs and components.
5. Ensure proper earthing.
6. Marking of all circuits and DBs.

##### **Panels:**

1. Check layout and alignment.
2. Termination of cables.
3. Marking of feeders.
4. Check test certificates of manufacturers, Type test certificates of CPRI.
5. Earthing.
6. Measure Insulation and earth resistance values.
7. Test Certificates of all the Circuit Breakers
8. Calibration of all the protective relays.
9. Insulation/ Earth resistance.
10. Testing of Electrical/ Mechanical interlocking arrangement.
11. Checking of Meters. Test certificates.

##### **Rising Mains:**

1. Check layout/ dimensions/ alignments.
2. Check test certificates.
3. Check Bus bar sections, Insulator fixing, Tightness of joints, Connections.

4. Check earth conductor size and connections.
5. Insulation and earth resistance measurements.

**DG Sets:**

1. Layout and erection of the set.
2. Test Certificates
3. Commissioning of the sets.
4. Neutral/ Body earthing.
5. Measurement of Insulation and earth tests.
6. Load Test.
7. Checking of Protection relays. Calibration of all the relays/ Meters.
8. Fuel Storage arrangement. Fuelling arrangement.
9. Check Panel meters/ calibration.
10. Check interlock with Transformer Supply.

**Pumping Stations**

1. Check layouts.
2. Check test certificates.
3. Check all the instruments like Pressure Guages, Voltmeters, Ampere meters.
4. Check control circuits. Starter circuits. Ferrules should tally with control circuits.
5. Check performance like discharge, head, energy consumption with respect to the charts.
6. Check earthing connections.
7. Cable sizes.

**HVAC:**

1. Check layout of all the sub-assemblies like Cooling Tower, Pumps, Chillers, Pipe lines, Control Panels.
2. Check test certificates of the components.
3. Complete Testing of Radiant Cooling System building level works including testing of samples
4. Check commissioning tests of all the sub-assemblies:
  - Pressure tests of all the pipe lines.
  - Wet bulb approach of Cooling Towers.
  - Pressure Testing of Chillers.
  - Performance tests of Chillers, Pumps.
  - Insulation tests of electric control panels.

**Fire Alarm:**

1. Check layout of control panels. Ensure proper Mimic diagram/ Display diagrams are provided.
2. All functional tests to be carried out.
3. Battery backup/ UPS be checked.
4. Zoning should be convenient for locating source of alarm.

**Firefighting:**

1. Please ensure that the firefighting is strictly as per drawings.
2. The usual inspection from Fire Brigade authorities is to be got done.
3. All performance tests are to be carried out.

4. Capacities of various components are to be checked with reference to the contract and local bye-laws.
5. The mandatory signage of the equipment is to be checked.

### **3.8.2 POST CONSTRUCTION TESTS OF ELECTROMECHANICAL WORKS**

#### **Electrical Switch room**

1. Panels– SLD, GA diagrams (Containing details of voltage, Ampere, sizes, cable capacities and rating of equipment) – The TPQA Agency shall ensure that the drawing will be framed and displayed in switch room by the contractor.
2. Control circuit of instruments – the drawing The TPQA Agency shall ensure that the drawing will be framed and displayed in switch room by the contractor.
3. UPS System - SLD, GA diagrams (Containing details of voltage, Ampere, sizes, cable capacities and rating of equipment) – the drawing will be framed and displayed in switch room.

#### **Distribution Boards**

1. Circuit locations to be duly marked on the inside of the cover of DB.
2. Switch boxes/Plates – Circuit details of respective DB to be marked.

#### **Earthing**

1. TPQA Agency ensure that contractor shall submit the Schematic diagram indicating earth conductor sizes and location/ type of earth.
2. TPQA Agency ensure that contractor shall submit Earth resistance tests of all the earthing stations.

#### **DG Set**

1. Operation Manuals, Warrantee Cards, Test Results for all the parameters, as laid down in the contracts will be furnished.
2. Layout drawings, Electrical panel GA/ SLD/ Control Circuit drawings will be framed and displayed in the DG Room.

#### **Insulation Tests**

1. Insulation test results of all the circuits to be furnished.

#### **Pumping Stations**

1. Layout Drawings, Schematic drawings, Electric Panel GA drawings, SLD drawings, Control Circuit drawings will be framed and displayed in the Pump House.
2. Operation Manuals, Performance Curves, Test Certificates will be furnished.
3. Test Results for operations, as laid down in the respective contracts will be carried out and results furnished. The test results will clearly indicate Discharge/ Head parameters and results
4. Efficiency charts/ curves on full load/ partial loads will be furnished.

#### **Lifts**

1. Lift Operating Instructions shall be prominently displayed in the Lift Cars.
2. Operation Manuals, Results of all the tests, as provided in the contract will be furnished.
3. Control Circuit Drawing will be framed and displayed in the machine room. Electrical

Schematic Drawing also will be framed and displayed in the Machine Room.

### **HVAC**

1. All Operation Manuals, Parts Catalogues, Test Certificates, Performance charts, Warrantee Cards to be furnished.
2. Test Results for operations, as laid down in the respective contracts will be carried out and results furnished. The test results will clearly indicate Discharge/ Head parameters and results Efficiency charts/ curves on full load/ partial loads will be furnished.
3. Layout Drawings, Schematic drawings, Electric Panel GA drawings, SLD drawings, Control Circuit drawings should be framed and displayed in the Chiller plant Room.
4. Complete Performance Testing of Radiant Cooling System including load testing, seasonal testing and compliance of performance parameters as per tender technical specs and OEM manuals.

### **Fire Fighting System**

1. All Operation Manuals, test Certificates, Performance charts, Warrantee Cards to be furnished.
2. Test Results for operations, as laid down in the respective contracts will be carried out and results furnished. The test results will clearly indicate Discharge/ Head parameters and results
3. Layout Drawings, Schematic drawings, Electric Panel GA drawings, SLD drawings, Control Circuit drawings will be framed and displayed in the respective locations.
4. A training programme will be organized by the contractor to impart training to the concerned personnel, responsible for firefighting.
5. Copy of approval from competent local body authority, as per local regulations, be framed and displayed.

