



**NATIONAL CENTER OF EXCELLENCE  
SPECIAL PROJECTS & INFRASTRUCTURE  
5/25 (Basement), Vikram Vihar, Lajpat Nagar IV,  
New Delhi - 110024**

Bid reference No.: AIFF/SPI/NCE/RFP/27022019/(005)

**INVITATION OF BIDS FOR (UNDERGROUND WATER TANK WORK)**

1. The All India Football Federation invites bid for the Construction of Underground Water Tank Work (Phase 1) for National Center of Excellence in Football, New Town, Kolkata, West Bengal, India.

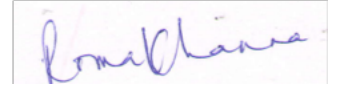
**2. Critical Date Sheet**

Published Date	27 <sup>th</sup> February 2019 10:00 HRS
Bid Document Download	27 <sup>th</sup> February 2019 10:00 HRS
Clarification Start Date	27 <sup>th</sup> February 2019 10:00 HRS
Clarification End Date	07 <sup>th</sup> March 2019 17:00 HRS
Bid Submission Start Date	27 <sup>th</sup> February 2019 12:00 HRS
Bid Submission End Date	13 <sup>th</sup> March 2019 15:00 HRS
Bid Opening Date	14 <sup>th</sup> March 2019 10:30 HRS
Probable Amount of Contract	195.00 Lacs
Project Duration	135 Days(incl. monsoon season)

3. Bidders shall ensure that their Bids, complete in all respect should be submitted online before the closing date and time as indicated in the critical date sheet above on the e-mail id provided.
4. Bids shall be submitted online only at [tenders.nce@the-aiff.com](mailto:tenders.nce@the-aiff.com) and submit hard copies as per the instructions given in the document. Tenderers/Bidders are advised to follow the instructions provided in the 'Instructions to the Bidder/Tenderer' for the e-submission of the bids online on the email id provided.
5. Bidder who has downloaded the tender from the AIFF website [www.the-aiff.com](http://www.the-aiff.com) **shall not tamper/modify the tender form including downloaded price bid template in any manner.**

In case if the same is found to be tempered/ modified in any manner, bid will be completely rejected and EMD/Bid Security would be forfeited.

6. Intending bidders are advised to visit again AIFF website [www.the-aiff.com](http://www.the-aiff.com) prior to closing date of submission of bid for any corrigendum / addendum/ amendment.



Roma Khanna  
Director  
Special Projects & Infrastructure  
All India Football Federation

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## **DISCLAIMER**

1. This Request for Proposals document (“**RFP**”) is being published to enable interested applicants (“**Bidders**”) to participate in the Selection Process of contractors or service providers who are competent and eligible for undertaking as per the brief particulars of scope, work for “The Construction of Underground Water Tank Work (Phase 1) for National Center of Excellence, New Town, Kolkata, West Bengal, India.”
2. The information contained in this RFP or subsequently provided to Bidders, whether verbally or in documentary or any other form by or on behalf of the Authority or any of its employees, consultants or advisers, is provided to Bidders on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is or may be provided.
3. This RFP is not an agreement and is neither an offer nor invitation by the Authority to the prospective Bidders or any other person. The purpose of this RFP is to provide interested parties with information that may be useful to them in the formulation of their Proposals (“**Bid**”) pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by the Authority in relation to the Services. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This RFP may not be appropriate for all persons, and it is not possible for the Authority, its employees or consultants or advisers to consider the objectives, expertise and particular needs of each party who reads or uses this RFP. The assumptions, assessments, statements and information contained in this RFP, may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments and information contained in this RFP and obtain independent advice from appropriate sources.
4. Information provided in this RFP to the Bidders is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Authority accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.
5. The Authority, its employees, consultants and advisers make no representation or warranty and shall have no liability to any person including any Bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the RFP and any assessment, assumption, statement or

information contained therein or deemed to form part of this RFP or arising in any way in this Selection Process.

6. The Authority also accepts no liability of any nature whether resulting from negligence or otherwise, howsoever caused, arising from reliance of any Bidder upon the statements contained in this RFP.
7. The Authority may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumption contained in this RFP.
8. The issue of this RFP does not imply that the Authority is bound to select a Bidder or to appoint the contractor for the Services and the Authority reserves the right to reject all or any of the Bids without assigning any reasons whatsoever.
9. The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Authority or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and the Authority shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid, regardless of the conduct or outcome of the Selection Process.
10. It shall not be assumed by any prospective Bidders that there shall be no deviation or change in any of the information mentioned herein pertaining to requirements or terms of reference or scope of work. While this document has been prepared in good faith, neither AIFF nor any of their employees, consultants or advisers make any representation or warranty or shall have any responsibility or liability whatsoever in respect of any statements or omissions here from. Any liability is accordingly and expressly disclaimed by AIFF and any of their employees, consultants or advisers even if any loss or damage is caused by any act or omission on the part of AIFF or any of their employees, consultants or advisers, whether negligent or otherwise.
11. By acceptance of this document, the recipient agrees that any information herewith will be superseded by any subsequent written information on the same subject made available to the recipient by or on behalf of AIFF. AIFF and any of its respective officers undertake no obligation, among others, to provide the recipient with access to any additional information or to update this document or to correct any inaccuracies therein which may become apparent, and they reserve the right, at any time and without advance notice, to change the procedure for the selection of or any part of the interest or terminate negotiations or the due diligence process prior to the signing of any binding agreement.

12. Accordingly, interested bidders should carry out an independent assessment and analysis of the requirements of the information, facts and observations contained herein.



## 1. BACKGROUND

As part of the legacy of the FIFA U-17 World Cup 2017, the Government of West Bengal awarded 15-acres of land to All India Football Federation (AIFF). The land would be used to develop a facility and set up a home base for Indian Football and its National teams. This one solution facility catering to all target audiences within the Indian Football ecosystem is described as “National Center of Excellence” (NCE). The center shall provide state of the art facilities to not only the Indian teams but set a new benchmark in the region and provide an alternative for various programs and initiatives for internal stakeholders to grow the game of football in the region.

## 2. NATIONAL CENTER OF EXCELLENCE

All India Football Federation is looking to create a state of the art facility in the form of the National Centre of Excellence to develop the football eco system in India with the cooperation of its key stakeholders i.e. Govt. of West Bengal, FIFA and AFC. This will be in line with the continuation plans for the overall development and growth of football in India. The Centre shall be used to run several elite programs in a controlled environment including but not limited to training camps for national teams, advanced courses in coach education, referee education, sports injuries and rehabilitation etc. The Centre will have a mini stadium that shall host youth competitions and practice matches for the national teams. The stadium will be an all seater facility. The centre will also have pitches (natural and hybrid) which will primarily be used for training purpose. The other facilities available at the centre would include but not be limited to accommodation, medical centre, teaching institution, dressing rooms, auditorium, futsal pitch, office space, dining area etc.

## 3. AVAILABILITY OF REQUEST FOR PROPOSAL DOCUMENT

The RFP document has been made available for download by prospective Bidders at the following link/website:

<https://the-aiff.com/document-library.htm>

## 4. OVERVIEW OF REQUEST FOR PROPOSAL DOCUMENT

- 4.1 The All India Football Federation (“**AIFF/Authority**”) having its principal office at Football House, Sector 19, Phase 1, Dwarka, New Delhi - 110075 is looking to establish the National Center of Excellence.
- 4.2 The National Center of Excellence is envisaged to have a lasting influence on Indian football, establishing a world class facility as the home base for AIFF National Teams across age groups, men and women with state of the art infrastructure, standardised facilities, equipment’s and services improving the overall quality and boosting the development of the game.

- 4.3 As part of this endeavour, the Authority is to ensure proper construction of the Underground Water Tank Work (Phase 1) at the location specified in detail in Section 9 of this RFP (“**Scope of Work**”). Through this RFP, the Authority wishes to initiate the Selection Process for suitable Contractor registered in India who are competent and eligible for providing Construction Services as per the eligibility criteria mentioned in this RFP document.
- 4.4 The Authority invites proposals (the “**Proposals**” or “**Bids**”) for selection of a Contractor through an open competitive bidding process in accordance with the procedure set out herein.
- 4.5 The selected bidder would be required to undertake the required works, in accordance with the agreement to be entered separately between the Authority and Selected Bidder (the “**Agreement**”) substantially as per the sample agreement in Annexure E of this RFP, subject to completion of all necessary formalities enumerated in the RFP and approval by the competent authority.

## **5. OVERVIEW OF SELECTION PROCESS**

- 5.1 The Authority has adopted a 2 (two) stage selection process (collectively the “**Selection Process**”) for evaluating the Proposals.
- 5.2 In the first stage, the credentials of Bidders would be evaluated to assess their compliance to the technical evaluation criteria specified in Section 8.0 (“**Technical Evaluation Criteria**”) and then a technical evaluation will be carried out to determine the eligibility of the Bidders and based on this technical evaluation, a list of pre-qualified and short-listed Bidders shall be prepared.
- 5.3 In the second stage, a financial evaluation will be carried out as per criteria mentioned in section 17.2 of this RFP to ascertain the lowest of the Bids received from eligible Bidders for providing the services as mentioned in the Scope of Work (“**Financial Evaluation**”).

## **6. INSTRUCTIONS TO THE BIDDERS**

- 6.1 Interested Bidder(s) are advised and encouraged to study this RFP document carefully and inform themselves fully about the assignment and relevant local conditions and factors before submitting their Proposals in response to the RFP. Submission of a Proposal in response to this RFP document shall be deemed to have been made after careful study and examination of this document with full understanding of its terms, conditions and implications. Proposals must be made strictly in accordance with the requirements of this RFP.

- 6.2 Any subsequent corrigenda/clarifications/modifications pertaining to the RFP, if required, will be made available on the following link/website: <https://the-aiff.com/document-library.htm>
- 6.3 Any failure, oversight or delay to read any such addenda will not entitle any Bidder(s) to any additional time for submission of Bids or any other relief or create any liability in any manner of the Authority towards the Bidder(s).
- 6.4 The work comprises of a proposed Underground Water Tank for National Center of Excellence in Football, New Town, Kolkata, West Bengal, India. The work involves piling work as per drawing for constricting a deep underground water tank of area 430 sq.m with 3.45 m clear height. The tank will be constructed by making RCC walls covered with RCC top with plumbing and electrical works. And it is accessible by 1.5 m wide covered staircase. Aesthetically it will be covered with landscape features on top in future.
- 6.5 Bidders are required to submit one electronic scanned copy of only the technical bid to the e-mail id as mentioned in this document (for details on the online bid submission process please refer to section 7) and whereas printed original hard copy of technical and financial bids sealed in an envelope. The Bidders must ensure that the information furnished in their respective electronic technical bid soft copy is identical to that submitted by them in their original paper Bid or Proposal. In case of any discrepancy observed by the Authority in the contents of the electronic soft copy and original paper Bid documents, the information furnished on the original paper Bid documents will prevail over the digital softcopy submitted.
- 6.6 The Bid documents submitted must be without any overwriting, interlineations, corrections, double typing, etc. The Authority may however, at its discretion, consider any document with any overwriting or corrections if the same has been duly initialed and dated by the Authorized Representative of the Bidder.
- 6.7 Bidders must ensure that their Technical Proposal document soft and hard copies do not contain any financial quotations or prices.
- 6.8 The Bidders shall submit the hard copy Proposal in bound form with all pages numbered serially and by giving an index of submissions. Each page of the submission shall be initialed by the Authorised Representative of the Bidder as per the terms of the RFP.
- 6.9 Bids should be delivered in a plain sealed envelope, bearing the full name, postal address, telephone no., fax no. and e-mail address of the Bidder. Additionally, it shall bear on top, the following:

**“CONFIDENTIAL BID PROPOSAL (UNDERGROUND WATER TANK WORK –  
NATIONAL CENTRE OF EXCELLENCE)”**

- 6.10 If the envelope is not sealed and marked as instructed above, the Authority assumes no responsibility for the misplacement or premature opening of the contents of the Proposal submitted and consequent losses, if any, suffered by the Bidder.
- 6.11 The aforesaid outer envelope will contain 2 (two) separate sealed envelopes, one clearly marked **‘Technical Proposal’** and the other clearly marked **‘Financial Proposal’**. The technical proposal should also contain the Earnest Money Deposit or Bid Security as specified in Section 13 of this RFP. The **“Financial Proposal”** Evaluation envelope of only the Bidder(s) who duly satisfy the technical evaluation requirements will be opened. All the documents should be duly stamped and signed by the Authorised Representative of the respective Bidder(s).
- 6.12 The sealed envelope containing the Bids must be received in the office of the Authority at 5/25 (Basement), Vikram Vihar, Lajpat Nagar IV, New Delhi – 110024 on or before 15:00 HRS on 13<sup>th</sup> March 2019. Envelopes/documents received after the stated time and date will be rejected and returned unopened. Proposals submitted by fax, telex, telegram or only e-mail, for bidding, shall not be entertained.
- 6.13 The Bid should be unconditional. In case of any condition, the Bid shall be treated as non-responsive and may be disqualified.
- 6.14 The Bid should be only in the prescribed format as provided in Annexure A. It should also be accompanied by all the requisite supporting documents, else it may be rejected.
- 6.15 The Technical Proposal and Financial Proposal shall be typed or written in indelible ink and signed by the Authorised Representative of the Bidder.
- 6.16 The Bidder shall submit warranty for Pumping system against manufacturing defect will be provided for a period of 12 months from the date of installation.
- 6.17 The Price schedule is prepared on the basis of following Schedule of Rates DSR 2016, DSR PAR 2012, Goa Schedule of Rates 2015, E-DSR Maharashtra 2013-14 & all amendments upto the date of submission of bid.
- 6.18 Dewatering: If water is met due to seepage, subsoil water, rain or other causes, it shall be removed by the contractor by suitable diversions, pumping or bailing out and the excavated and prepared surface of each layer shall be kept dry as directed by the authorised representative of the authority. No extra payment will be made for such dewatering work.

6.19 In case of difference, contradiction, discrepancy, with regard to conditions of contract, specifications, Drawings, Bill of Quantities etc. forming part of the contract, the following shall prevail in order of Precedence.

- i) Conditions of Contract
- ii) Bill of Quantity
- iii) Technical Specifications
- iv) Drawings

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

The Bidders are required to submit soft copy of only their technical bids electronically on the mentioned e-mail id, using valid Digital Signature Certificates.

### **7.1 PREPARATION OF BIDS**

- Bidder should consider corrigendum/amendment/modification published on the RFP document before submitting their bids.
- Please go through the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents must be submitted, the number of documents – including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- 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 / XLS / RAR /JPG formats. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.