### **Fire Alarm System**

1. All Operation Manuals, Test Certificates, Performance charts, Warrantee Cards to be furnished.
2. Test Results for operations, as laid down in the respective contracts will be carried out and results furnished. The test results will clearly indicate Discharge/ Head parameters and results
3. Layout Drawings, Schematic drawings, Electric Panel GA drawings, SLD drawings, Control Circuit drawings will be framed and displayed in the respective locations.
4. Layout drawings indicating location of all smoke detectors, control panels will be framed and located prominently so that in event of unfortunate incident an appropriate action can be taken.
5. A training programme will be organized by the contractor to impart training to the concerned personnel, responsible for fire-fighting.
6. Copy of approval from competent local body authority, as per local regulations, be framed and displayed.

### **Note:**

1. The TPQA Consultant has to develop a robust quality control and assurance plan, Inspection and testing plan for ensuring compliance of technical specifications, GFC and Shop drawings, methodologies and relevant BIS Codes. Nothing extra shall be paid on this account.
2. **Random Checks/Verifications:** It means that the Civil and Electro-mechanical items executed by Contractor shall be verified and witnessed by the TPQA consultant to an

extent of 10% of the quantum of that particular item/category as mentioned at scope of work.

3. The Quality Assurance Plan, which is in line with the CPWD Quality Assurance Policy shall be submitted by TPQA consultant within 15 days after issue of LoA to them.

#### **4 Deliverables & Schedule**

- The team leader of the consultant shall submit Monthly and Quarterly Progress Reports.
- Develop and prepare all inspection, documenting & reporting formats including transmittal methodology and follow the same for the entire period of contract.
- The inspection reports in case of non-compliances of serious nature having consequential effects on quality of work should be submitted to IITH within 3 days of the visit without waiting for weekly reporting.
- Attend periodic (fortnightly) meetings with IITH, Contractors and Consultants highlight concerns raised in the inspection reports.
- Post construction completion: Undertake final inspection and declare the construction of the building / services fit for use with the intended level of workmanship and finishing.

#### **5 Schedule of Completion of Tasks:**

Consultant will prepare and submit an inspection report within 15 days of mobilization, periodic reports (mentioning the stages at which these will be shared) and post project completion report. The consultant shall also make final inspection and declare the construction of the building / services fit for occupation with the intended level of workmanship and finishing.

#### **6 Data and services to be provided by the client:**

IITH will provide all information related to the work such as contract documents between IITH and contractors, GFC drawings and project documents agreed between contractor and IITH. IITH will provide access to all work sites and beneficiaries under the project. Over all 200 Sft of area at required project locations in portable cabins will be provided for use as office space as per the directions of Engineer in Charge.

#### **7 Review and monitoring of consultant's work:**

Consultants will be monitored at various stages by IITH through periodic reviews. The project implementation period is envisaged to be the same as the contract period/ extended contract period of the contractor for execution. In case of extension of contract period, no extra costs shall be paid to the consultant. The consultant through the periodic performance reports, would point out delays observed, if any and suggest measures to adhere to the time schedule. In case, performance of the consultant is assessed as unsatisfactory, the contract would be deemed closed. In such case the consultant would get a chance to explain and

defend himself in front of a review committee and the decision taken by the review committee shall be final and binding on both the parties. The review committee would consist of IITH representatives and / or external members as appointed by the Director, IITH.

**8 List of Key Professional Positions whose CV and experience would be evaluated.**

CV of the Project in Charge as well as all the experts / personnel proposed to be associated / employed by the consultant for the project will be evaluated by IITH for approval before getting engaged for the project. The team of personnel should comprise of Civil & Electrical Engineers of the respective disciplines. The details are as under:

Sl. No.	Qualification	Discipline	Number	Minimum Experience (Years)	Designation	Rate of recovery
1.	Graduate Engineer	Civil Engineer	1	20 Years ( In Composite Works)	Project Manager	Rs. 1,00,000/- per month
2.	Graduate Engineer	Civil Engineer	1	12 Years	Deputy Project Manager	Rs. 60,000/- per month
3.	Graduate Engineer	Civil Engineer	1	10 Years	Project Engineer	Rs. 50,000/- per month
4.	Graduate Engineer	Electrical Engineer	1	10 Years	Project Engineer	Rs. 50,000/- per month
5.	Diploma Engineer	Civil Engineer	1	5 Years	Assistant Project Engineer (At Precast Factory)	Rs. 30,000/- per month

**9 Preparation of Proposal, Submission, Receipt of Proposal, its evaluation and award of contract.**

**Preparation of Proposal**

Intending consultant shall submit Approach Paper for the proposed TPQA in demonstration of their understanding of the work involved, expertise in the field and also efficiently and effectively discharging their contractual obligations and responsibilities in achieving the intended purpose of engaging TPQA consultant. The approach paper may include the checklists for Third Party Inspections, Important stages of checks / verification, monitoring of compliances of suggested corrective measures, reports and formats etc.

**10 The consultants are expected to prepare Proposal covering the following aspects:**

- The consultant shall give power point presentation of approx. 20 minutes covering their approach taking a typical building project of approx. 300 Crore.
- Manpower such as Architects / Engineers required to provide effective third party inspection and their period of engagement in different scenario and stages of works from start to handing over of the project to IITH.
- Proposed activities to be undertaken by the Architects/Engineers engaged by the agency.
- Important stages of construction to be inspected and reporting thereof.
- Proposed check list to ensure quality workmanship at each stage of construction.
- Proposed key materials testing and its extent (As part or percentage of that specified in the relevant IS codes) by a third party quality assurance agency.
- Total quality assurance plan including innovative approach for achieving optimum quantity with zero tolerance to defects.