## 7.2 **SUBMISSION OF BIDS**

- Bidder should prepare and upload documents with sufficient time at hand for bid submission so that they can upload the bid in time i.e. on or before the bid submission date and time. Bidder will be responsible for any delay due to other issues.
- The Bidder must digitally sign and upload the required bid documents one by one as indicated in the tender document.
- Bidder should prepare the Bid Security as per the instruction specified in the tender document. The original should be posted/couriered/given in person to the concerned official latest by the last date of bid submission or as specified in the tender documents. The details of the DD/any other accepted instrument, physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise the uploaded bid will be rejected.
- The time of receiving the e-mail (which is displayed on the authority's dashboard) will be considered as the standard time for referencing the deadlines for submission on the bids by the bidders, opening of bids etc. The Bidders should follow this time during bid submission.
- Upon the successful and timely submission of bids a confirmation message for successful bid submission will be sent. Please note this confirmation is only for acknowledging that the bid has been received. The acceptance/rejection of bid depends upon the evaluation during bid opening.
- The bid submission confirmation has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgement may be used as an entry pass for any bid opening meetings.

## 7.3 **ASSISTANCE TO BIDDERS**

- Any queries relating to the tender document, the terms and conditions contained therein and regarding the process of bid submission (online/hard copies) should be addressed to the Tender Inviting Authority at [tenders.nce@the-aiff.com](mailto:tenders.nce@the-aiff.com)

## 8. TECHNICAL EVALUATION CRITERIA

Technical Proposal shall comprise the following

S. No	Criterion	Supporting Documents to be submitted
1.	Experience – Financial & Physical	Format I-1 below
2.	Annual Turnover	Format I-2 below
3.	The Bidder should be a company registered under the Companies Act, 1956	Certificate of incorporation, GST Certificate and Pan Card
4.	In case of consortium, the details of role to be played by each member of the consortium and their proposed equity structure for new entity is to be clarified. The lead Bidder should be an organisation registered in India and have 51% share in the consortium and continue to have the same for the term of the Agreement. In case of consortium the details of role to be played by each member of the consortium and their proposed equity structure for new entity is to be clarified. The pre-qualification criteria information for only the partner sharing the majority of the consortium will be considered.	MoU or contract between the members of the consortium.
5.	The Bidder does not have any direct/indirect holding in any of the other bidding company. There should be no cross ownership between any Bidders.	Attach self-certification /undertaking on company letterhead duly signed and stamped by the competent authority of the Bidder.
6.	The Bidder should have submitted an Earnest Money Deposit as per Section 13 of this RFP.	Original Demand Draft in name of All India Football Federation.
7.	The Bidder should have submitted an undertaking that there are no major legal cases pending against it.	Attach self-certification /undertaking on company letter head duly signed and stamped by

		the competent authority of the Bidder.
8.	The Bidder should have submitted an undertaking that it is not blacklisted by Government of India or the State Government West Bengal or any other relevant authority or private organisation.	Attach self-certification /undertaking on company letterhead duly signed and stamped by the competent authority of the Bidder.
9.	Construction Plan	As per the scope of work mentioned in section 9, project timelines in section 10 and relevant information and annexures, the Bidder(s) should submit a construction plan. The plan should be submitted on company letter head duly signed and stamped by the competent authority of the Bidder. The plan should be prepared keeping in mind the pre-monsoon, monsoon, post-monsoon and any other relevant factors concerning the construction of specified works.

**Note:**

1. Technical Proposal should be uploaded duly page numbered and indexed.
2. Technical Proposal uploaded otherwise will not be considered.
3. The Financial Bids of only the Bidders who satisfy the technical evaluation criteria will be opened.



**EXPERIENCE: FINANCIAL & PHYSICAL:**

The bidder should have completed either of the below:

- i. three similar works, each costing not less than the amount equal to 40% of the probable amount of contract during the last 3 financial years; or
- ii. two similar works, each costing not less than the amount equal to 50% of the probable amount of contract during the last 3 financial years; or
- iii. one similar work of aggregate cost not less than the amount equal to 80% of the probable amount of contract during the last 3 financial years;

**To be filled in by the bidder:**

- i. Details of successfully completed similar works shall be furnished in the following format
- ii. Certificate duly signed by the employer shall also be enclosed for each completed similar work.

Agreement Number & Year	Name of Work	Date of Work Order	Date of Completion	Amount of Contract	Employer's Name and Address

**Note:**

- i. Similar works: The similarity shall be based on the physical size, complexity, methods technology or other characteristics of main items of work viz, earth work, cement concrete, Reinforced cement concrete, brick masonry, stone masonry etc

**(Format: I -2)**

## **ANNUAL TURNOVER**

### **Requirement:**

- i. Average annual construction turnover on the construction works not less than 5 Crores during the last 5 financial years;

### **To be filled in by the bidder:**

<b>Financial Year</b>	<b>Payments received for contracts in progress or completed</b>
2017-18	
2016-17	
2015-16	
2014-15	
2013-14	

### **Note:**

1. Annual turnover of construction should be certified by the Chartered Accountant.
2. Audited balance sheet including all related notes, and income statements for the above financial years to be enclosed.

## 9. SCOPE OF WORK

9.1 The Scope of work of project for Contractor includes, but not limited to:-

The Construction of Underground Water Tank for National Center of Excellence in Football, New Town, Kolkata, West Bengal, India. The work involves piling work as per drawing for constricting a deep underground water tank of area 430 sq.m with 3.45 m clear height. The tank will be constructed by making RCC walls covered with RCC top with plumbing and electrical works. And it is accessible by 1.5 m wide covered staircase. Aesthetically it will be covered with landscape features on top in future.

### Pile Foundation Work

- Work included consists of all necessary services and furnishing of all labour material, tools, equipment and related items for the full and satisfactory performance of the contract, conforming to given specifications and as shown in the Contract Drawings or reasonably implied therein or any authorised conditions or alterations thereof.
- The Contractor shall visit the site and familiarise himself with the conditions at site. The Employer or Engineer's representative shall not be held responsible for the accuracy of the site condition or sub soil data, furnished in good faith with the contract.
- With the tender the Contractor shall submit the detailed method of construction to be used. For cast in situ concrete piles the Contractor shall indicate the methods he proposes to concrete the pile in order to prevent necking of piles.
- The items of work will generally be as follows:
  - Boring/ Drilling including provision of temporary casing.
  - Supplying, fabrication and placement of all reinforcing bars.
  - Casing of concrete piles as per specification.
  - Load testing of piles if required any.

9.2 **Location:** Premises No. 08-0787, Plot No. AA-IIE/57/A, Action Area IIE, New Town, Kolkata. The site is adjacent to Deer Park, near Eco Park.

### 9.3 ACCEPTABLE MAKES OF MATERIAL

Acceptable makes of materials to be used in the work are enclosed. In case of non-availability of these makes, after the approval of the Authority, the Contractor can use the alternative makes only BIS marked materials. Non BIS marked materials may be permitted by the Authority only when BIS marked materials are not manufactured

SR. NO.	NAME OF ITEM	MAKE APPROVED
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1)	ORDINARY PORTLAND CEMENT GRADE 43/53	BIRLA, JK, ACC, ULTRATECH, JAYPEE, AMBUJA,
2)	WHITE CEMENT	JK, BIRLA, ACC, JAYPEE, AMBUJA
3)	REINFORCEMENT STEEL	TATA , SAIL, RINL, JINDAL, JSW STEEL, SHYAM STEEL
4)	PAINT/POLISH/ PRIMER/ WATER PROOFING PAINT	BERGER, ASIAN, DULUX, BRITISH PAINT
5)	HYDRO-PNEUMATIC PUMPING SYSTEMS( FLUSHING, SOFT & GARDEN HYDRANT)	GRUNDFOS, ITT, WILO/ KSB
6)	PVC PIPE FOR WEEP HOLES	PRINCE, SUPREME, FINOLEX
7)	STRUCTURAL STEEL	TATA , SAIL, RINL, JINDAL, JSW STEEL, SRMB
8)	PUMPS	GRUNDFOS, XYLEM, WILO, KSB
9)	GI/MS PIPES	TATA, JINDAL HISSAR, SAIL
10)	GI FITTINGS	UNIK, ZOLOTO, SS
11)	BALL VALVES	ARCO, SANT, ZOLOTO
12)	BUTTERFLY VALVE	KSB, SKS, AUDCO
13)	CI DOUBLE FLANGED SLUICE VALVE	ZOLOTO, SANT, CASTLE, KARTAR
14)	NON RETURN VALVE	ZOLOTO, SANT, CASTLE, KARTAR
15)	Y-STRAINERS	ZOLOTO, SANT, CASTLE, KARTAR
16)	FLOAT SWITCH	NOLTA, DANFOSS, HONEY WELL
17)	PRESSURE GAUGE	FIEBIG, H GURU, DAN FOSS
18)	DOSING SYSTEM	MILTON ROY, ASIALMI, GRUNDFOS
19)	LIQUID LEVEL INDICATOR/ LIQUID LEVEL CONTROLLER	ADVANCE, HONEYWELL, DANFOSS
20)	FILTER/ SOFTNER	ION EXCHANGE, RENNAISANCE AQUA, PENTAIR
21)	SALT SATURATOR	ION EXCHANGE, RENNAISANCE AQUA, PENTAIR
22)	WATER METER	KENT, MARSHALL, SANT

#### 9.4 TYPICAL TENDER DRAWING (REFER ANNEXURE F)

##### 9.4.1 ARCHITECTURAL PACKAGE

SL NO	DRAWINGS	DRAWING NO
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1)	SITE SURVEY PLAN	TD.A.0.01
2)	SITE DEVELOPMENT LAYOUT-1	TD.A.0.02
3)	U.G. TANK DETAILS	TD.P.4.01

#### 9.4.2 STRUCTURAL PACKAGE

SL NO	DRAWINGS	DRAWING NO
1)	U.G.TANK STRUCTURAL DETAILS	TD.S.4.02
2)	U.G.TANK STRUCTURAL DETAILS	TD.S.4.02-A

9.5 The Bidder(s) should submit the construction plan along with the technical bid as stated in the evaluation criteria. The plan will be evaluated by the technical committee of the authority. The authority reserves the right to carry out minor changes in the construction plan during the period of work at no extra cost to the authority.

#### **Note:**

- The bidder must be aware about the location of the proposed works, surrounding local condition where works are to be constructed, Encroachment by local people and its consequence which may affect the progress of works. Accordingly, bidder shall submit BID considering all these aspect and shall Quote the rates. Bidder shall not raise any extra/additional claim on these aspects.
- The contractor is required to deploy the resources at site and start the construction. No claim shall be entertained for idle labour, idle machinery, idle technical / non-technical staff, idle T&P and if any hindrance due to any reason.
- The contractor shall be responsible right through the entire duration of the Project for execution of all works till commissioning and handing over of project complete with all respects and shall remove all defects, if any, developed during Defects Liability Period (DLP).
- No works, for which rates are not specifically mentioned in the priced schedule or quantities, shall be taken up without written permission of AIFF. Rates of items not mentioned in the priced Schedule of Quantities shall be fixed by AIFF as provided in the corresponding clauses of the tender document.

- The work shall be executed as per the details in Schedule of Quantities and direction of the authorised representative of the authority and shall be completed in all respect with full satisfaction of the authorised representative of the authority as per the Government guidelines, Indian standard codes & Manuals. The Bidder may assess the quantum of work before filling of tender.
- Contractor will also submit report on completed work along with drawings of completed work and including photographs of works.
- The Contractor will submit the sample and test reports of prefab panel, paints, steel, cement, coarse sand etc. to the authorised representative of the authority for approval before starting the work. Any material used without prior approval shall be replaced by the contractor immediately at his own cost. No payment in this regard shall be entertained.
- The Contractor shall dispose of all the dismantled materials, debris, garbage, waste outside of the campus of the works at his own cost after prior approval from the authorised representative of the authority and provide clear and clean site at the time of handing over the works
- The contractor shall make his own arrangements for obtaining electric connection and water Connection/arrangement (if required).

## **10. PROJECT TIMELINES**

Total Project Duration – 135 Days (incl. monsoon days)

## **11. MILESTONES & PAYMENT CERTIFICATES**

11.1 The payment to the contractor will be made as per the following payment schedule, subject to furnishing of relevant documents mentioned below and under Section 21 (Terms of Payment).

FIRST PAYMENT MILESTONE	25% of the contract value within 30 days of signing of the contract.
SECOND PAYMENT MILESTONE	40% of the contract value on 50% of completion of work certified in writing by the Authority.
THIRD PAYMENT MILESTONE	35% of the contract value within 30 days of Selected completion of the work certified in writing by the Authority.

- 11.2 The Contractor shall submit to the authorised representative of the authority monthly statements of the value of the work executed less the cumulative amount certified previously, supported with detailed measurement of the items of work executed.
- 11.3 The authorised representative of the authority shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
- 11.4 The value of work executed shall be determined, based on the measurements approved by the authorised representative of the authority.
- 11.5 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.
- 11.6 The value of work executed shall also include the valuation of Variations and Compensation Events.
- 11.7 All payments shall be adjusted for deductions for advance payment, security deposit, other recoveries in terms of contract and taxes at source as applicable under the law.
- 11.8 The authorised representative of the authority may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
- 11.9 Payment of intermediate certificate shall be regarded as payments by way of advance against the final payment and not as payments for work actually done and completed.
- 11.10 Intermediate payment shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or be considered as an admission of the due performance of the contractor any part thereof, in any respect or the occurring of any claim.
- 11.11 The payment of final bill shall be governed by the provisions of contract.

## **12. LIQUIDATED DAMAGES FOR UNSATISFACTORY WORK AND DELAY**

- 12.1 The contractor always will ensure that the all the works are being carried out as per scope of work section and according to the timelines of this RFP unless otherwise informed by the Authority. The authorised representative of the authority will conduct site inspections and in case of unsatisfactory quality of workmanship or delay in completion or delivery of Services by the contractor, the contractor will subject to liquidated damages of an amount equal to 0.1% per day, subject to a maximum of 10% (ten percent) of the contract value. In case the Authority feels there are severe issues with the construction work, the Authority shall have the right to make alternate arrangements for satisfactory carrying out the required works, at the risk and cost of the Selected Bidder.

### 13. EARNEST MONEY DEPOSIT

13.1 Should be 1% of the Estimated Value of works/contract value.

13.2 The demand draft should be in the favour of All India Football Federation. The EMD of unsuccessful Bidders will be returned to them within two weeks of selection of the Selected Bidder. For Selected Bidder, the EMD will be returned within 15 days of signing of the contract. Any bid submitted without EMD will be out rightly rejected. The Earnest Money will be forfeited because one or more of the following reasons:

- The Bidder withdraws its Bid during the validity period specified in RFP.
- The Bidder does not respond to requests for clarification of its Bid.
- The Bidder fails to provide required information during the evaluation process or is found to be non-responsive or has submitted false information in support of its qualification.
- In case of a Selected Bidder, the said Bidder fails to sign the Agreement in time; or does not furnish the mandatory Performance Security.
- The Bidder materially alters his Bid during the Bid processing period.

### 14. SCHEDULE OF SELECTION PROCESS

S.NO	Particular	Detail
1	Release of RFP document on AIFF website.	27 <sup>th</sup> February 2019
2	Visit by prospective Bidders to the site. Each Bidder will need to intimate and confirm in writing about the visit 48 hours in advance.	27 <sup>th</sup> February – 06 <sup>th</sup> March 2019 10:00 HRS to 16:00 HRS
3	Last date for receiving queries via email.	07 <sup>th</sup> March 2019
4	Last Date for submission of bids to 5/25 (Basement), Vikram Vihar, Lajpat Nagar IV, New Delhi - 110024	13 <sup>th</sup> March 2019 15:00 HRS
5	Opening of bid – Technical 5/25 (Basement), Vikram Vihar, Lajpat Nagar IV, New Delhi - 110024	14 <sup>th</sup> March 2019 10:30 HRS



6	Opening of bid - Financial 5/25 (Basement), Vikram Vihar, Lajpat Nagar IV, New Delhi - 110024	15 <sup>th</sup> March 2019 11:30 HRS
7	Issue of letter of award to the Selected Bidder	To be confirmed on the Day of Financial Bid Opening
8	Submission of Performance Guarantee by Selected Bidder	Within 10 days of issuance of letter of award
9	Signing of Agreement	To Be Confirmed on submission of Performance Guarantee
10	Validity of Bids	6 Months from bid due date

## 15. QUERIES FROM BIDDERS

The Bidders may request clarifications about this RFP document, only in writing, by sending an email to [tenders.nce@the-aiff.com](mailto:tenders.nce@the-aiff.com). The subject line for the email should be specified as “QUERY REGARDING RFP FOR UNDERGROUND WATER TANK WORK”. No query received after 07<sup>th</sup> March 2019 will be entertained or responded to by the Authority.

## 16. VALIDITY AND MODIFICATION OF PROPOSAL

- 16.1 The Bidder should quote the Bid price in Indian Rupees only.
- 16.2 If any Bidder does not qualify in pre-qualification and technical evaluation, the Financial Proposals shall not be opened of the said Bidder.
- 16.3 The Bids shall be valid for a period of 6 months from the date of opening of the Bids. A Bid valid for a shorter period may be rejected as nonresponsive. On completion of the validity period, unless the Bidder withdraws the Bid/ proposal in writing, it will be deemed to be valid until such time that the Bidder formally (in writing) withdraws the same.
- 16.4 In exceptional circumstances, at its discretion, the Authority may solicit the Bidder's consent for an extension of the validity period. The request and the responses thereto shall be made in writing via email.

- 16.5 The Bidder may modify, substitute, or withdraw its Bid after submission, if written notice of the modification, substitution, or withdrawal is received by the Authority prior to Bid Due Date. No Bid shall be modified, substituted, or withdrawn by the Bidder on or after the Bid Due Date.
- 16.6 The modification, substitution, or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with section 6 instruction to the bidders, with the envelopes being additionally marked “MODIFICATION”, “SUBSTITUTION” or “WITHDRAWAL”, as appropriate.

## **17. EVALUATION OF BIDS**

- 17.1 The bids will be evaluated in two parts:

### **17.1.1 Technical Evaluation**

For the evaluation of the Bids, the envelope labelled technical evaluation will be opened first and the documents submitted will be duly verified by the technical committee of the Authority. The technical bid opening will take place as per the details provided in the Bid schedule. The Bidders should make sure that the technical bids are submitted as per the checklist provided at Annexure A.

The Bidders, if they wish to, can attend the technical bid opening at their own cost. In case they are attending, they need to notify the Authority about the same 24 Hours in advance.

### **17.1.2 Financial Evaluation**

Financial bids of only the Bidders who fulfil all the technical evaluation criteria will be opened. The financial bids should be submitted as per the BOQ in Annexure B.

The evaluation of the Financial Bids will be done by the finance committee appointed by the Authority. The committee, during the time of evaluation, may seek clarification from the Bidder(s) on the amount quoted in the Bid. In case two Bidders have the same financial offer, preference will be given to the Bidder with higher turnover.

## **18. CORRECTION OF ERROR**

- 18.1 Bidders are advised to exercise adequate care in quoting the prices. No excuse for corrections in the quoted figures will be entertained after the commercial proposals are received.

- 18.2 Arithmetic errors in proposals will be corrected as follows: In case of discrepancy between the amounts mentioned in figures and in words, the amount in words shall govern. The amount stated in the Bid, adjusted in accordance with the above procedure, shall be considered as binding, unless it causes the overall Bid price to rise, in which case the Bid price shall govern.

## **19. PERFORMANCE SECURITY**

- 19.1 Upon selection of the Selected Bidder(s), the Authority will send a letter of award to the Selected Bidder. After receiving the letter of award, the Selected Bidder will be required to submit performance security amounting to 5% of the contract value within 10 days of issue of letter of award. In case of any delay beyond the same a penalty of Rs. 500/- day will be levied on the contract value. The performance security will be submitted as per the format provided in Annexure C. The performance guarantee should be valid for 180 days after completion of the required works.
- 19.2 All incidental charges whatsoever such as premium, commission, etc. with respect to the Performance security shall be borne by the Bidder.
- 19.3 Failure to comply with the requirements of Scope of Work specified in this RFP, as per the judgment of the Authority, shall constitute sufficient grounds for the forfeiture of the Performance Security.
- 19.4 The “Performance Security” shall be released after completion of the contract in all respects and provided further that there is no breach of the contract on the part of the Bidder.
- 19.5 No interest or cost will be paid on the Performance Security by the Authority.

## **20. AWARD OF CONTRACT**

The Authority will award the contract to the Selected Bidder whose bid has been determined to be technically responsive and has been determined as the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily and the Bidder has successfully submitted the performance guarantee. Upon successfully receiving the performance security from the Selected Bidder, the Selected Bidder and the Authority will enter into an agreement as per Annexure E, subject to completion of all necessary formalities enumerated in the RFP and approval by the competent authority.

## **21. TERMS OF PAYMENT**

The payment will be disbursed in the following manner:

- 21.1 The payments will be made as per the payment schedule and certified payment certificates mentioned in this document. The contractor will need to submit an invoice in hard copy to the Authority. Upon verification of the invoice by the Authority, the payment will be released within 30 days of certification of the invoice.
- 21.2 No adjustment of the price quoted in the Financial Bid shall be made because of any variations in costs of labour and materials, currency exchange fluctuations with international currency or any other cost component affecting the total cost in fulfilling the obligations under the contract.
- 21.3 The prices, once offered, must remain fixed and must not be subject to escalation for any reason whatsoever within the period of the validity of the Bid and the contract. An invoice submitted with an adjustable price quotation or conditional proposal may be rejected as non-responsive.
- 21.4 In case the Authority is unable to provide access to the site as stated in the project timelines section of this document, the payments will be made on pro-rata basis.
- 21.5 The Authority reserves the right to ask the Bidder to submit proof of payment against any of the taxes, duties, levies indicated within specified time frames.

## **22. TERMS & CONDITIONS**

- 22.1 The information contained in this RFP or subsequently provided to the Bidders in writing by the Authority is provided to Bidders on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is or may be provided.
- 22.2 This RFP is not an agreement and is neither an offer nor invitation by the Authority to the prospective Bidders. The purpose of this RFP is to provide interested parties with information that may be useful to them in the formulation of their Bids pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by the Authority in relation to the Services. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This RFP may not be appropriate for all persons, and it is not possible for the Authority to consider the objectives, expertise and needs of each party who reads or uses this RFP. The assumptions, assessments, statements and information contained in this RFP, may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions,

assessments and information contained in this RFP and obtain independent advice from appropriate sources at its own cost.

- 22.3 Information provided in this RFP to the Bidders is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Authority accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.
- 22.4 The Authority makes no representation or warranty and shall have no liability to any person including any Bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the RFP and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP or arising in any way in this Selection Process.
- 22.5 The Authority also accepts no liability of any nature whether resulting from negligence or otherwise, howsoever caused, arising from reliance of any Bidder upon the statements contained in this RFP.
- 22.6 The issue of this RFP does not imply that the Authority is bound to select a Bidder or to appoint the Selected Bidder for the Services and the Authority reserves the right to reject all or any of the Bids without assigning any reasons whatsoever.
- 22.7 The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Authority or any other costs incurred about or relating to its Bid. All such costs and expenses will remain with the Bidder and the Authority shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid, regardless of the conduct or outcome of the Selection Process.

- 22.8 By acceptance of this document, the recipient agrees that any information herewith will be superseded by any subsequent written information on the same subject made available to the recipient by the Authority.
- 22.9 It should be noted that entities which are controlled or owned, fully or in part, by the same individual or entity may not submit separate bids under this RFP, either as separate Bidders or as part of the same consortium.
- 22.10 The contractor shall ensure the construction of the required works, in accordance with the provisions of this RFP and the Agreement.
- 22.11 The Bidder shall submit its Bid in the form and manner specified in this RFP properly labelled. The Technical Bid shall be submitted in the form in Annexure-A and the Financial Proposal shall be submitted in the form at Annexure B. In case of discrepancy between the label and the documents in the envelope the bid will be out rightly rejected by the Authority. Upon selection, the Bidder shall be required to enter an agreement with the Authority as provided at Annexure E .
- 22.12 The Bidder must ensure that all its relevant employees, officers, affiliates, advisors and subcontractors, permanently treat as confidential any data gathered which may pertain to, or be incidental to, this RFP, irrespective of whether the Bidder is subsequently awarded the Agreement. The undue use by any Bidder of confidential information related to the process may result in rejection of its bid.
- 22.13 The Bidder(s) shall not have a conflict of interest that may affect the Selection Process or the award of Services Agreement hereunder (the “Conflict of Interest”). Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, the Authority shall forfeit and appropriate the Bid Security as mutually agreed genuine pre-estimated compensation and damages payable to the Authority for, inter alia, the time, cost and effort of the Authority including consideration of such Bidder’s Proposal, without prejudice to any other right or remedy that may be available to the Authority hereunder or otherwise.
- 22.14 The Authority requires that the Bidder renders professional, objective, and impartial services and always holds the Authority’s interest paramount, avoid conflicts with other assignments or its own interests, and act without any consideration for future work. The Bidder shall not accept or

engage in any assignment that would conflict with its prior or current obligations to other clients, or that may place it in a position of not being able to carry out the assignment in the best interests of the Authority.

22.15 The Bidder(s) are encouraged to submit their respective bids after visiting the mentioned site to familiarize themselves with the conditions, location, surroundings, climate, working environment, Applicable Laws and regulations or any other matter considered relevant by them. An intimation to the Authority needs to be given 48 hours in advance. No Bidder will be allowed to visit the site apart from the dates mentioned in the bid schedule.

22.16 Notwithstanding anything contained in this RFP, the Authority reserves the right to accept or reject any bid and to annul the Selection Process and reject all Proposals, at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons thereof.

22.17 The Authority may, in its sole discretion, extend the Bid Due Date.

22.18 The Authority reserves the right to verify all statements, information and documents, submitted by the Bidder in response to the RFP. Any such verification or the lack of such verification by the Authority to undertake such verification shall not relieve the Bidder of its obligations or liabilities hereunder nor will it affect any rights of the Authority thereunder.

22.19 The Bidders shall submit the Proposal in bound form with all pages numbered serially and by giving an index of submissions. Each page of the submission shall be initialled by the Authorised Representative of the Bidder as per the terms of the RFP. In case the proposal is submitted on the document downloaded from Official Website, the Bidder shall be responsible for its accuracy and correctness as per the version uploaded by the Authority and shall ensure that there are no changes caused in the content of the downloaded document. In case of any discrepancy between the downloaded or photocopied version of the RFP and the original RFP issued by the Authority, the latter shall prevail.

22.20 The rate quoted shall be firm throughout the period of performance of the assignment and discharge of all obligations of the Selected Bidder under the Agreement.

- 22.21 The Selected Bidder may, if necessary, be invited for negotiations. The negotiations shall generally may not be for reducing the price of the Bid, but will be for re-confirming the obligations of the selected bidder under this RFP. Issues such as understanding of the RFP and the way Services are to be provided shall be discussed during negotiations. In case the Selected Bidder fails to reconfirm its commitment, the Authority reserves the right to designate the next lowest Bidder as the Selected Bidder and invite it for negotiations.
- 22.22 The Selected Bidder shall, subject to the provisions of the Agreement, indemnify the Authority for an amount not exceeding the value of the Agreement for any direct loss or damage that is caused due to any deficiency in Services and for any liability arising because non-compliance with Applicable Laws.
- 22.23 The Selected Bidder shall commence the Services as per the project timelines stated in this document. In case of any delays in commencement of services, the Authority will inform the Selected Bidder in writing.
- 22.24 The Selected Bidder would need to provide details of the staff that will be deployed at the site and make appropriate identification cards within 15 days from commencement of works . Any delay post that will be liable to a deduction of Rs 1,000/- per day.
- 22.25 All documents and other information provided by the Authority or submitted by a Bidder to the Authority shall remain or become the property of the Authority. Bidders are to treat all information as strictly confidential. The Authority will not return any Bid or any information related thereto. All information collected, analysed, processed or in whatever manner provided by the Bidder to the Authority in relation to the assignment shall be the property of the Authority.
- 22.26 The Selection Process and the agreement for the work shall be governed by, and construed in accordance with, the laws of India and the courts in the state in which the Authority has its headquarters shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or about the Selection Process and the works that will be carried out thereafter.
- 22.27 The Authority reserves the right to make inquiries with any of the clients listed by the Bidders in their previous experience record.



22.28 The Authority may, by written notice of suspension to the contractor, suspend all payments to the contractor hereunder if the contractor fails to perform any of its obligations under the Contract, including the carrying out of the Services, provided that such notice of suspension (i) shall specify the nature of the failure, and (ii) shall allow the contractor to remedy such failure, if capable of being remedied, within a period not exceeding thirty (30) days after receipt by the Bidder of such notice of suspension.

22.29 During the period of work at the site, the Selected Bidder will take utmost care to the fact that no damage is caused to the property due to its work. In the event of any case of damage is brought to the notice of the Authority by the relevant/owning/governing party, the Selected Bidder will be responsible to take care of all the costs arising due to the damage caused.

22.30 During a Dispute, each party must continue to perform its obligations under this Agreement. In case a dispute arises between the parties regarding any matter under the contract, either Party of the contract may send a written Notice of Dispute to the other party. The Party receiving the Notice of Dispute will consider the Notice and respond to it in writing within 72 hours after receipt. If that party fails to respond within 72 hours, or the dispute cannot be amicably settled within 15 days following the response of that party the matter will go into arbitration. However, in all cases both the Authority as well as the Selected Bidder(s) will under all circumstances look for an amicable settlement for disputes.

22.31 The bidder and/or contractor shall not at any time use All India Football Federation (AIFF) or FIFA or AFC trademark(s) or trade name(s) in any advertising or publicity without the approval of the authority. If the bidder and/or contractor is found violating this norm it will be considered an IP right violation.

22.32 The Bidder/Contractor shall at all times adhere to the regulations of FIFA, AFC and AIFF for the duration of the project

22.33 The contractor will be responsible for welfare of its deployed staff and ensuring that all the equipment's being used are in perfect working conditions. The Authority will not be responsible for any of them.