#### **11 Evaluation & Selection Methodology of TPQA Services Contract:**

##### **(A) Technical Bids Evaluation Methodology:**

The Evaluation Committee (EC) comprising with 4 members will evaluate the Technical Bids of the RFPs submitted by the Bidders/Consultants. EC will evaluate the proposals on the basis of assessment of Bidder/Consultant's approach towards the TPQA, experience, expertise and interaction with the Project in Charge assessing overall capability of his team proposed to be engaged on quality assurance job. The following criteria will be adopted for technical evaluation:

S.No.	Description of Attribute	Marks
1.	Performance Certificate obtained for the similar TPQA service experience of any Building Projects of Rs.210 Cr under single agreement of the Departments/ PSU/Autonomous Organizations under the Government of India/State Governments.. (Outstanding:40 marks, Very Good: 30marks, Good: 20 marks, Poor: 0 (zero) marks) *Performance of Service(Quality) certified as "satisfactory" will be treated as "Good"	40 marks
2.	PPT Presentation as submitted by Consultant for the TPQA services in line with CPWD EPC contract system for this Precast Housing and Hostel Towers	20 marks
3.	Project Approach paper as submitted by Consultant for the TPQA services in line with CPWD EPC Contract system for this Precast Housing and Hostel Towers	10 marks
4.	Interaction with Project in Charge with Empowered Committee members	30 marks
	<b>Total</b>	<b>100 marks</b>



**Note:** (1) Evaluation Committee(EC) may decide to visit and inspect works on which bidder/consultant was engaged as TPQA agency before/after the presentation /interaction with the bidder/consultant, if required.

(2)To become eligible for qualification in technical bid evaluation, the bidder/consultant must secure at least fifty percent marks in each above cited attribute (i.e.1,2,3,4) and sixty percent marks in aggregate.

(3) For qualifying in each attribute and overall aggregate marks secured by the bidder/consultant shall be considered it as average of the marks assessed by the members of Evaluation Committee(EC).

**(B) Financial Bids Evaluation:**

Financial Bids of those bidders, who are technically qualified as per the above criteria @Sl.No.11(A) shall be opened and the lowest quoted bidder/consultant will be awarded the TPQA services contract.

**12 Fee for Providing TPQA Services:**

IITH shall pay a fee as quoted by the agency, the rates quoted shall be inclusive of all taxes.

- a) The valid payments will be made roughly on quarterly basis and fee will be calculated based on the gross value of work done and paid to the contractor after due inspection and report by TPQA agency since the previous bill.
- b) All taxes, Labour Cess etc., as applicable shall be borne by the TPQA Consultant himself. The TPQA Consultant shall quote his rates considering all such taxes including GST on works. Any recovery towards GST is notified by the competent authority, the same shall be effected and no claim what so ever shall be entertained by IITH. The TPQA Consultant shall quote his rates accordingly.
- c) 10% as TDS amount of GST amount payable on the bills will be deducted as per the Govt. of India, Ministry of Finance, Department of Revenue notification vide No.65/39/2018-DOR, dtd: 14-09-2018
- d) The TPQA agency will have to deposit Performance Guarantee (PG) in the form of bank guarantee on any scheduled bank amounting 3% of the Tendered amount for a period of 24 months plus 2 months with a provision for further extension if necessary. The PG will be submitted within 15 days from the date of award of the work.

**13 Award of Contract**

The consultants found suitable by the Evaluation Committee will be informed of their selection for inclusion in the panel of selected TPQA agencies and will be awarded the work as and when IITH deems appropriate. The performance of the TPQA agency awarded the project will be continuously and constantly monitored by IIT Hyderabad. IITH at its sole discretion may award any one or more works to one of the empaneled agencies at the fee as decided by IITH. Director, IIT Hyderabad shall be the competent authority in this regard whose decision shall be final and binding.

IIT Hyderabad reserves the right to accept or reject any or all the proposals without assigning any reason. IIT Hyderabad also reserves the right to call for additional information from consultants.

#### **14 Agreement**

The successful bidder shall enter into an agreement with IITH consisting of this RFP and letter of award on a Non-judicial stamp paper of ₹100/-.

#### **15 OTHER REQUIREMENTS:**

- a) Consultants shall have all the minor testing equipment such as but not limited to: sieves and weight, moisture meter, soil density meter, temperature recorder, surface finish recording instruments such as straight edges, measuring tapes, calipers, etc. at site locations for 'on spot field testing' of material and workmanship.
- b) In addition to the above specific quality testing required by IITH for any of the work or material shall be carried out the next working day of requisition and report shall be furnished as soon as possible preferably the next working day of completion of the requisitioned test.
- c) The Contract Documents are the basis of all works to be undertaken. All documents refer to the standard CPWD specifications/works manual. In cases, where specific specifications are not available or provided in the contract documents, general good engineering practices shall be followed in consultation with IITH.
- d) The Consultant shall make unscheduled visits to ensure random/surprise checks from time to time of the works under construction and submit report on the same day and in no case later than the following day to IITH. These points shall be checked for compliance in subsequent visits and reported.
- e) It should be remembered that time is of the essence and that considerable judgement is required to see that the progress is achieved in the work as per milestone mentioned in the contract document between IITH and contractor.
- f) Apart from the specific activities as described above the Consultants shall also advise the EIC, IITH on the implementation and compliance of the of accepted environment friendly sound practices on control of dust, noise, water, air and soil pollution due to construction activities, and general safety and security on the construction sites etc.
- g) The consultant shall also inspect, review and report the adequacy and competence of contractor's site engineers, supervisors, skilled labour and available constructions tools and machinery.
- h) Review contractor's work program and advise on corrective measures. Develop and prepare all the reporting formats including transmittal methodology and follow the same for the entire period of contract.
- i) Random/ independent tests of materials brought at site shall be carried out for samples at 2% of the sampling specified in the BIS/ CPWD contract from NABL accredited labs. Payment for the same will be reimbursed on submission of the vouchers/receipts.
- j) The consultant shall attend PP (Project Progress) meetings and give a brief presentation on each contract's quality standards and bring out specific points of improvements.

## **16 RECONCILIATION MECHANISM**

In case of differences of opinion between EPC Contractor and TPQA Agency the same shall be resolved by EIC, IITH. The decision of EIC shall be final and binding on all parties.

## **17 Laws, Rules and Regulations**

The TPQA Consultant will use their best professional efforts to (a) identify laws, rules and regulations, relevant to the Project, (b) interpret the same in a reasonable manner, (c) seek advice of governmental officials and/or IITH's legal counsel when questions of interpretation and/or applicability arise, and (d) produce reports, plans, and other documents, which are consistent therewith. Having done so in accordance with normal standards of good professional practice, the TPQA Consultant would have met its obligation of rendering the agreed service for the payments made by IITH, and will not be responsible for contrary interpretations or determinations by enforcement authorities or others.