## **23. FORCE MAJEURE**

- 23.1 For the purposes of this document, “Force Majeure” means an event which is beyond the reasonable control of the Authority, is not foreseeable, is unavoidable and not brought about by or at the instance of the Authority claiming to be affected by such events and which has caused the non- performance or delay in performance, and which makes Authority’s performance of its obligations here under impossible or so impractical as reasonably to be considered impossible in the circumstances, and includes, but is not limited to, war, riots, civil disorder, earthquake, fire, explosion, storm, flood, quarantine or other extreme adverse weather conditions, strikes, lockouts or other industrial action (except where such strikes, lockouts or other industrial action are within the power of the Authority invoking Force Majeure to prevent), confiscation or any other action by Government agencies.
- 23.2 Force Majeure shall not include: (i) any event which is caused by the negligence or intentional action of the Bidder or Bidder’s agents or employees, nor (ii) any event which a diligent Bidder could reasonably have been expected both to consider at the time of the conclusion of this Contract, and avoid or overcome in the carrying out of its obligations hereunder.
- 23.3 Force Majeure shall not include insufficiency of funds or inability to make any payment required hereunder.
- 23.4 The Selected Bidder affected by an event of Force Majeure shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall take all reasonable measures to minimize the consequences of any event of Force Majeure.
- 23.5 The Selected Bidder/Authority affected by an event of Force Majeure shall notify the respective other concerned party of such event as soon as possible, and in any case not later than seven (7) days following the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give written notice of the restoration of normal conditions as soon as possible.
- 23.6 Any period within which a Selected Bidder shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Bidder was unable to perform such action as a result of Force Majeure.
- 23.7 During the period of their inability to perform the Services because of an event of Force Majeure, the Selected Bidder, upon instructions by the Authority, shall either: demobilize; or continue

with the Services to the extent possible, in which case the Selected Bidder shall continue to be paid proportionately and on pro rata basis, under the terms of the Contract.

23.8 In the case of dispute in agreement between the Parties as to the existence or extent of Force Majeure, the matter shall be settled as per conditions mentioned in this document.

## **24. FRAUD AND CORRUPT PRACTICES**

24.1 For the purposes of this section, the following terms shall have the meaning hereinafter respectively assigned to them:

- (a) **“corrupt practice”** means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of the Authority who is or has been associated in any manner, directly or indirectly with the Selection Process or the LOA or has dealt with matters concerning the Agreement or arising therefrom, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of the Authority, shall be deemed to constitute influencing the actions of a person connected with the Selection Process); or (ii) save as provided herein, engaging in any manner whatsoever, whether during the Selection Process or after the issue of the LOA or after the execution of the Agreement, as the case may be, any person in respect of any matter relating to the Services or the LOA or the Agreement, who at any time has been or is an employee or service provider of the Authority in relation to any matter concerning the Services;
- (b) **“fraudulent practice”** means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process;
- (c) **“coercive practice”** means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person’s participation or action in the Selection Process;
- (d) **“undesirable practice”** means (i) establishing contact with any person connected with or employed or engaged by the Authority with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or (ii) having a Conflict of Interest; and
- (e) **“restrictive practice”** means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Selection Process.

- 24.2 The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this **RFP**, the Authority shall reject a Bid without being liable in any manner whatsoever to the Bidder, if it determines that the Bidder has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice (collectively the “**Prohibited Practices**”) in the Selection Process. In such an event, the Authority shall, without prejudice to its any other rights or remedies, forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to the Authority for, *inter alia*, time, cost and effort of the Authority, in regard to the **RFP**, including consideration and evaluation of such Bidder’s proposal.
- 24.3 Without prejudice to the rights of the Authority under Clause 25.2 hereinabove and the rights and remedies which the Authority may have under the **LOA** or the Contract, if a Bidder or contractor, as the case may be, is found by the Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the issue of the **LOA** or the execution of the agreement, such Bidder or contractor may be blacklisted by the Authority as well as by FIFA and AFC and may not be eligible to participate in any tender or **RFP** issued by the Authority and/or by FIFA and/or AFC during a period of 4 (four) years from the date such Bidder or contractor is found by the Authority to have directly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as the case may be.

## **25. BID PRICES**

- 25.1 The bidder shall fill rates in ‘Rate Column of BOQ Sheet’ in figures only for all items of the works described in the Bill of Quantities. Items for which no rate is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. Corrections if any, shall made by crossing out, initialling, Dating and rewriting.
- 25.2 All duties, taxes, GST and other levies payable by the contractor under, or for any other cause shall be included in the rates, prices and total bid Price submitted by the Bidder.
- 25.3 The rates and prices quoted by the bidder shall be fixed for the duration of the Contract and shall not be subject to adjustment of any account.

## **26. MISCELLANEOUS**

- 26.1 The Selection Process shall be governed by, and construed in accordance with, the laws of India and the courts in Delhi shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or in connection with the Selection Process.
- 26.2 The Authority, in its sole discretion and without incurring any obligation or liability, reserves the right, at any time, to:
- (a) suspend and/or cancel the Selection Process and/or amend and/or supplement the Selection Process or modify the dates or other terms and conditions relating thereto;
  - (b) consult with any Bidder in order to receive clarification or further information;
  - (c) retain any information and/or evidence submitted to the Authority by, on behalf of and/or in relation to any Bidder; and/or
  - (d) independently verify, disqualify, reject and/or accept any and all submissions or other information and/or evidence submitted by or on behalf of any Bidder.
- 26.3 It shall be deemed that by submitting the proposal, the Bidder agrees and releases the Authority, its employees, agents and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/or performance of any obligations hereunder, pursuant hereto and/or in connection herewith and waives any and all rights and/or claims it may have in this respect, whether actual or contingent, whether present or future.
- 26.4 All documents and other information supplied by the Authority or submitted by a Bidder shall remain or become, as the case may be, the property of the Authority. The Authority will not return any submissions made hereunder. Bidders are required to treat all such documents and information as strictly confidential.

The Authority reserves the right to make inquiries with any of the clients listed by the Bidders in their previous experience record.

## ANNEXURE A – TECHNICAL SUBMISSION CHECKLIST

The checklist to be provided as first page of the Technical Bid:

Pre-qualification Checklist:

S.No.	Documents	Attached (Yes/No)
1	Experience – Financial & Physical	
2	Proof of Annual Turnover	
3	Certificate of Registration	
4	Details of consortium if any	
5	No Cross ownership - Self attested copy	
6	Demand Draft for EMD	
7	No Pending legal cases - Self attested copy	
8	Non-Blacklisting by Govt Authority - Self attested copy	
9	Construction Plan	

## **ANNEXURE B – BILL OF QUANTITIES**

**Project :** The Construction of Underground Water Tank Work (Phase 1) for National Center of Excellence in Football, At Rajarhat, Kolkata, WB, India.

**SUMMARY OF COST**

SL NO.	DESCRIPTION	AMOUNT (RS.)
A	UG TANK	₹ -
B	PLUMBING WORK	₹ -
C	ELECTRICAL WORK	₹ -
		₹ -



**BILL OF QUANTITIES FOR UNDERGROUND TANK**

SL No	DESCRIPTION OF WORKS	UNIT	QTY	RATE	AMOUNT
1	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (not exceeding 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed.				
	All kinds of soil	Cum	2327.00		₹ -
2	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead upto 50 meter and lift upto 1.5 meter.	Cum	414.00		₹ -
3	Supplying & filling with excavated earth earth brought from outside	Cum	952.00		₹ -
4	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :1:4:8 (1 Cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size)	Cum	75.00		₹ -
5	Boring, providing and installing bored cast-insitu reinforced cement concrete pile of specified diameter and length below the pile cap M 25 in cement concrete, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with, bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. by crawler mounted, telescopic boom hydraulic piling rig all complete, including removal of excavated earth with all lifts and leads (Length of pile for payment shall be measured upto bottom of pile cap).				
	750 mm dia. Piles, approximately 20.0 M long with cut off level as mentioned in drawings.	RM	420.00		₹ -
6	Vertical load testing of piles in accordance with IS 2911 (Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per				

	specification & the direction of Engineer in-charge.				
	Single pile above 50 tonne and upto 100 tonne capacity				
6a	Initial test.	Per Test	2.00		₹ -
6b	Routine test	Per Test	1.00		₹ -
7	Cyclic vertical load testing of pile in accordance with IS Code of practice IS: 2911(part IV) including preparation of pile head etc for.				
	Single pile.				
	Above 50 tonne and upto 100 tonne capacity pile.	Per Test	1.00		₹ -
8	Lateral load testing of single pile in accordance with IS Code of practice IS : 2911 (Part IV) for determining safe allowable lateral load on pile :				
	Above 50 tonne and upto 100 tonne capacity pile.	Per Test	1.00		₹ -
9	Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge. (Note :- Cement content considered in this item is @ 330 kg/cum. Excess/ less cement used as per design mix is payable/recoverable separately).				
	All works upto plinth level	cum	625.00		₹ -
10	Centering and shuttering including strutting, propping etc and removal of form for all heights:				
10a	Foundations, footings, bases of columns etc for mass concrete	sqm	134.00		₹ -

10b	Suspended floors, roofs, landings, balconies and access platform	sqm	368.00		₹ -
10c	Lintels, beams, plinth beams, girders, bressumers and cantilevers	sqm	608.00		₹ -
10d	Columns, Pillars, Piers, Abutments, Posts and Struts	sqm	118.00		₹ -
10e	Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.	sqm	1081.00		₹ -
11	Providing and applying Integral crystalline slurry of hydrophillic in nature for waterproofing treatment to RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservoirs, sewage & water treatment plant, tunnels/subway and bridge deck etc., prepared by mixing in the ratio of 5:2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3:1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of sythetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e. by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks upto a width of 0.50 mm. The work shall be carried out all complete as per specification and the direction of the Engineer-in-Charge. The product performance shall carry guarantee for 10 years against any leakage.				
11a	For vertical surface two coats @ 0.70 kg sqm per coat	sqm	715.00		₹ -
11b	For horizontal surface one coat @ 1.10 kg per sqm	sqm	368.00		₹ -
12	Steel reinforcement work for RCC including straightening, cutting, bending, placing in position and binding all complete upto plinth level and above plinth level.- Piling				
	Thermo mechanically Treated bars of grade Fe 500 or more.	Kgs	109326.00		₹ -
	<b>TOTAL COST</b>				<b>₹ 0.00</b>

**BILL OF QUANTITIES FOR PHE- PUMPS & EQUIPMENTS**

SL No	DESCRIPTION OF ITEMS	UNIT	QTY	RATE	AMOUNT
<b>A</b>	<b>PUMPS AND EQUIPMENTS</b>				
A.1	<b>(Hydropneumatic Pumping System With Variable Frequency Drive)</b>				
	Supply, Installation, Testing and Commissioning of compact packaged type skid mounted, self contained variable frequency drive hydropneumatic system complete as per directions of the engineer-in-chief & as per following specification:-				
	(i) In- line vertical multistage centrifugal clear water pump set with SS304 casing, SS-304 impeller with SS-316/SS431 shaft ,CI base with CED coating complete directly coupled with TEFC induction motor of class "F" insulation & efficiency class IE-2, 2900rpm, suitable for operation on 415 Volts $\pm 10\%$ , 3 phase, 50 Hz A.C. supply complete.				
	(ii) The entire system shall be mounted on a common base frame i/c common suction and common delivery of MS Ced coating pipe headers with flanges, interconnecting piping with all required Control Valves, Non-return valves, pressure guage with isolation cock etc. and all required accessories.				
	(iii) Pressure vessel of non corrosive MS composite construction lined with NSF and/or FDA listed material, like high density polyethylene with fully replaceable polyurethane. Air cell burst pressure of minimum of 3 times the vessel operating pressure and <b>prototype</b> cycle tested for <b>80,000</b> cycles with charging connections to discharge pipe line with necessary flanges, gaskets, isolating valve, nuts/ bolts etc. with suitable foundation bolts & other accessories, complete.				
	(iv) Panel mounted microprocessor multi pump controller with large graphical display and Flying variable frequency drive (VFD) mounted inside a panel complete with pressure sensor transmitter. The graphical display capable to show number of pumps running & also communicate with other controllers following with open protocol through RS485 port. System should be capable to compensate for frictional losses at lower flows. All alarms should be displayed in the controller. The panel should also have provision for manual / automatic alternate (cyclic) operation of pumps, ON/OFF switch, complete.				

	(v) Necessary foundationing bolts, vibration elimination pads and other accessories complete as required.				
	<b>FOR Irrigation</b>				
	Duty of each pump suitable for:-				
a)	No. of Pumps : 3nos. (2 W + 1 S)				
b)	Capacity : 400 LPM (25 m <sup>3</sup> /hr of Each Pump)				
c)	Head : 85 Meters				
d)	Air Vessel :100 ltr tank				
	Note:-1 set consists of 3 nos. of pumps (2Working + 1Standby)	Set	1		₹ -
	<b>TOTAL COST</b>				<b>₹ 0.00</b>

**BILL OF QUANTITIES FOR PHE-INTERNAL WATER SUPPLY**

SL No	DESCRIPTION OF ITEMS	UNIT	QTY	RATE	AMOUNT
<b>A 1</b>	<b>Installation for Internal water supply</b>				
<b>A 1.1</b>	Supply, Installation, testing and commissioning of the following <b>CPVC pressure Pipes as per ASTM D 2846 (SDR 11 below 2" and schedule 80 for 2" and above)</b> .Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. The pipes & fittings shall be <b>tested to a pressure of 10 Kg/Sq.cm.</b> Fixing at wall/ ceiling level supported by clamps, hangers etc. as per specification and Cutting hole in wall / floor / slab and making good the same <b>with 1:1 Geru mixed cement mortar complete</b> as required. PVC / G.I. heavy class pipe sleeve of larger diameter shall be provided wherever the pipes crossing the walls/floor slab and sealing the sleeves as per consultants requirement, jointing & making proper connections.				
	<b>INTERNAL (CONCEALED IN WALL FOR HOT AND COLD WATER SUPPLY ONLY)</b>				
<b>a</b>	40 mm NB	RM	10		₹ -
<b>b</b>	32 mm NB	RM	25		₹ -
<b>c</b>	25mm NB	RM	50		₹ -
<b>d</b>	20mm NB	RM	65		₹ -
<b>e</b>	15mm NB	RM	65		₹ -
<b>A 1.2</b>	Supply, Installation, testing and commissioning of the following <b>CPVC pressure Pipes as per ASTM D 2846 (SDR 11 below 2" and schedule 80 for 2" and above)</b> .Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. The pipes & fittings shall be <b>tested to a pressure of 15 Kg/Sq.cm.</b> Fixing at wall/ ceiling level supported by clamps, hangers etc. as per specification and Cutting hole in wall / floor / slab and making good the same <b>with 1:1 Geru mixed cement mortar complete</b> as required. PVC / G.I. heavy class pipe sleeve of larger diameter shall be provided wherever the pipes crossing the walls/floor slab and sealing the sleeves as per consultants requirement, jointing & making proper connections				
<b>a</b>	100 mm NB	RM	150		₹ -

<b>b</b>	80 mm NB	RM	150		₹ -
<b>c</b>	65 mm NB	RM	55		₹ -
<b>A 1.3</b>	Providing and fixing Pressure Reducing valves of approved make as indicated by engineer-in-charge. Including two valve ,union,taflon tap etc.Contractr to set pressure as per instructions from consultant during execution. <b>MOC - Brass</b>				
<b>a</b>	50 mm NB	Nos	QRO		
<b>b</b>	40 mm NB	Nos	2		₹ -
<b>c</b>	32 mm NB	Nos	2		₹ -
<b>A 1.4</b>	Providing, fixing, jointing & testing of <b>Auto Air vent valve</b> for cold water supply uptakes / risers, suitable for pressure not less than 10 Kg/Sq.cm. <b>MOC-Brass</b>				
<b>a</b>	20 mm NB	Nos	4		₹ -
<b>A 1.5</b>	Providing, fixing, testing and commissioning of Ball Valves of brass body nickel plated with stainless steel ball, lever operated ZOLOTO make) <b>PN 20</b>				
<b>a</b>	100 mm NB	Nos	2		₹ -
<b>b</b>	80 mm NB	Nos	2		₹ -
<b>c</b>	65 mm NB	Nos	1		₹ -
<b>d</b>	50 mm NB	Nos	1		₹ -
<b>e</b>	40 mm NB	Nos	2		₹ -
<b>f</b>	32mm NB	Nos	2		₹ -
<b>g</b>	25mm NB	Nos	2		₹ -
<b>h</b>	20mm NB	Nos	2		₹ -
	<b>TOTAL COST</b>				<b>₹ 0.00</b>

**BILL OF QUANTITIES FOR ELECTRICAL WORK**

SL No	DESCRIPTION OF ITEMS	UNIT	QTY	RATE	AMOUNT
1	<b>LT DISTRIBUTION BOARDS</b>				
	Design, fabrication, assembling, wiring, supply, installation, testing & commissioning of Main distribution boards/ sub distribution boards/ final distribution boards fabricated out of 14 gauge CRCA sheet steel in cubicle formation with reinforcement of suitable size angle iron, channels, T irons, flats wherever necessary for large distribution boards/panels, where as 16 gauge CRCA sheet steel for final distribution boards. Cable gland plates shall be provided at "top & bottom" both.				
	The boards shall be treated with all anticorrosive process before painting as per standards with 2 coats of red oxide primer & final approved shade of powder coating. 2 nos. earthing terminals shall be provided for 3 phase distribution boards. The boards shall be suitable for 415 V, 3 phase, 4 wire, 50 Hz supply system. Lifting hooks shall be provided in case of large boards. Boards shall be fabricated in easily transportable sections & length, height, depth etc to match with site conditions. An approval shall be taken for each panel before final manufacture.				
	Galvanised hardwares with zinc passivation shall be used in fabrication of boards. Follow the detailed specifications at the time of fabrication.				
1.1a	<b>PANEL</b>	Set	1.00		₹ -
	Incomer -				
	63A FP MCCB, 25KA - 1set				
	Bus :63A AL BUS FP				
	With VI , KWH Meter , indicating lamps,KVA,Frequency,PF, phase angle and LED Cluster Indicating lamps, ELR WITH CBCT per incomer and control MCBs- 3 Nos and 60/5 CTs - 3nos -01 Set & all other required accessories				
	Outgoings				
	63/40A FP MCB - 5 nos				
	Star Delta Starter for Pump Sets including Over load Relay ,Single Phase preventer,on/off push Button, -4 Sets.				
	Note:				
	All MCCB will have rotary handle in panels				



	All MCCB should have 100% Ics=Icu				
	All MCCB should have adjustable thermal release				
	All MCB will be rated for 10KA breaking capacity & C'curve characteristics				
<b>2</b>	<b>CABLES &amp; SUB MAINS</b>				
2.1	Supply, Testing & Laying of aluminium / copper armoured FR PVC/XLPE Insulated 1.1KV grade cables fixed to walls, ceilings, on trays or laid in ready-made trench as per standard practices				
a	4 Core 25 sq. mm. A2XFY	mtr	180.00		₹ -
b	3Core 6 sq. mm 2XFY	mtr	200.00		₹ -
2.2	Cable end termination of above armoured cables with Heavy duty Lugs & Brass cable glands. Including cost of all crimping lugs and compression glands, cable sockets insulation tape, sealing compound etc:				
a	4 Core 25 sq. mm. A2XFY	Nos.	2.00		₹ -
b	3Core 6 sq. mm 2XFY	Nos.	18.00		₹ -
	<b>TOTAL</b>				<b>₹ 0.00</b>

## ANNEXURE C – BANK GURANTEE FORMAT

### Bank Guarantee for Performance Security

To

**INSERT DETAILS OF AUTHORITY**

.....

.....

.....

In consideration of ..... (hereinafter referred as the “**Authority**”, which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) awarding to ....., having its office at ..... (hereinafter referred as the “**Contractor**” which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), vide the Authority’s Agreement no. .... dated ..... valued at Rs. .... (Rupees .....), (hereinafter referred to as the “**Agreement**”) the assignment for providing construction services, and the Contractor having agreed to furnish a Bank Guarantee amounting to Rs. .... (Rupees ..... ) to the Authority for performance of the said Agreement.

1. We, ..... (hereinafter referred to as the “**Bank**”) at the request of the Contractor do hereby undertake to pay to the Authority an amount not exceeding Rs. .... (Rupees ..... ) against any loss or damage caused to or suffered or would be caused to or suffered by the Authority by reason of any breach by the said Contractor of any of the terms or conditions contained in the said Agreement.
-

2. We, ..... (indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on a demand from the Authority stating that the amount/claimed is due by way of loss or damage caused to or would be caused to or suffered by the Authority by reason of breach by the said Contractor of any of the terms or conditions contained in the said Agreement or by reason of the Contractor's failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs. .... (Rupees .....).
3. We, ..... (indicate the name of the Bank) do hereby undertake to pay to the Authority any money so demanded notwithstanding any dispute or disputes raised by the Contractor in any suit or proceeding pending before any court or tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor shall have no claim against us for making such payment.
4. We, ..... (indicate the name of Bank) further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be required for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Authority under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till the Authority certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee. Unless a demand or claim under this Guarantee is made on us in writing on or before a period of one year from the date of expiry of this Guarantee, we shall be discharged from all liability under this Guarantee thereafter.
5. We, ..... (indicate the name of Bank) further agree with the Authority that the Authority shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the

Authority against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor or for any forbearance, act or omission on the part of the Authority or any indulgence by the Authority to the said Contractor or any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so relieving us.

6. This Guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.
7. We, ..... (indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Authority in writing.
8. Notwithstanding anything contained herein above, the Bank's liability under this Guarantee shall be restricted to Rs. .... crore (Rupees ..... ) only and shall remain valid upto.....and the Bank is liable to pay the Guaranteed amount or any part thereof under this Bank Guarantee only if the Authority serve upon the bank a written claim duly received by an authorized official of the bank or demand on or before .....

For .....

Name of Bank:

Seal of the Bank:

Dated, the .....day of ....., 20.....

(Signature, name and designation of the authorised signatory)

NOTES:

- (i) The Bank Guarantee should contain the name, designation and code number of the officer(s) signing the Guarantee.
- (ii) The address, telephone no. and other details of the Head Office of the Bank as well as of issuing Branch should be mentioned on the covering letter of issuing Branch.

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## CIVIL WORKS

### MATERIAL & WORKMANSHIP

#### I. GENERAL

##### **Materials and Workmanship Specifications**

The specifications listed in this Part of the Employer's Requirements may be modified by the Tenderer at the time of submitting the Tender to suit the requirements of the Tenderer's design. Any such modifications shall be submitted with the Tender.

When considering any changes, it shall be noted that the specifications given in this Part shall represent the minimum required standards for material and workmanship to be followed in the construction of the works.

Where there is any discrepancy between this Part 4 of Employer's Requirements and either Part 2 or Part 3 of the Employer's Requirements, the requirements of Part 2 and Part 3 shall take precedence.

##### **Standard of Works**

The whole of the materials employed in connection with the permanent work of the Contract shall be new and of the best quality and description of their respective kinds and, except where otherwise called for, shall be of the highest grade described in Indian or other relevant Standards for such materials and shall be tested as prescribed therein; similarly, the workmanship in every case shall be of the best character, and the whole shall be subject to the approval of the Engineer.

##### **Standards & Code**

Any Indian, British, American or other International Standard or Code of Practice referred to in the documents relating to the Contract shall be held to be the latest edition published at the time of Tender. Where alternative Standards or Codes of Practice have been published in metric units, these shall take precedence over the publication in imperial units.

##### **Equivalent Standards**

- a) Subject to the approval of the Engineer, materials may be supplied conforming with other recognised Standards which correspond closely with the relevant Specified Standards.
- b) In the event that the Contractor proposes use of an alternative Standard he shall provide to the Engineer a copy of the Standard proposed together with an authoritative translation into English where the original is in a language other than English.

##### **Alternative Materials & Equipment**

- a) In all cases where the name of a particular type or make of equipment or material is referred to on the Drawings or elsewhere in this Specification, this is intended to indicate only the acceptable standard.
- b) The Contractor may offer alternative materials to equipment to that specified and in all such cases the Contractor's offer shall be at least of equal quality. When alternatives are offered the Contractor shall submit to the Engineer for approval, a statement detailing the

alternative(s) and shall include full technical descriptions, drawings, specifications, test certificates etc and shall provide such full information as is required to enable the Contractor to demonstrate to the Engineer that the alternative(s) is (are) equivalent to the item specified. Any further information that the Engineer may require shall be produced by the Contractor when called for.

### **Approval of Materials & Items of Equipment**

- a) As soon as possible after the Contract has been awarded, the Contractor shall submit to the Engineer a list of suppliers from whom he proposes to purchase the materials required for the Works. Each supplier must be willing to admit the Engineer, or his representative, to his premises during ordinary working hours for the purpose of obtaining samples or inspection of the works and processes. In addition, if required by the Engineer, the Contractor shall deliver samples to the offices of the Engineer or to nominated testing laboratories or to the site of the Works. The cost of such samples shall be borne by the Contractor.
- b) The Contractor shall provide at least the following information when seeking approval of materials and items of equipment.
  - A Description of the material/item
  - Name of proposed supplier
  - Indian Standard, or other approved Standard applicable
  - Test Certificates as applicable
- c) The Contractor shall use locally produced materials in preference to imported providing they comply with the requirements of the Specification.

### **Supply of Samples**

- a) The whole cost of supplying adequate samples of any materials to be used in the Works for testing either at the Manufacturer's Works or at the site or at an independent Laboratory nominated by the Engineer, shall be deemed to be included in the rates or sums entered in the Price Schedule.
- b) Samples shall be taken at regular intervals and tested in accordance with relevant standards.

### **Material – General**

- a) Sources of supply :
- b) The sources of supply of materials shall not be changed from those approved without the written permission of the Engineer.
- c) Quality of supply :
- d) Materials subsequently supplied shall be at least equal to the approved sample in all respects.
- e) Rejected materials :
- f) Rejected materials are to be removed promptly from the Site.
- g) Copies of orders :
- h) The Contractor shall, at the Engineer's request, forward to the Engineer copies of orders for materials to be incorporated into the Works.



- i) Manufacturers instructions :
- j) All materials, goods etc., shall be used or installed in accordance with the instructions of the Manufacturer or Supplier unless otherwise specified or instructed by the Engineer.

### **Testing of Samples**

- a) At the Manufacturer's Works :
- b) The costs of testing at Manufacturer's Works of any materials to be used in the Works and the supply of "proof" or test certificates by the Manufacturer shall be deemed to be included in the rates or sums entered in the Price Schedule.
- c) At an Independent Laboratory :
- d) In addition to those tests required by the Employer's Requirements and relevant Standards, the Engineer may at any time instruct the Contractor to supply samples of materials to be used in the Works for test by an Independent Laboratory. The costs of transport to the Independent Laboratory and laboratory charges, fees of independent inspectors, etc, shall be paid for under the appropriate item in the Price Schedule, except where a sample is found not to be in accordance with the specified requirements, in which case the costs shall be borne by the Contractor.
- e) Sampling and Testing frequency:  
The sampling and test frequencies shall be as per the relevant IS codes. Where the relevant IS code does not lay down any frequency for sampling and testing, the same shall be as given in the table below or as directed by the Engineer

## **II. TECHNICAL SPECIFICATIONS FOR CIVIL & FINISHING WORKS**

### **1. TECHNICAL SPECIFICATION FOR EARTHWORK EXCAVATION**

This specification covers the general requirements of earthwork. The earthwork shall consist of all works involved in site grading, excavation, shoring, filling around foundations, filling in plinths, disposal of spoils as directed by the Engineer, and such other relevant items. The area to be excavated or filled with the excavated materials shall be clearly demarcated in the field by the Contractor.

The earthwork shall also include, where required, temporary bracing and shoring to maintain excavation etc.

All excavation work shall be inspected and approved by the Engineer before any further works in excavated areas are allowed to commence.

Excavation shall be in all kinds of soils and shall include careful removal of all materials of whatever nature, whether dry or wet, necessary for the construction work, exactly in accordance with lines, levels, grades, curves etc. shown on the drawings. It shall be done to the exact length, width, depth and profile as shown in relevant drawings or as directed by the Engineer. Bottom of excavation shall be levelled both longitudinally and transverse direction and it shall be free of loose unconsolidated material. If excavated to greater length, width or depth, the contractor shall fill such extra excavation with M-10 grade concrete at his own expense and well rammed. If permitted by the Engineer, the extra length and width shall be filled in with good excavated earth or murrom and well rammed as directed. Extra excavation shall not be measured for payment. All bottom of

excavation shall be lightly watered and thoroughly rammed before laying the next required material layer.

The contractor shall have full responsibility for the stability of the excavation.

The method of excavation, sheet piling and or other strutting system and methods shall be in every case be subject to the approval of the Engineer. The contractor shall ensure the stability and safety of the excavations and protect the sides of foundation with proper strutting system.

Any dewatering, shoring, strutting and timbering or cutting of extra width of trenches required for the work and safety of workmen and equipment shall be done by the Contractor at his expense. Water from the dewatering shall be drained off in such a way that it does not cause any damage to any property or any nuisance to others.

The Contractor shall erect and maintain during progress of work temporary fences around dangerous excavations.

Excavation material required for filling shall be stacked or dumped where indicated by the Engineer. Excavated material not required for filling, unsuitable material (what is suitable and what is unsuitable is left to the sole discretion of the Engineer) and any surplus material from the stacks or dumps retained for filling, shall be removed and spread on the site where and as directed by the Engineer or carted away from the site as directed by the Engineer. Dumping of this surplus material shall be in an orderly manner and according to the levels/grades as indicated by Engineer.

Water accumulated within excavated areas from whatever causes shall be bailed or pumped out at Contractor's expense till such time, as backfilling operations are complete.

Contractor shall take necessary measures for protection and maintenance of earthwork.

Any damage to the earth work shall be made good at Contractor's cost.