## **18 Miscellaneous**

The agreement between IITH and TPQA Consultant with respect to TPQA services described herein, supersedes all prior agreements, and may be amended only in writing. IITH and TPQA Consultant binds itself and its partners, successors, executors, administrators and assigns to the other party of the Agreement and to the partners, successors, executors, administrators and assignees of such other party, in respect to all covenants of the Agreement; except as above, neither IITH nor TPQA Consultant will assign, sublet or transfer their interest in the Agreement without the written consent of the other.

## **19 Settlement of disputes by Conciliation and Arbitration**

During the period of the project, IITH will endeavor to provide the TPQA consultant any assistance as required, which will not involve any financial implications. In the unfortunate situation of any and all disputes, disagreement and controversies arising in any manner, which cannot be settled by mutual agreement between IITH and TPQA Consultant, the matter shall be settled through conciliation. If conciliation process can not settle the issue, the matter shall be submitted to the sole arbitrator appointed by Director IITH. If any fee is payable to the arbitrator, it shall be paid equally by both parties.

All other provisions of the Arbitration and Conciliation Act 1996 (with amendments) shall apply and the venue of Arbitration shall be at Hyderabad.

## **20 Termination**

- i. IITH reserves the right; in its sole discretion to terminate this Contract.  
Independent and in addition to the above, IITH shall be entitled to encash the Bank Guarantee in any of the following circumstances: -
  - a) The Project in Charge whose profile has been submitted by TPQA Consultant at the time of application for RFP is not involved in any of the project stage or is not present in the meetings.
  - b) The Project in Charge has delegated the project to his / her colleague or other person.
  - c) There is no continuity in the participation of the Project in Charge or team

members of the TPQA Consultant.

- d) The TPQA Consultant has made misleading or false representation, or has deliberately suppressed the information in the forms, statements and enclosures required to be submitted during various work stages.
  - e) The TPQA Consultant has hidden the record of poor performance, such as abandoning projects, not properly completing the assigned projects, or financial failure/weakness, as submitted to IITH in the Expression of Interest submitted to undertake the TPQA services of the project; and
  - f) The TPQA Consultant has resorted to any unethical means, like influencing the Evaluation Committee etc.
- ii. IITH may terminate this Agreement by providing 7 days' notice if the TPQA Consultant does not deliver the products expected of them during or at the end of this exercise of TPQA services of the project, or if IITH abandons the whole or part of the work remaining to be carried out at any time.
  - iii. IITH shall award payments to the TPQA Consultant for the work stages for which IITH has granted approvals. IITH reserves the right to award the remainder of the contract to any other TPQA Consultant.

The above referred contingencies are independent and severable and occurrence of any one of the contingencies is sufficient for the encashment of the bank guarantee.

## **21 Jurisdiction of Courts**

For any breach of the terms and conditions of this Agreement or for issues relating thereto with respect to its interpretation, liabilities, or any other issue, the courts at Hyderabad shall have the sole and exclusive jurisdiction to entertain and decide the issues involved.

## **22 Governing Law**

This Agreement is executed in Hyderabad and shall be governed, construed and enforced according to the laws of India.

## **23 Damages**

In the event of any breach of the terms and conditions of this Agreement by the TPQA Consultant, IITH shall be entitled in law to recover from the TPQA Consultant liquidated damages ascertained and quantified in accordance with the actual loss occasioned by the breach of terms and conditions.

## **24 Confidentiality**

The TPQA Consultant agrees that any information provided to them for discharge of their obligations under this contract is confidential and it shall be used for the purposes of this Agreement only and the same shall not be disclosed to any third party.

IITH and the TPQA Consultant declare that this agreement is executed voluntarily and without any undue influence / coercion.

## **25 Extension of Time**

After the completion of said period of the agreement, the TPQA services shall be extended for a period of 90 days without any additional cost to IITH. Extension beyond the period of 90 days shall be as per the terms and conditions mutually agreed by IITH and TPQA Consultant.

**Checklist of documents to be submitted along with Technical Bid**

<b>Sl. No.</b>	<b>Description of the Document</b>	<b>Enclosed Yes/No</b>	<b>Remarks</b>
1	Copy of GST Registration certificate & GSTIN, copy of PAN card should accompany the Technical Bid		
2	Performance Certificate obtained for the similar TPQA service experience of any Building Projects of Rs.210 Cr under single agreement of the Departments/ PSU/Autonomous Organizations under the Government of India/State Governments..		
3	PPT Presentation as submitted by Consultant for the TPQA services in line with CPWD EPC contract system for this Precast Housing and Hostel Towers		
4	Project Approach paper as submitted by Consultant for the TPQA services in line with CPWD EPC Contract system for this Precast Housing and Hostel Towers		
5	Undertaking for GST registration in the state in which the work is to be taken up		
6	Undertaking pursuant to Section 206AB (as applicable) of the Income Tax Act, 1961 (Proforma enclosed as Annexure-A)		

**On Contractor/ Agency's Letter Head**

**Undertaking pursuant to Section 206AB (as applicable) of the Income Tax Act, 1961**

**To**  
**Registrar**  
**IIT Hyderabad**  
**Kandi, Sangareddy- 502284**

**Dear Sir/Madam,**

**Subject:** Declaration confirming filing of Income Tax Return for immediate two preceding years.

I, Ms./Mrs./Mr. \_\_\_\_\_ in capacity of Authorized Signatory of \_\_\_\_\_ having PAN \_\_\_\_\_ and registered office at \_\_\_\_\_ do hereby declare that \_\_\_\_\_ has filed Income Tax Returns for immediately last 2 preceding Financial Years as mentioned below per due dates under Section 139 (1) of the Income Tax Act, 1961 ('the Act') and details of which are as given under:

<b>Financial Year for which Income Tax Return was due as per Section 139(1)</b>	<b>Acknowledgement no. of ITR filed under Section 139(1)</b>	<b>Date of Filing</b>
2021-22 <i>(if applicable on date of this declaration)</i>		
2020-21		
2019-20		

Further, I confirm that \_\_\_\_\_ has lined the above PAN with Aadhaar number as on this date.

I also undertake that \_\_\_\_\_ hereby indemnify **Indian Institute of Technology Hyderabad** for any loss/liability (including any Tax, interest, penalty, etc.) that may arise due to incorrect reporting of above information.