**Backfilling around foundations in pits, trenches, plinth and under floors :**

- a) All clods of earth shall be broken or removed. Material for backfilling shall generally be obtained from the spoil of excavation. But, the Engineer shall have the option, in case of shortage of good selected earth obtained from excavation, to direct the Contractor to get the filling materials from approved borrow pits within the site. The Contractor shall make necessary access roads to borrow area at his own expense and maintain the same, if such access roads do not exist.
- b) After the concrete or masonry in the foundation has fully set, the spaces around the foundation structure in pits and trenches shall be cleared of all debris, brick bats, mortar dropping etc. and filled with earth in layers not exceeding 15 cm each layer being watered, rammed and properly consolidated before the succeeding one is laid. Each layer shall be consolidated to the satisfaction of the Engineer. Back filling shall be done in such a manner as not to cause undue thrust on any part of the structures. The final surface shall be trimmed and levelled to proper profile as directed by the Engineer. Decision of the Engineer concerning proper consolidation shall be final and binding.
- c) The plinth and under floors shall be similarly filled with approved materials as described herein before in layers not exceeding 15 cm watered and consolidated with mechanical machines to the satisfaction of the Engineer. When the filling reaches finished level, the surface shall be flooded with water for atleast 24 hours, allowed to dry and then rammed and consolidated, in order to avoid any settlement at a later stage. The finished level of the filling shall be trimmed to the level specified.

**Site levelling**

Earth for area filling and levelling shall be obtained from the cut areas of work and if necessary the balance with approved good fill material from approved quarry or from any other source outside the boundary including all lifts and leads, laying in layers of 250 mm and below breaking clods, dressing to required lines, grades and levels, watering and compacting with power roller of 10 tonnes.

**Clearing site**

- a) The ground over which the cutting is to be done and the ground over which filling is to be formed shall be cleared of all trees, brushwood, loose stones, vegetation, bushes, stumps and all other objectionable materials. The holes dug up for grubbing roots etc. shall be filled with suitable excavated material and compacted. Materials obtained from clearing site shall be disposed off by burning or disposal to areas outside the boundary of the project in such a way that there is no chance of their getting mixed with materials for filling.
- b) For removal of vegetation etc. crawler mounted dozer of adequate capacity shall be used. The work will be supplemented by using manual methods wherever required. The dozer shall have ripper attachment for removal of stumps, roots, etc. All trees, stumps etc. falling within excavation and fill area shall be cut to such depth below ground level that in no case these fall within 50 cm of the sub grade bottom.

**Setting out**

After clearing the site, the area shall be set out as shown on the plans or as directed in writing. The contractor shall provide all labour, tools, tackles, instruments and materials required for setting out and establishing bench marks and grid pillars. The contractor will be responsible for maintaining bench marks, profiles, grid pillars as long as they are required. Levels and sections shall be taken by the contractor in presence of the representative of the Main contractor before the excavation/filling is started.

**Materials**

The contractor shall utilise all useful and acceptable material obtained from the cutting from anywhere within the site for filling of low areas anywhere within the site. The contractor shall obtain additional good quality material from approved quarries or from any other source. The filling material should be soil, murum or a mixture of soil, sand, murum, gravel, small boulders having laboratory dry density of at least 1.44 gm/cc. Rejected material if brought to site will be ordered to be removed at contractors cost. Any objectionable material found in the filling material shall be hand picked and removed. The contractor shall be responsible for payment of rents, compensation, fees, royalty etc. and these are deemed to be included in the rates. The Main contractor shall remain indemnified regarding any claims that may be made by private owners.

**Equipment**

Pickaxes, crowbars, phawras and pans may be used for manual work. Scrapers, dozer, graders, dumpers, shovels, trucks, trolleys etc. may be used for mechanised work. Three wheeled 10 tonne power roller or sheep foot roller may be used for compaction. Mechanically driven tankers may be used for watering.

**Construction Methods**

Before any material is laid on the ground, the same shall be cleared of all rubbish etc. When the filling is to be laid on slopes, the existing slopes shall be ploughed deeply to

give proper hold. The top layer of the ploughed surface shall be scarified and watered and compacted before any filling material is laid.

Whenever fill is to be deposited against the face of a natural slope, or sloping earthworks face including embankments, cuttings, other fills and excavations steeper than 1 vertical on 4 horizontal, such faces shall be benched as mentioned below immediately before placing the subsequent fill.

Continuous horizontal benches, each at least 300 mm wide, shall be cut into the old slope for ensuring adequate bond with the fresh filling material to be added.

However, when the existing slope against which the fresh material is to be placed is flatter than 1 vertical on 4 horizontal, the slope surface may only be ploughed or scarified instead of resorting to benching.

All permanent faces of side slopes of cut and fill formed areas shall, subsequent to any trimming operations, be reworked and sealed to the satisfaction of the Engineer by tracking a tracked vehicle considered suitable by the Engineer, on slope or any other method approved by the Engineer.

The finished side slopes of cut and fill formed areas shall be 2 to 1 (i.e. 2 horizontal to 1 vertical) slope or the slope required by the Engineer.

When the fill level is higher than the adjacent area outside the boundary of the project then the layers shall be laid in a suitable slope upto the ground level at the boundary line.

#### **Laying the filling material**

Filling material shall be placed in successive horizontal layers of 250 mm consolidated thickness or in thickness less than 250 mm if required by the Engineer extending to the complete area of filling. The extra loose stuff at the edges shall be trimmed after completion of earthwork without extra cost. When boulders, broken stones and hand materials are mixed up with the filling materials, care shall be taken to see that they are distributed evenly and uniformly into the earth and no hollows are left near them. No stone or hard material shall project above the top of any layer. Each layer of filling shall be levelled, watered, compacted and tested before the succeeding layer is placed. The surface of the filling at all times shall shed water and prevent ponding.

All clods, lumps, boulders, etc shall be broken to have a maximum size of 75 mm before filling and compaction.

#### **Protection**

The contractor shall take the necessary measures and precautions for the protection of the earthwork. Any damage to the earthwork shall be made good at the contractor's cost.

The contractor will have to make his own arrangements so that water is adequately and effectively drained and this arrangement may be left after completion of earthworks if so desired.

#### **Rolling**

The layers shall be compacted with Power driven rollers of 8 to 10 Tonnes capacity. The roller shall pass at least twice over the same area once in forward move and the second time in backward move.

#### **Finishing**

The filling shall be finished and dressed smooth and even in conformity with the alignment, levels, cross-sections and dimensions shown on the drawings with due

allowance for shrinkage. All damages caused by rain, movement of vehicles or any other reason shall be made good in the finishing operations.

The contractor shall not excavate beyond the specified levels / dimensions on the drawings.

The finished cut and fill formation shall satisfy the permitted surface tolerances of +20 mm or -25 mm.

Where the finished surfaces fall outside the above specified tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer.

Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low, the deficiency shall be corrected by scarifying the lower layer and adding fresh material and recompacting to the required density.

### **Maintenance**

The contractor shall be responsible for maintaining the earth work satisfactorily at his cost till finally accepted including making good any damages.

### **Excess excavation**

Any excess depth excavated below the specified levels shall be made good by dozing, grading and refilling with suitable material of similar characteristics to that removed and watered and compacted to achieve specified density.

### **Compaction**

Only the compaction equipment approved by the Engineer shall be employed to compact the different material types encountered during execution. Smooth wheeled, vibratory, pneumatic tyred, sheep foot or pad foot rollers etc. of suitable size and capacity as approved by the Engineer shall be used for the different types and grades of materials required to be compacted either individually or in suitable combinations.

The compaction shall be done with the help of vibratory roller of 8 to 10 tonne static weight with plain or pad foot drum or heavy pneumatic tyred roller of adequate capacity capable of achieving required compaction.

The contractor shall demonstrate the efficiency of the equipment he intends to use by carrying out compaction trials. The procedure to be adopted for these site trials shall first be submitted to the Engineer for approval.

Rollers of adequate capacity shall be used to achieve the required compaction by artificial watering and rolling. Subsequent layer shall be placed after each finished layer is approved. The level of compaction required is 90% of Standard Proctor Density for all areas except where Roads and Building works are to be provided. At such places the required compaction density of Standard Proctor shall be as given below :

Roads	:	95%
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### **Buildings**

Top Layer	:	98%
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500 mm below top layer	:	95%
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Below 500 mm	:	90%
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The top layer of filling shall be brought to the specified line, levels and grade as shown in the drawings or as directed.

## 2. TECHNICAL SPECIFICATION FOR ANTITERMITE TREATMENT

### SCOPE

This specification covers the general requirements for pre-constructional anti-termite treatment to the buildings to protect against attack by sub-terranean termites by suitable chemical treatment measures.

### GENERAL REQUIREMENTS

All the buildings shall be adequately protected against attack by subterranean termites by suitable chemical treatment measures. The work shall be carried out by a specialist pest control agency approved by the Engineer. The work to be carried out by the specialist firm shall carry a guarantee for the satisfactory performance of the treatment for a minimum period of 10 years.

The Contractor shall submit manufacturer's literature, specifications and application instructions for insecticide materials for the reference of Engineer.

The treatment shall be carried out generally in accordance with the stipulations laid down by IS 6313 - part ii (code of practice for anti-termite measures in buildings - Part II - pre-constructional chemical treatment measures) subject to the minimum requirements given in this specification.

The earth filling immediately under the stone soling (under floors) bottom and side fills of all foundations (excepting foundations) and soil along external perimeter of all buildings shall be chemically treated against termites.

The Contractor shall furnish all skilled and unskilled labour, plant, tools, tackle, equipment, men, materials, chemicals required for complete execution of the work in accordance with the specification as described herein and / or as directed by the Engineer. The Contractor shall strictly follow, at all stages of work, the stipulations contained in the Indian Standard Safety Code and the provisions of the Safety Rules as specified in the General Conditions of the Contract for ensuring safety of men and materials.

### CODES AND STANDARDS

The applicable Indian Standard and Code is given below :

IS : 6313 Part II : Code of practice for anti-termite measures in  
(Latest edition) buildings - pre-constructional chemical  
treatment measures.

### MATERIALS

The chemicals to be used as insecticides for the treatment shall be chloropyriphos 20% EC bearing ISI certification or approved equivalent conforming to the requirement and concentration laid down in latest IS 6313 - Part II

### APPLICATION

Latest IS 6313 (Part-II) shall be followed as general guidance for preparation and application of chemicals. The chemical solution shall be prepared by mixing the chemical with the appropriate quantity of water to obtain a chemical emulsion of the correct concentration as stipulated in IS : 6313 (Part - II).

The application shall be as follows :

Dilute 1 part of chloropyriphos 20% EC with 20 parts of water to get 1% emulsion. The prepared emulsion shall be applied by trained operators strictly in accordance with the Manufacturer's Specifications / directions. Health and safety precautions recommended

by manufacturer shall be observed during the treatment. The Contractor shall protect surfaces not intended to have treatment.

To facilitate proper penetration of the chemical into the soil, a pressure pump of adequate capacity and sprayers shall be employed to apply the solution.

#### **RCC foundations and basement**

The treatment applied essentially to masonry foundations where there are voids in the joints through which termites are above to seek entry into buildings. Hence the foundations require to be completely enveloped by a chemical barrier. In the case of RCC foundations, the concrete is dense being a 1:2:4 (Cement : Fine aggregates : Coarse aggregates, by volume) mix of richer, the termite are unable to penetrate it. It is, therefore, unnecessary to start the treatment from the bottom of excavations.

The treatment shall start at a depth of 500 mm below the ground level except when such ground level is raised or lowered by filling or cutting after the foundations have been cast. In such cases, the depth of 500 mm shall be determined from the new soil level resulting from the filling or cutting mentioned above and soil in immediate contact with the vertical surfaces of RCC foundations shall be treated at the rate of 7.5 litres per Sq.metre.

#### **TOP SURFACE OF PLINTH FILLING**

The top surface of the consolidated earth within plinth walls shall be treated with chemical emulsion at the rate of 5 ltrs per sqm of the surface before the stone bed or sand bed is laid. If the filled earth has been well consolidated and the surface does not permit the emulsion to seep through, holes upto 50 to 75 mm deep at 150 mm centres both ways may be made with 12 mm dia. mild steel rod on the surfaces to facilitate saturation of the soil with the chemical emulsion.

#### **JUNCTION OF WALL AND FLOOR**

Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surfaces from ground level upto the level of the filled earth surface. To achieve this a channel of size 3x3 cm shall be made at all the junctions of walls and columns with the floor (before laying the sand or soling) and rod holes made in the channel upto the ground level at 15 cm. centres and the iron rod moved backward and forward to breakup the earth. The chemical emulsion is poured into the channel at the rate of 7.5 ltrs per sqm of the vertical surface and allowed to soak through the holes fully so that the soil is in contact with the chemical. The soil shall be tamped back into the channel after this operation and consolidation to original conditions.

#### **EXTERNAL PERIMETER OF BUILDING**

After the building is complete, the earth along the external perimeter of the building should be roded at intervals of 150 mm and to a depth of 300 mm. The rods should be moved backward and forward parallel to the wall to breakup the earth and chemical emulsion poured along the wall at the rate of 7.5 litres per square metre of vertical surfaces. After the treatment, the earth should be tamped back into place. Should the earth outside the building be graded on completion of building, this treatment should be carried out on completion of such grading.

#### **SOIL SURROUNDING PIPES**

Wherever any service pipes enter the soil inside the area of the foundation of any building, the soil surrounding the point of entry of each pipe at the foundation, floor

etc. shall be fully soaked with the chemical solution for a distance of atleast one meter from the point of such entry.

### **EXPANSION JOINTS**

Soil beneath expansion joints at ground floor level shall be specially treated as directed. The joint itself shall also be treated as directed by the Engineer.

### **TREATMENT UNDER APRON**

The soil below the concrete for stone aprons to be provided around the perimeter walls of all buildings shall also be treated with the chemical solution.

### **TREATMENT OVER DPC**

Top of concrete damp proof course in external and internal walls shall be given a liberal coat of chemical solution when the concrete is still green.

### **GUARANTEE**

The Contractor shall provide a written guarantee in the format given in the next page that the building covered in this contract will be protected from termites for a period of ten years from the date of substantial completion of work covered under this contract.

At the end of the defect liability period the specialist membrane contractor must go on site to check and certify the tension of the fabric and if needed re-tension the fabric, if any reduction in the tension is observed, to ensure no flapping of fabric is taking place.

The Contractor will provide 15 years manufacturer warranty draft based on the material manufacturer company for the proposed fabric.

The Guarantee shall be in legal paper in an acceptable form.

## **3. TECHNICAL SPECIFICATION FOR CONCRETE WORKS**

This specification covers the general requirements for plain and reinforced cement concrete of different grades.

The requirements for concrete shall be materials, storage of materials, design of concrete mix, sampling and testing, form and formwork, construction joints, preparation and placement of concrete including batching, mixing, conveying, depositing and curing, finishing, grouting, inspection, clean-up etc. The concrete shall generally comply with the requirements of latest IS : 456.

Unless otherwise specified, the rates for all RCC will be exclusive of reinforcements. Reinforcements will be paid for separately. Unless otherwise specifically mentioned, the rates for all plain and RCC works shall be inclusive of formwork, centering and shuttering.