**For** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Name of person:**

**Designation:**

**Place:**

**Date:**

**Annexure-I****INDICATIVE TEST REQUIREMENTS:**

An indicative list of tests on material and workmanship is listed to provide guidance to the Consultant.

**Sub Head: Mortars****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
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 Lab Lab Lab Lab Lab Lab Lab	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 Lab Lab Lab Lab	IS 4031 (Part II) IS 4031 (Part III) IS 4031 (Part V) IS 4031 (Part VI) IS 4031  <b>(Part IV)-1988 (Reaffirm 2014)</b>	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	Field	Appendix 'A' under Chapter 3 of CPWD Specificati	20 cum	Every 20 cum or part

		impurities		on 2019-Vol I		thereof or more frequently as decided by Engineer-in-Charge.
	3.1.3.2	Silt Content	Field	Appendix C under Chapter 3 of CPWD Specification on 2019-Vol I	20 cum	-do-
	3.1.3.4	Particle size distribution	Field or Laboratory as decided by the Engineer-in-charge	Appendix B under Chapter 3 of CPWD Specification on 2019-Vol I	40 cum	40 cum or part thereof

1	2	3	4	5	6	7
Sand	3.1.3.5	Bulking of Sand	Field	Appendix D under Chapter 3 of CPWD Specification on 2019-Vol I	20 cum	Every 20 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
		Loss of ignition in percent by mass, max.	Lab	IS 1727	10 cum	Frequency as decided by Engineer-in-charge
		Fineness, specific surface in $m^2/kg$ /	Lab/field	Blaine's permeability method	10 cum	-do-
		Compressive strength at 28 days in $N/mm^2$ , Min.	Lab.	-	10 cum	Only in cases when fly ash is used as pozzolana in cement



**SUB HEAD : CONCRETE WORK**

**LIST OF MANDATORY TESTS**

<i>Material</i>	<i>Clause</i>	<i>Test</i>	<i>Field/ Laborator y</i>	<i>Test procedure</i>	<i>Min. qty of Material for Carrying out test</i>	<i>Frequency of Testing</i>
1	2	3	4	5	6	7
Stone aggregate	4.1.2.2	(a) Percentage of soft or deleterious material	Field or Laborator y - Test as required	IS 2386- Part II	As required By Engineer in-Charge	For all quantities
	4.1.2.3	Particle size	Field/ Lab	Appendix 'A' Under Chapter 4 of CPWD Specification 2019- Vol I	45 cum	For every 45 cum or part thereof for RCC Work only. For rest of items as decided by Engineer- in Charge
	4.1.2.5	(a) Estimation of organic impurities	Field/ Lab	IS 2386- Part II	10 cum	For every 40 cum or part thereof
		(b) Surface moisture	Field/ Lab	IS 2386	10 cum	-do-
		(c) Determination of 10% fine value	Field/ Lab	IS 2386	10 cum	-do-
		(d) Specific gravity	Field/ Lab	IS 2386	10 cum	-do-
		(e) Bulk density	Field/ Lab	IS 2386	10 cum	-do-
		(f) Aggregate crushing strength	Field/ Lab	IS 2386	10 cum	-do-
		(g) Aggregate impact value	Field/ Lab	IS 2386	10 cum	-do-
Concrete	4.2.2	Slump test	Field	Appendix D'under Chapter 4 of CPWD Specification 2019- Vol I	10 cum	15 cum or part thereof

## SUB HEAD : RCC 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
Reinforced Cement Concrete (Design Mix)	Coarse Aggregates				50 cum or part thereof & also on each change of source	
	Fine Aggregates				50 cum or part thereof & also on each change of source	
	Cement				50 MT or on each change of source	
	Fresh Concrete	(a) Slump test	Field	Appendix 'D' Chapter 4 of CPWD Specification 2019- Vol I	10 cum	50 cum for R.C.C. work including in all other small location. R.C.C.done in a day is less than 50 cum test may be carried out as required by Engineer- in-Charge
	Fresh Concrete	(b) Cube Test	Lab	Appendix A Chapter 4 of CPWD Specificatio n 2019- Vol I'	10 cum or part thereof	50 cum or 10 batches of 5-7 cum each for R.C.C. work in all location taken together. R.C.C. done in a day is less than 50 cum test may be carried out as required by Engineer-in- Charge
Reinforced Cement Concrete (Ready Mix)	Coarse Aggregates				50 cum or part thereof & also on each change of source	

	Fine Aggregates				50 cum or part thereof & also on each change of source	
	Cement				50 MT or on each change of source	
	Fresh Concrete	(a) Slump test	Field/Lab	Appendix 'D' of Chapter 4 of CPWD Specification 2019- Vol I'	10 cum	50 cum for R.C.C. work including in all other small location. R.C.C. done in a day is less than 50 cum test may be carried out as required by Engineerin-Charge

1	2	3	4	5	6	7
	Fresh Concrete	(b) Cube Test	Lab	Appendix 'A'	10 cum or part thereof	50 cum or 10 batches of 5-7 cum each for R.C.C. work in all location – taken together. R.C.C. done in a day is less than 50 cum test may be carried out as required by Engineerin-Charge
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  (ii) 10 mm to 16 mm dia one sample for each 35 tonnes or part thereof  (iii) over 16 mm dia one sample for each 45 tonnes or part thereof
						(i) Under 10 mm dia, one sample For each 40 tonnes or part thereof  (ii) 10 mm to 16 mm, one sample for each 45  (iii) over 16 mm dia, one sample for each 50 tonnes or part thereof

## Mandatory tests on Aggregates at site

<i>Tests</i>	<i>Nos. of test on each 50 cum of Material or part thereof</i>
1. Specific gravity	3
2. Bulk density	3
3. Aggregate crushing strength	3
4. Limits of deleterious substances	3
5. Aggregate impact value	3

Following tests shall be conducted at site on each lot of cement delivered: -

<i>Mandatory tests</i>	<i>Number of test per lot</i>
1. Consistency of standard cement paste	5
2. Initial and final setting time	5 each
3. Compressive strength test	10

Water sample from each source shall be tested as under: -

<i>Test</i>	<i>Number of test for each source</i>
Acidity	3
Alkalinity	3
Presence of solids	3