### **MATERIALS :**

#### **Cement :**

Unless otherwise specified, ordinary Portland cement of 43 grade conforming to latest IS : 8112 shall be used for all concrete works. Test certificates from the manufacturers to show that the cement brought by the contractor to site for use in the works fully complies with the relevant IS Specification shall be submitted to the Engineer at the Contractor's own cost. In addition, field test shall be conducted for every consignment of cement for the purpose of concrete design mix. Cement shall be stored and neatly packed, not exceeding 10 bags high in weather proof sheds with raised wooden plank flooring to prevent deterioration by dampness or intrusion of foreign matter. It shall be stored in such



a way as to allow the removal and use of cement in chronological order of receipt, i.e. the first received being first used. Cement deteriorated and/or clotted shall not be used on work but shall be removed at once from the site. Daily record of cement received and consumed shall be maintained by the contractor in an approved form and a copy submitted to the Engineer once a week. Notwithstanding the above, the Engineer, for any reasons whatsoever, may at his discretion order to retest, the cement brought to site in an approved testing laboratory and fresh certificate of its soundness shall be produced at the Contractor's own cost. Cement ordered for retesting shall not be used for any work pending results of re-test.

#### **Aggregates :**

Fine and coarse aggregates shall conform to IS 383. If required, the aggregates shall be washed and screened. Sampling and testing shall be as per IS : 2386.

Each size of aggregate shall be stored on a separate platform and shall avoid mixing and contamination with foreign material. Segregated aggregates shall be rejected.

Cost of stacking, washing, screening and cost of all tests, sampling etc. shall be borne by Contractor.

#### **Fine Aggregate :**

Sand shall conform to IS: 383. It shall pass through I.S sieve 4.75 mm (3/16 B.S) test sieve, leaving a residue not more than 5%. It shall be from a natural source approved by the Engineer. It shall be washed if directed to reduce the percentage of deleterious substances to acceptable limits at Contractors own cost. Sand shall not contain any trace of salt and sand containing any trace of salt shall be rejected.

The fine aggregate for concrete shall be graded within limits as specified in IS : 383 and the fineness modules shall range between 2.60 to 3.20. The fine aggregate shall be stacked carefully on a clean hard dry surface so that it will not get mixed up with deleterious foreign materials. If such a surface is not available a platform of planks or corrugated sheets or brick floor or concrete floor shall be prepared.

IS Sieve Designation	Percentage Passing			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone Iv
10 mm	100	100	100	100
4.75	90 - 100	90 - 100	90 - 100	95 - 100
2.36	60 - 95	75 - 100	85 - 100	95 - 100
1.18	30 - 70	55 - 90	75 - 100	90 - 100
600 Micron	15 - 34	35 - 59	60 - 79	80 - 100
300 Micron	5 - 20	8 - 30	12 - 40	15 - 50
150 Micron	0 - 10	0 - 10	0 - 10	0 - 15

#### **Coarse Aggregate :**

Coarse aggregate shall conform to IS : 383. It shall consist of crushed or broken stone, 95% of which shall be retained on 4.75 mm IS test sieve. It shall be obtained

from crushed granite, trap, basalt or similar approved stones from approved quarry. Coarse aggregate shall be chemically inert when mixed with cement & shall be angular in shape and free from soft friable thin porous laminated or flaky pieces. It shall be free from dust and other foreign matter. Gravel/shingle of desired grading may be permitted as a substitute in part or full in plain cement concrete if the Engineer is otherwise satisfied about the quality of aggregate.

IS Sieve Designation	A						B			
	% Passing for single sized aggregate of nominal size						% Passing of graded aggregate of nominal size			
	63 mm	40 mm	20 mm	16 mm	12.5 mm	10 mm	40 mm	20 mm	16 mm	12.5 mm
80 mm	100	-	-	-	-	-	100	-	-	-
63 mm	85 - 100	100	-	-	-	-	-	-	-	-
40 mm	0 - 30	85 - 100	100	-	-	-	95 - 100	100	-	-
20 mm	0 - 5	0-20	85 - 100	100	-	-	30 - 70	95 - 100	100	100
16 mm	-	-	-	85 - 100	100	-	-	-	90 - 100	-
12.5 mm	-	-	-	-	85 - 100	100	-	-	-	90 - 100
10 mm	0-5	0-5	0-20	0-30	0-45	85 - 100	10-35	25-55	30-70	40-85
4.75 mm	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36 mm	-	-	-	-	-	0-5	-	-	-	-

Unless otherwise specifically stated for all RCC works, the size of coarse aggregate shall be 20 mm and down size.

**Water :**

Water used for mixing concrete and curing shall be potable quality, fresh, clean, free from oil, salts, acids, alkali and shall be in accordance with the clause 4.3 of IS 456. The contractor shall produce test results of water proposed to be used on the job for approval by the Engineer for the mixing before casting any concrete.

**Reinforcement :** Refer separate specification given elsewhere.

**Admixtures :**

The use of admixtures may be allowed only if approved by the Engineer and his decision in this regard shall be final.

**Concrete :**

Concrete shall be specified in various graded designations as M-10, M-15, M-20, M-25, M-30, M-40, M-45, M-50 etc. The letter 'M' refers to the mix and the number to the minimum compressive strength in N/Sq.mm to be established by 28 day of 15 cms

works cube tests with the probability of not more than 1 test out of 10 falling below that minimum.

The proportions of ingredients for concrete shall be such that in addition to complying with the strength requirement, the concrete shall have adequate workability and proper consistency to permit it to be worked readily into the forms and around reinforcement, under the conditions of placement to be employed without excessive segregation or bleeding.

All ingredients shall be proportioned and measured by weight using approved weigh-batching equipment. There shall be full field control of (1) predetermined grading of all aggregates that go into concrete (2) predetermined proportion of coarse aggregate, fine aggregate, cement and water for the required strength.

#### **Design Mix :**

The Contractor is responsible for the design of the concrete mix. The Contractor shall design the mix and submit for the approval of the Engineer. No concreting works shall be commenced without the approval of the design mix of concrete.

The Contractor shall make trial mixes using coarse aggregates, sand, water and cement actually available at site to be used for making concrete. Before making trial mixes all the ingredients shall be tested in the field laboratory and should conform to the relevant IS Specifications. Suitable proportions of sand and the several sizes of coarse aggregates for each grade of concrete shall be selected to give as nearly as practicable the maximum density, this is to be determined by mathematical means, laboratory tests, field trials or other means.

The minimum cement contents for design mix concrete of various grades shall be as per relevant IS 456:2000

The mix required to produce, place and compact the specified grade of concrete shall be designed by the Contractor. He shall carry out preliminary tests of specimen at his own cost at field laboratory as per IS : 456 and IS : 516 and he shall furnish to the Engineer a statement of proportions proposed to be used for various concrete mixes and grades of concrete for approval.

The minimum strength requirements shall be as follows :

Minimum compressive strength of 15 cm cubes at 7 days and 28 days after mixing, conducted in accordance with IS : 516.

Grade of Concrete	Preliminary Test N/Sqmm		Work Test N/Sqmm	
	At 7 days	At 28 days	At 7 days	At 27 days
M - 10	9.0	13.5	7.0	10
M - 20	17.5	26	13.5	20
M - 25	22.0	32	17.0	25

Once a mix including water cement ratio has been determined and specified for use by the Engineer, that W/C ratio shall be maintained.

Details of design mix concrete approved by the Engineer shall be submitted to the Engineer for record along with the results of sieve analysis and such other tests on cement, aggregates and water etc. The approved design mix shall then be followed for subsequent concreting operations at site till a variation in some characteristics of any ingredient is observed or till a variation in the degree of quality control necessitates a change in the mix.

**Batching and Mixing of Concrete :**

All materials for controlled concrete shall be batched as per approved design mix in suitable weigh batcher of adequate capacity and of approved design. Mixers for concrete may be stationary mixers of either the tilting or non-tilting type, or truck mixers of approved design. Thorough mixing of the concrete is essential and mixers shall be capable of combining the materials into a uniform mixture, uniform colour and of discharging this mixture without segregation. The mixers should always be operated at the speed and time recommended by the makers. The mixers shall be maintained in satisfactory operating condition, and mixer drums shall be kept free of hardened concrete. The consistency of the concrete produced from the mixers should have sufficient workability to enable it to be well consolidated, to be worked into the corners of the shuttering and around the reinforcements.

The slump for concrete as determined by slump tests as per Indian Standard 1199 latest edition, shall not exceed the maximum slumps indicated below for each type of construction using high frequency vibration unless otherwise approved or directed by the Engineer.

The contractor shall not place concrete having a slump outside the limits specified without the approval of the Engineer.

Atleast one slump test shall be made for every compressive strength test carried out. More frequent tests shall be made if there is a distinct change in job conditions, or if required by the Engineer.

**Transporting :**

shall be conveyed from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of any of the ingredients. If segregation does occur during transport, the concrete shall be remixed before being placed. Normally not more than 30 minutes shall lapse between mixing and consolidation in position. All means of conveyance shall be adopted to deliver concrete of the required consistency and plasticity without segregation or loss of slump.

**Concrete should be transported only by transit mixers**

**Placing :**

Method of placing shall be such as to preclude segregation and as far as practicable the placing shall be continuous. Special care shall be taken in accordance with latest IS : 456 while laying concrete under extreme weather.

Concrete shall be transported by transit mixers and placed in position without segregation. It is important that the concrete be placed in its final position before the cement reaches its initial set. The concrete should normally be compacted in its final position within 30 min. of leaving the mixer, and once compacted, it should not be disturbed. Before the concrete is actually placed in position, the insides of the forms

should be inspected to see that they have been cleaned and oiled, care being taken to see that the reinforcements do not get contaminated. Temporary openings should be provided to facilitate inspection, especially at the bottom of columns, to permit the removal of all sawdust, wood shavings etc. Openings should be placed so that the water used to flush the forms will drain away. No water should be left in the forms. The concrete should be spread evenly in the form to avoid segregation and should completely fill all corners of the form work and the space between the reinforcement. Vibrator should not be used for spreading the concrete. Concreting should be carried on without interruption between predetermined construction joints.

**Compacting :**

The object of compacting concreting is to achieve maximum density. The concrete should therefore, be placed a little in excess of its specified depth so that after proper compaction its final desired depth is obtained. Manually rodding and tapping the concrete and tapping the form work on its external face shall be continuously carried out at the actual pouring head, while compacting the concrete with mechanical vibrators shall be done sufficient distance away from the pouring head, so that the vibrator is utilised only to compact the concrete and not to spread it. The Engineer may, however, at his absolute discretion, permit concreting by increasing the slump and correspondingly increasing the cement contents at contractor's cost. Except for shallow or inaccessible concrete the vibrator shall be penetrated vertically and at regular distance intervals, not at an angle and not at haphazard intervals. At corners, obstructions, embedded fixtures and congested reinforcement areas, the vibrators shall be manipulated with the utmost care and handled only by the most experienced workmen.

The number and type of vibrator to be used shall be subject to the approval of the Engineer and in general immersion type vibrators shall be used. Consolidation by using immersion vibrator will be in accordance with IS Code : 3558. Sufficient number of reserve vibrators in good working condition shall be kept on hand at all times, so as to ensure that there is no slacking of interruption in compacting.

**Protection of Concrete :**

All freshly placed concrete surfaces shall be protected from damages by workmen equipment or any other cause. The surface shall be protected from dry wind and direct sun rays. The Contractor shall provide and use, where directed by the Engineer enough tarpaulins or other suitable materials to cover completely or enclose all freshly finished concrete.

**Curing :**

As soon as the concrete is hardened sufficiently, it shall be cured by maintaining the concrete in a damp condition by application of wet sacking or other approved moisture retaining covering for a period of 28 days after placing the concrete. In floors curing should be carried out by ponding and covering with polythene sheets to reduce evaporation losses. Extreme care should be taken to ensure that all surfaces are kept in a moist condition and no local area shall be allowed to dry out intermittently. Curing shall be done with potable water free from sediments of any kind.

**Construction Joints :**

Construction joints in exposed concrete work shall be made only where shown on the drawings or directed by the Engineer and shall be in accordance with the details shown or approved by the Engineer. The procedure given in clause 20.1.4.2 of IS : 456 shall be followed for general guidance. All foreign matters shall be removed from the concrete before it is allowed to fully harden. The removal shall be effected by scrubbing the concrete surface with wire and with bristle brushes and washing down to expose clearly the aggregate. However care shall be taken to avoid dislodgment of particles of aggregate. If concrete has been allowed to harden excessively the surface shall be chipped over its whole surface and thereafter thoroughly washed. Before fresh concrete is added on the construction joints, the surface of the old concrete shall be thoroughly wetted and covered with a thin layer of cement mortar 1:1.

Construction joints in concrete floors and walls of basement, water tanks or any other structures in contact with water or earth, shall be provided with PVC water stops of approved make coated on either side with hot asphalt. The longitudinal joints, in water stops, shall preferably be not welded or overlapped atleast 200 mm.

**Sampling and strength test of concrete :**

Sampling and testing of concrete shall be conducted in accordance with the latest issue of Indian Standard 1199, 516 and 456.

During the progress of construction compression tests shall be made to determine whether the concrete being produced complies with the strength requirements specified. The test will be made in accordance with Indian Standard 516 latest edition.

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following :

Quantity of concrete in the work, Cum	Number of Samples
1 - 5	1
6 - 15	2
16 - 30	3
31 - 50	4
51 and above	4 Plus one additional sample for each additional 50 Cum or part thereof

**NOTE :**

At least one sample shall be taken from each shift

A set of six specimens from random mixer batches, shall constitute a test, three being tested for 7 days and three being tested for 28 days strength.

The strength test result shall be the average strength of the three companion test specimens, tested at 28 days, except that, if one specimen in a test shows manifest evidence of improper sampling, moulding or testing the result shall be discarded and

the remaining two strengths averaged. Separate procedures shall be established when cements other than Portland cement are used.

Normally, 7 day and 28 day tests shall be made on specimens. For any mix, a correlation between 7 day and 28 day strengths may be made in the laboratory. Soon after a job starts, a similar correlation will evolve for samples of concrete taken from the mixer. After that correlation has been established, the results of the 7 day tests may be used as an indicator of the compressive strengths which should be expected at 28 days, provided such results are consistent. If 7 day tests show compressive strengths that are too low, measures shall be taken at once, at the Engineer's direction, without waiting for the results of the 28 day tests.

A. The concrete shall be deemed to comply with the strength requirements if:

- a) every sample has a test strength not less than the characteristic value ; or
- b) the strength of one or more samples though less than the characteristic value, is in each case not less than the greater of ;
  - i) the characteristic strength minus 1.35 times the standard deviation; and
  - ii) 0.80 times the characteristic strength and the average strength of all the samples is not less than the characteristic strength plus

$$\left| \begin{array}{c} \overline{\hspace{1cm}} \\ 1.65 - \frac{\hspace{1cm} 1.65 \hspace{1cm}}{\hspace{1cm} \text{number of samples} \hspace{1cm}} \\ \underline{\hspace{1cm}} \end{array} \right| \begin{array}{l} \text{times the standard} \\ \text{deviation} \end{array}$$

B. The concrete shall be deemed not to comply with the strength requirements if :

- a) The strength of any samples is less than the greater of:
  - i. the characteristic strength minus 1.35 times the standard deviation and;
  - ii. 0.80 times the characteristic strength; or
- b) the average strength of all the samples is less than the characteristic strength plus

$$\left| \begin{array}{c} \overline{\hspace{1cm}} \\ 1.65 - \frac{\hspace{1cm} 3 \hspace{1cm}}{\hspace{1cm} \text{number of samples} \hspace{1cm}} \\ \underline{\hspace{1cm}} \end{array} \right| \begin{array}{l} \text{times the standard} \\ \text{deviation} \end{array}$$

C. Concrete which does not meet the strength requirements as specified in para (A) but has a strength greater than that required by para (B) may be accepted as being structurally adequate without further testing by the Engineer in consultation with designer.