## LIST OF MANDATORY TESTS – Masonry Work

<i>Sl. No.</i>	<i>Material</i>	<i>Clause</i>	<i>Test</i>	<i>Field/ laboratory Test</i>	<i>Test Procedure</i>	<i>Minimum Qty. of material for carrying out test</i>
(i)	Bricks/  Brick Tiles	6.1.3,  6.1.4, 6.1.5	Testing of Bricks/Brick Tiles for dimensions, Compressive strength, Water absorption and efflorescence	Laboratory	Appendix  A, B, C & D of Chapter 6	As per Table 6.3  and 6.4

(ii)	Sewer Bricks	6.1.4	Dimensions, Compressive strength, Water absorption And Efflorescence	Laboratory	Appendix A, B, C & D of Chapter 6	As per Table 6.3 and 6.4
(iii)	Burnt clay perforated building bricks	6.1.5	--do--	-- do --	-- do--	-- do--

## CLADDING WORK

### LIST OF MANDATORY TESTS

Material	Clause	Test	Field/ Laboratory Test	Test	Minimum quantity of material/ work for carrying out the test	Frequency of testing
Marble	8.3 (Table 8.2)	(i) Moisture Absorption	Laboratory	IS 1124	50 Sq.m.	100 sqm. or part thereof.
		(ii) Hardness Test	-do-	Mho's Scale	-do-	-do-
		(iii) Specific Gravity	-do-	IS 1122	-do-	-do-
Granite		(i) Moisture	-do-	IS 1124	-do-	-do-
		(ii) Specific Gravity	-do-	IS 1122	-do-	-do-

## WOOD WORK & P.V.C. 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
Timber	9.1.6	Moisture content	Field (by moisture meter) laboratory test as required by Engineer- in-Charge	Appendix 'C'	1 cum	Every one cum or part thereof.

Flush door	9.7.10	End immersion Test knife test Adhesion Test	Laboratory	IS 2202 Appendix 'F'	26 shutters	As per sampling and testing specified in clause 9.7.11
Mortice Locks	9.15.13	Testing of spring	Laboratory	IS 2209-Appendix 'G'	50 Nos	100 or part thereof.

### Testing (Criteria for conformity) for Upvc extruded hollow profiles

The uPVC extruded hollow profiles use in window and doors shall conform to the specification as per **EN 12608** and other standards as mentioned below:

S.No.	Name of the test	Test Method	Specified Parameter
1	Vicat Softening Temperature	EN ISO - 306	Shall not be < 75°C
2	Charpy Impact Strength	EN ISO - 179-2	Shall not be < 20KJ/m <sup>2</sup>
3	Flexural Modulus Elasticity	EN ISO - 178	Shall not be < 2200 N/mm <sup>2</sup>
4	Tensile Impact Strength	EN ISO - 8256	Shall not be < 600 KJ/m <sup>2</sup>
5	Mean Breaking Stress for welded corner		
	(a) For the tensile bending test	EN - 514	Shall not be < 25 N/mm <sup>2</sup>
	(b) For the compression bending test		Shall not be < 30N/mm <sup>2</sup>
6	Heat Reversion Test	IS:4985-2000	Shall not be > 2.0 %
7	Surface Spread of flame	BS : 476 - Part 7	Classification 1
8	Ignitability Evaluation	BS : 476 - Part 5	'P' Not easily ignitable
9	Tensile modulus	ASTM D 638	Shall not be < 35 MPa
10	Shear Modulus	ASTM D 732	Shall not be < 220 MPa
11	Tensile Strength	EN ISO 527	Shall not be < 30 MPa

For the determination of the weld ability of profiles, welded corners shall be tested for tests as mentioned above. The sample subjected to weld test shall not be finished by grooving and knifing etc. except for the outside edge of 90-degree angle, which shall be cleaned to permit the sample to sit fully on to the support.

Minimum percentage of **titanium dioxide** content in uPVC profiles shall not be less than **7.00 percent** and **calcium carbonate** content shall not be more than **10.00 percent**.

The uPVC casement / fixed / sliding windows and doors shall be factory fabricated by the approved manufacturer and installation work shall be carried out by them or their authorized vendor duly approved by the Engineer -in -charge.

## STEEL WORK

### LIST OF MANDATORY TESTS

<i>Material</i>	<i>Clause</i>	<i>Test</i>	<i>Field/ laboratory test</i>	<i>Test procedur e</i>	<i>Min. quantity of material for carrying out the test</i>	<i>Frequenc y of testing</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
Steel	10.1.1	(a) Tensile strength (b) Bend test	Laborator y	IS 1599	20 tonne	Every 20 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	Every 8 tonne or part thereof	Every 8 tonne or part thereof

## Flooring 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>
<i>1.</i>	<i>2.</i>	<i>3.</i>	<i>4.</i>	<i>5.</i>	<i>6.</i>	<i>7.</i>
Terrazzo Tiles	11.10.1 & 11.11.1	1. Transverse strength 2. Water absorption 3. Abrasion test	Laboratory	IS: 1237	5000 Nos. (no testing need be done if total number of tiles of all types of all sizes from all Manufacturers used in a work is less than 5000 Nos)	One test for every 10,000 Nos. or part thereof for each type and size from a single manufacturer. (One test to be done even if the number of terrazzo tiles of any type and size from a single manufacturer is less than 5000 Nos. provided the total number of terrazzo tiles of all types and sizes from all manufacturers used in a work exceed 5000 Nos)

Pressed Ceramic tiles (for floor )	11.4,11.5&11.16	1. Dimension s and surface quality 2. Physical properties 3. Chemical properties	Laboratory	I S: 13630	3000 Nos.	3000 Nos. or part ereof
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**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, <b>wearing layer, and general quality</b> | - 12 tiles |
| (b) For wet transverse strength test  | - 6 tiles  |
| (c) For resistance to wear test   | - 6 tiles  |
| (d) For water absorption test   | -          |

### 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 & Concrete Pavement

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	
Cement concrete pavement under controlled conditions	16.37.19	Coarse aggregate	Laboratory	IS 2386 (Part 1)	Before approval of the quarry and every subsequent change in the source of supply and one test per 100 cum.	
		1. Flakiness Index				
		2. Impact Value	-do-	IS 2386 (Part 4)	-do-	
		3. Loss Angles abrasion Value	-do-	-do-	-do-	
		4. Deleterious material	-do-	IS 2386 (Part 2)	Before approval of the quarry and at every subsequent change in the source of supply	
		5. Moisture content	-do-	IS 2386 (Part 3)	Regularly as required subject to a minimum of one test per day	
		Fine Aggregate				
		1. Silt content	Field	As per CPWD specification Vol. I.	One test per 15 cum.	
		2. Gradation of sand	-do-	IS 2386 (Part 2)	-do-	
		3. Deleterious material	-do-	IS 2386 (Part 2)	Before approval of the quarry and at every subsequent change in the source of supply	
4. Moisture content	-do-	IS 2386 (Part 3)	Regularly as required subject to a minimum of two tests per day			
		5. Mix Aggregate	Field	IS 2386 (Part 1)	One test per 15 cum of concrete	
		6. Flexural strength	Laboratory	IS 526	One test consisting of 8 specimen for 30 cum. of concrete	

**Note :** Above mentioned clause numbers are from CPWD Specifications 2019 Volume 1 & 2 with upto date correction slips.

## TESTS FOR PRECAST COMPONENTS / STRUCTURES

### Sampling Procedure

**Lot:** All the precast units of the same size, manufactured from the same material under similar conditions of production shall be grouped together to constitute a lot.

The number of units to be selected from each lot for dimensional requirements shall depend upon the size of the lot and shall be in accordance with col 2 and col 3 of Table 1 of IS 15916 : 2010. The units shall be selected from the lot at random. In order to ensure the randomness of selection, reference may be made to IS 4905.

**Number of Tests and Criteria for Conformity:**

All the units selected at random in accordance with col 2 and col 3 of Table 1 of IS 15916 : 2010 shall be subjected to the dimensional requirements. A unit failing to satisfy any of the dimensional requirements shall be termed as defective. The lot shall be considered as conforming to the dimensions requirements, if no defective is found in the sample, and shall be rejected, if the number of defectives is greater than or equal to the first rejection number. If the number of defectives is less than the first rejection number the second sample of the same size as taken in the first stage shall be selected from the lot at random and subjected to the dimensional requirements. The number of defectives in the first sample and the second sample shall be combined and if the combined number of defectives is less than the second rejection number, the lot shall be considered as conforming to the dimensional requirements, otherwise not.

The lot which has been found as satisfactory with respect to the dimensional requirements shall then be tested for load test. For this purpose one unit shall be selected for every 300 units or part thereof. The lot shall be considered as conforming to the strength requirement, if all the units meet the requirement; otherwise not.

**Testing on Individual Components**

The component should be loaded for 1 h at its full span with a total load (including its own self weight) of 1.25 times the sum of the dead and imposed loads used in design. At the end of this time it should not show any sign of weakness, faulty construction or excessive deflection. Its recovery 1 h after the removal of the test load, should not be less than 75 percent of the maximum deflection recorded during the test. If prestressed, it should not show any visible cracks up to working load and should have a recovery of not less than 85 percent in 1 h.

**Load Testing of Structure or Part of Structure**

Loading test on a completed structure should be made, if required by the specification or if there is a reasonable doubt as to the adequacy of the strength of the structure

In such tests the structure should be subjected to full dead load of the structure plus an imposed load equal to 1.25 times the specified imposed load used in design, for a period of 24 h and then the imposed load shall be removed. During the tests, vertical struts equal in strength to take the whole load should be placed in position leaving a gap under the member.

NOTE — Dead load includes self-weight of the structural members plus weight of finishes and walls or partitions, if any, as considered in the design.

**1.1** If within 24 h of the removal of the load, a reinforced concrete structure does not show a recovery of at least 75 percent of the maximum deflection shown during the 24 h under load, test loading should be repeated after a lapse of 72 h. If the recovery is less than 80 percent in second test, the structure shall be deemed to be unacceptable.

**1.2** If within 24 h of the removal of the load, prestressed concrete structure does not show a recovery of at least 85 percent of the maximum deflection shown during the 24

h under load, the test loading should be repeated. The structure should be considered to have failed, if the recovery after the second test is not at least 85 percent of the maximum deflection shown during the second test.

If the maximum deflection, in mm, shown during 24 h under load is less than  $40 l^2/D$ , where  $l$  is the effective span, in m; and  $D$ , the overall depth of the section, in mm, it is not necessary for the recovery to be measured and the recovery provisions of 1.1 and 1.2 shall not apply

### 3.6 Tolerances for Precast Elements

Casting tolerances of precast elements shall be in accordance with Clause 6.2 of IS 15916 is as mentioned below:

<i>Sl No.</i> (1)	<i>Product Tolerances</i> (2)	<i>Product (see Key No.)</i> (3)
i)	<i>Length:</i>	
	a) $\pm 5$ mm	1, 7
	b) $\pm 5$ mm or $\pm 0.1$ percent whichever is greater	2, 3, 8
	c) $\pm 0.1$ percent subject to maximum of $\begin{matrix} +5 \\ -10 \end{matrix}$ mm	4
	d) $\pm 2$ mm for length below and up to 500 mm $\pm 5$ mm for length over 500 mm	5
	e) $\pm 10$ mm	6, 9, 10
ii)	<i>Thickness/cross-sectional dimensions:</i>	
	a) $\pm 3$ mm	1
	b) $\pm 3$ mm or 0.1 percent, whichever is greater	2, 8

<i>Sl No.</i> (1)	<i>Product Tolerances</i> (2)	<i>Product</i> (see Key No.) (3)
	c) $\pm 2$ mm up to 300 mm wide $\pm 3$ mm for greater than 300 mm wide } d) $\pm 2$ mm e) $\pm 4$ mm	4, 5 3, 7 6, 9, 10
iii)	<i>Straightness/bow:</i> a) $\pm 5$ mm or 1/750 of length, whichever is greater b) $\pm 3$ mm c) $\pm 2$ mm	2, 4, 8 1, 5 7
iv)	<i>Squareness:</i> When considering the squareness of the corner, the longer of two adjacent sides being checked shall be taken as the base line a) The shorter side shall not vary in length from the perpendicular by more than 5 mm b) The shorter side shall not vary in length from the perpendicular by more than 3 mm c) The shorter side shall not be out of square line for more than $\begin{matrix} +2 \\ -5 \end{matrix}$ mm	2, 5, 8 1, 7 4
v)	<i>Twist:</i> Any corner shall not be more than the tolerance given below from the plane containing the other three corners: a) Up to 600 mm in width and up to 6 m in length 5 mm Over 600 mm in width and for any length 10 mm length } b) $\pm 1/1500$ of dimension or $\pm 5$ mm, whichever is less c) $\pm 3$ mm d) $\pm 1$ mm	2, 8 4 1 7
vi)	<i>Flatness:</i> The maximum deviation from 1.5 m straight edge placed in any position on a nominal plane surface shall not exceed: a) $\pm 5$ mm b) $\pm 3$ mm c) $\pm 2$ mm d) $\pm 4$ mm or maximum of 0.1 percent length	2, 8 4 1, 7 5
<b>Key No. for product reference:</b>		
1 Channel unit		
2 Ribbed slab unit/hollow slab		
3 Waffle unit		
4 Large panel prefabrication		
5 Cellular concrete floor/roof slabs		
6 Prefabricated brick panel		
7 Precast planks		
8 Ribbed/plain wall panel		
9 Column		
10 Step unit		

Apart from mandatory tests specified above, Tests required for conformance of various materials becoming part of permanent 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 and Standards

**A. Mechanical and electrical works:**

List of mechanical and electrical items required to be inspected by the consultant

**1. Mechanical**

Pumps by type

**2. Electrical**

Motors by type

Electrical starters Electrical Panels  
Switchboards Motor control panels DC  
distribution panels Induction-cum-  
ununciation panels Bus ducts Battery  
chargers  
Transformers HV/ MV/ LV Power Voltage Current Capacitors  
Level switches Electrical cables

**3. Miscellaneous**

Earthing equipment  
Lightening arrestors and essential fittings Cable trays  
Any other items as specified in the contract documents

**4. Inspections**

The main headings for these works are as follows: Pumps  
Motors  
Electrical panels Transformers  
Capacitors Cables

**5. Pumps**

Items for third party inspection at site:

Pumps	1.	Review of material test certificate for pump casing, bowls, shaft, impeller bearings, column pip etc.
	2.	Review of factory test results.
	3.	Performance test at site for Head, Discharge, Power Input
	4.	Witnessing performance test at 49 Hz and 50 Hz frequency including vibration measurement covering following tests.
Motors	1.	Visual examination of motor assembly
	2.	Review of test certificate for conductor, starter coil, shaft bearing etc.
	3.	Witnessing routine test at site no load and load test vibration measurement as per IS

	4.	Verification of type test report
	5.	Visual and dimensional check
Transformer	1.	Visual inspection, dimensional check and verification of bill of materials.
	2.	Review of factory test reports
	3.	Witnessing insulation resistance voltage test at HV side and LV side
	4.	Routine tests as per IS:2026
	5.	Verification of type results, temperature rise test, impulse test, insulating oil test etc.
	6.	Witnessing all routine and type test as per IS:2834 such as sealing test, test for output/ capacitance, insulation resistance test between terminals. Containers and loss angle measurement, test for efficiency of discharge device, test for dielectric loss angle, thermal stability test, self-healing test, voltage test between terminals
	7.	Visual and dimensional check
	8.	Witnessing routine test as per IS:1554
	9.	Witnessing insulating test, resistance test, current rating test, star reactance test, star capacitance test, short circuit current test, voltage drop test
	10.	Earth resistance test for Body and Neutral
Pipe and specials	1.	Visual and dimensional check
	2.	Review of chemical and physical test certificates as per the relevant Indian Standard specifications.
	3.	Witnessing hydrostatic pressure test as per the relevant Indian Standard specifications
	4.	Checking the integrity of epoxy lining for MS pipes at joints after laying and jointing pipes
Valves	1.	Visual and dimensional check
	2.	Review of material test certificates for valve body and internals
	3.	Operational smoothness
	4.	Witnessing hydrostatic test/ leakage test as per applicable code
Diesel generating sets	1.	Review of tests as specified in relevant IS or Special Specifications
	2.	Full load test for 6 hours
	3.	Over load test for half an hour
	4.	Insulation test
	5.	Earth Resistance test

### **C. Quality monitoring during construction of pipelines**

- Checking pipe work excavation levels, randomly Checking effectiveness of pipe joints
- Inspection of manholes, chambers and other structures
  - Base levels and concrete thickness
  - Walls
  - Roof slabs and covers
- Checking sewers for water tightness

### **D. Quality monitoring of buildings works**

The total quality monitoring of various works will be included but not be limited to the following

- Quality of materials
- Quality of construction of various works w.r.t. strength, performance, functionality etc. during different stages of construction
- Workmanship & Finishes
- Performance of mechanical and electrical equipment and systems

#### **1. Quality of materials**

- The checking of quality of materials includes
  - Physical examination
  - Review of tests reports
- Collecting representatives' samples wherever possible and conducting necessary tests for confirmation
- Informing the concerned agencies regarding the acceptance of material or otherwise
- Witnessing the performance tests on machinery carried out by the manufacturer at his factory, before dispatching to site.

**Above all, the Consultant must ensure that energy efficiency and environment-friendliness of all constructions and interventions are maintained and also ensure the same about the performance of the equipment procured.**

## **Annexure – II**

### **REPORTING REQUIREMENTS AND FIELD STUDIES/ TESTS**

<b>Name of Report</b>	<b>Contents</b>	<b>Frequency</b>
Field Quality Audit Report	Field / laboratory test report, observations, analysis and recommendations for further action etc.	Immediately upon completion of field visit/ lab test
Periodic / Fortnightly Reports (as outlined in stages)	Abstract of Field Test Reports, General Contract Summary, Issues for follow up and compliance, special recommendations on any modification required.	Within one week of the completion of the stage
End of Project Report	Contract summary, brief description of services, special events, lessons learnt, recommendations for future such projects etc.	One month before contract completion
Day to Day inspection report	Field tests /observations analysis of processes and recommendations	Immediately upon observation of non-standard engineering process included in the daily report