In the event that concrete tested in accordance with the requirements of the above clause, fails to meet the specification, the Engineer shall have the right to require any one or all the following :

- a) Changes in the concrete mix proportions for the remainder of the work
- b) Coring and testing of the concrete represented by the tests which failed as per IS : 456.
- c) Load tests on part of structures as per IS : 456.

d)Removal and replacement of any such portions of the structure.

e)Extended curing of the concrete represented by the specimen.

The Contractor shall carryout all such measures as directed at his own expense, if the concrete cannot be accepted due to reasons attributable to the Contractor.

The unit rate of concrete shall be inclusive of all tests and remedial measures.

**FORM WORK :**

The formwork shall conform to the shapes, lines and dimensions for all the elements as shown on the drawing. The formwork shall be designed and constructed so that the concrete can be properly placed and thoroughly compacted to obtain the required shape, position and level subject to specified tolerances. The designed formwork arrangement shall be got approved by the Engineer. Approval of the proposed formwork by the Engineer will not diminish the Contractor's responsibility for the satisfactory performance of the formwork, nor for the safety and co-ordination of all operations.

Formwork for architectural shapes for columns, ring, beams, circular or spherical walls, shell roofs or bottoms in the case of water reservoirs or any other structure shall be made from approved wrought and put up timber or steel plates and frames.

The form work to be used shall be of an approved system type

Wooden props are strictly prohibited. Note that all RCC works are form finished.

Any rectification's at Contractors Cost.

**Erection of Formwork :**

The following shall apply to all formwork.

1. The contractor shall obtain the approval of the Engineer for the design of forms and the type of material used before fabricating the forms.

2. All shutter planks and plates shall be adequately backed to the satisfaction of the Engineer by a sufficient number and size of walers or framework to ensure rigidity during concreting. All shutters shall be adequately strutted, braced and propped to the satisfaction of the Engineer to prevent deflection under deadweight of concrete and superimposed live load of workmen, materials and plant, and to withstand vibration and wind. No joints in props shall be allowed.

3 Vertical props shall be supported on wedges or other measures shall be taken where the props can be gently lowered vertically during removal of the formwork. Props for an upper storey shall be placed directly over those in the storey immediately below and the lowest props shall bear on a sufficiently strong area.

4. Care shall be taken that all formwork is set plumb and true to line and level or camber or batter where required and as specified by the Engineer.

5. If formwork is held together by bolts or wires, these shall be so fixed that no iron will be exposed on surface against which concrete is to be laid. In any case wires shall not be used with exposed concrete formwork. The Engineer may at his discretion allow the Contractor to use tie-bolts running through the concrete and the Contractor shall decide the location and size of such tie-bolts in consultation with the Engineer. Holes left in the concrete by these tie-bolts shall be filled as specified by the Engineer at no extra cost. No through tie will be permitted in all cases where water is likely to be retained and gas tightness of the structure is to be ensured.



6. Provision shall be made in the shuttering for beams, columns and walls for a port hole of convenient size so that all extraneous materials that may be collected could be removed just prior to concreting.

7. Formwork shall be arranged as to permit removal of forms without jarring the concrete. Wedges, clamps and bolts shall be used wherever practicable instead of nails.

8. An approved mould oil or other material shall be applied to faces of formwork in contact with the wet concrete to prevent adherence of concrete. The use of oil which darkens the surface of the concrete shall not be allowed. Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in position. The formwork shall be kept thoroughly wet during concreting and the whole time that it is left in place.

9. Formwork for beams and slabs shall be so erected that the shuttering on the side of the beams and soffits of slabs can be removed without disturbing the beam bottoms. Immediately before concreting is commenced, the formwork shall be carefully examined to ensure the following :

- a) Removal of all dirt, shavings, sawdust and other refuse by brushing and washing.
- b) The tightness of joints between panels of sheathing and between these and any hardened core.
- c) The correct location of tie bars, bracing and spacers, and especially connections of bracing.
- d) That all wedges are secured and firm in position.
- e) That provision is made for traffic on formwork not to bear directly on reinforcing steel.

The Contractor shall obtain the Engineer's approval for dimensional accuracies of the work and for the general arrangement of propping and bracing. It is imperative that for scaffolding heights of 3.6 M and above, timber posts or steel scaffolding be used with adequate bracings in horizontal and vertical planes. The Contractor shall be entirely responsible for the adequacy of propping and for keeping the wedges and other locking arrangements undisturbed through the decentering period.

Formwork shall be continuously watched during the process of concreting. If during concreting any weakness develops and formwork shows any distress the work shall be stopped and remedial action taken.

#### **Exposed Concrete Work :**

Exposed concrete surfaces shall be smooth and even, originally as stripped without any finishing or rendering. Where directed by the Engineer, the surface shall be rubbed with carborundum stone immediately on striking the forms. The Contractor shall exercise special care and supervision of formwork and concreting to ensure that the cast members are made true to their sizes, shapes and positions and to produce the surface patterns desired. No honeycombing shall be allowed. Honeycombed parts of the concrete shall be removed by the Contractor as directed by the Engineer and fresh concrete placed without extra cost, as instructed by the Engineer.

All materials, sizes and layouts of formwork including the locations for their joints shall have the prior approval of the Engineer.

**Camber :**

Forms and falsework shall be generally cambered as indicated in the drawings or as instructed by the Engineer. However, for beams upto 5 M span and slabs upto 4 M span camber is not normally required to be provided.

Age of Concrete at removal of formwork :

Unless otherwise permitted in writing by the Engineer, the minimum period of keeping formwork in position after concreting the members in normal circumstances and where ordinary portland is used shall conform to the Indian Standard

Specifications and shall be as follows :

- |    |   |   |
|----|---|---|
| a) | Walls, columns and vertical faces of all structural members | 24 to 48 hours as may be decided by the Engineer. |
| b) | Slabs (props left under)                                    | 3 days  |
| c) | Beam soffits (props left under)                             | 7 days  |
| d) | Removal of props under slabs :                              |   |
|    | i. Spanning up to 4.5 m                                     | 7 days  |
|    | ii. Spanning over 4.5 m                                     | 14 days   |
| e) | Removal of props under beams and arches                     |   |
|    | i. Spanning up to 6 m                                       | 14 days   |
|    | ii. Spanning over 6 m                                       | 21 days   |

For other cements, the stripping time recommended for ordinary Portland cement may be suitably modified.

The Engineer may vary the above period if he considers it necessary. Immediately after the forms are removed, they shall be cleaned with a jet of water and a soft brush.

**Stripping of Formwork :**

Formwork shall be removed carefully without jarring the concrete, and shall be eased off carefully in order to allow the structure to take up its load gradually and curing of the concrete shall be commenced immediately. Immediately after the shuttering is removed, all the defective areas such as honeycombed surfaces, rough patches, holes left by form bolts etc. shall be brought to the notice of Engineer who may permit patching of the defective areas or reject the concrete work. Rejected concrete shall be removed then replaced by Contractor at his own cost. After removing loose materials, the surface shall be prepared and saturated with water for 24 hours before patching is done with 1:1.5 CM. The use of epoxy for bonding fresh concrete shall be carried out as directed by Engineer. Concrete surfaces to be exposed shall, where required by the Engineer, be rubbed down with carborundum stone to obtain a smooth and even finish. Where the concrete requires plastering or other finish later the concrete surface shall be immediately hacked lightly all over as directed by the Engineer. No extra charge will be allowed to the Contractor for such work on concrete surfaces after removal of forms.

In the case of folded plates and shell roofs the contractors should take approval for the pattern of centering and shuttering along with programme for deshuttering.

**Repropping :**

For multistoried buildings the floors may need repropping to support the loads of the upper floors under construction. The extent of such repropping shall be as directed by the Engineer. Such repropping shall not be paid for separately and the cost of such repropping shall be deemed to have been included in the Contractor's rates.

**Reuse of Forms :**

The Engineer may in his absolute discretion order rejection of any forms he considers unfit for use for a particular item, and order removal from the site of any forms he considers unfit for use in the works.

**Hacking-out :**

1. Immediately after removal of forms, the concrete surfaces to be plastered shall be roughened with a brush-hammer or with chisel and hammer as directed by the Engineer to make the surfaces sufficiently coarse and rough to provide a key for plaster.

This shall not be paid for separately and shall be deemed to have been included in the Contractor's rates.

2. No payment shall be made for temporary formwork used in concreting, nor for formwork required for joints or bulkheads, in floors, or elsewhere, whether such joints are to be covered later with concrete or mastic or other material.

**Inspection :**

All materials, workmanship and finished construction shall be subject to the continuous inspection and approval of Engineer. Materials rejected shall be replaced by Contractor immediately at his own cost.

**Clean-up :**

Upon the completion of concrete work, all forms, equipment, construction tools, protective coverings and any debris, scraps of wood etc. resulting from the work shall be removed and the premises left clean.

**PRECAST CONCRETE :**

All precast concrete shall be cast over vibrating tables or by using form vibrators. Exposed surfaces of precast members shall be finished as called for on the drawings. All jointing surfaces shall be wire brushed and hosed down until the aggregate is free from cement slurry. Castellations shall be provided wherever called for. Leave grouting holes, grooves, inserts, projections, reinforcements, lifting hooks, etc., to conform to the erection procedure. All edges and delicate projections likely to be damaged during handling and erection shall be protected by means of wooden cover fillets, until placed in position.

**MATERIALS :**

The materials used for the construction shall conform to IS- 456 latest.

**MOULD :**

The mould used for manufacturing precast components normally consist of two parts, (a) bottom mould, and (b) side moulds. The bottom mould can be made out of timber, masonry, concrete, steel, FRP, plastic or any other material acceptable to the Engineer. The side moulds similarly can be of timber, steel, FRP, or plastic. When using masonry or concrete moulds, the top surface shall be finished to the required accuracy and made smooth.

In case of masonry moulds, the use of chicken mesh or fibre reinforcements in the top surface will help in making the mould last longer for higher efficiency.

In the case of cored units the voids can be created either by an extrusion process, by inflated tubes, Mild steel tubes, timber, cardboard / hard paper or any other materials. The castellations / depressions / roughening of required depth shall be provided in the sides of the precast units. Suitable provisions in the side shutters of the mould may create better keying between in situ concrete and precast concrete units at the joints.

#### **REINFORCEMENT COVER :**

Minimum cover for the reinforcement for precast units shall be as follows ;

a) For reinforcement in the flange, 12 mm clear in all directions. This shall be increased to 15 mm when surfaces of precast members are exposed to corrosive atmosphere and

b) For main reinforcement in the rib, 20 mm or diameter of bar whichever is greater. In case of corrosive atmosphere, this shall be increased to 25 mm, or diameter of bar, whichever is greater.

It shall be ensured that the reinforcement cages are not in any way distorted during storage, handling, placement and casting. In the case of mass production in large precasting factories, the use of reinforcement ladders and mesh made by using a resistant welding machine will be advantageous for improving production.

#### **CONCRETE :**

The concrete mix used shall be minimum of M-15 grade in accordance with IS: 456 latest but M 25 and above grade of concrete is preferred for reinforced concrete units. The concrete mix as specified in the drawings shall be used for respective units in accordance with IS: 456 latest.

#### **CASTING & CURING OF UNITS :**

Mechanical vibration either through mould/table vibrators or screed vibrators is essential to ensure good compaction. Needle vibrators can be used for compacting concrete in the ribs and screed vibrators for compacting concrete in the flange. For larger factories, concrete placing machine, which level, vibrate and finish the concrete units can be advantageously utilized for this purpose.

Curing shall be done as per IS 456 latest. If necessary, low pressure steam curing may be provided to get early stripping / release strength.

#### **SAMPLING AND TESTING OF UNITS**

##### **Sampling :**

Sampling shall be done in accordance with latest load test : Load tests shall be carried out in accordance with IS 456 latest. All the units passing the load test can be used in the constructions.

#### **TRANSPORTATION AND ERECTION OF PRECAST ELEMENTS :**

##### **Lifting Hooks**

Wherever lifting hooks / holes are used these shall be provided at structurally advantageous points (for example, 1/5 of the length from the end of the element) to facilitate demoulding and erection of the precast unit. The lifting hooks can be formed out of normal Mild steel reinforcing bars with adequate carrying capacity to carry the self weight during demoulding, handling and erection. After erection, the

hooks can either be cut or bent down inside the screed or joint concrete that will be laid subsequently.

Lifting and removal of precast units shall be undertaken without causing shock, vibration or undue bending stress to or in the units. Lifting and handling positions should conform to the Engineers directions.

#### **Stacking of Units**

After removal from moulds the precast units shall be stacked over supports placed at about  $1/6$  of span from ends. Care shall be taken to see that no support is placed at the centre of span. Care also shall be taken to see that the main reinforcement is always at the bottom of stacked units.

#### **TRANSPORTATION :**

The units shall be transported always with the main reinforcement at the bottom. For transporting and erecting the units, rope slings shall be tied near the ends at  $1/5$  of the length from either end of the unit. In case the units are transported in trolleys, the over-hang of the units from the trolley shall not be more than  $1/5$  of the length. The unit shall be lifted manually or with the help of chain pulley blocks or mechanically with a hoist or a crane.

#### **PLACING AND ALIGNING :**

The units shall be placed and aligned side by side across the span to be covered. While placing the units, care shall be taken to see that they have the specified bearing on supporting wall / beam. Placing of units shall be started from one end of the building.

#### **BEARING :**

The precast units shall have a minimum bearing of 75 mm on the beams and 100 mm on the conventional masonry wall.

#### **CURING OF IN SITU CONCRETE IN JOINTS :**

The in situ concrete in the joint shall be cured for at least 7 days in accordance with IS 456 latest. The concrete shall then be allowed to dry for at least a week. A coat of cement slurry may be applied to the joints to fill the hairline cracks that might have developed. Joints shall be finished as specified in the drawings.

#### **FIXTURES :**

Designers shall indicate provisions for fixtures like fan hooks / inserts / electric conduits, etc., to be incorporated within the precast units or the in situ joints / screed concrete.

In case of concealed wiring, conduits may be placed within the joints along the length or within the screed before concreting. If adequate thickness is available this may be concealed within the floor / roof finish.

Holes, openings and fixtures required to be provided within the precast units shall be fixed accurately with adequate embedment at the precasting stage. Drilling of holes / cutting of edges shall not be made unless permitted by the Engineer.

#### **DEFECTS IN CONCRETE :**

Immediately on removal of form work, the surface of the concrete shall be examined by the contractor and any honeycombs or other imperfections shall be brought to the notice of the Engineer. The acceptability or otherwise of such defective concrete shall be at the sole discretion of the Engineer who may direct the

contractor to repair the defective work or ask for demolition and replacement of such defective work at the risk and cost of the contractor.

**PROTECTION OF CONCRETE :**

All concrete shall be protected from damage by workmen, equipment, overload or any other cause. All edges, corners and projections of concrete members likely to be damaged shall be protected by means of cover fillets or as directed by the Engineer.

**EQUIPMENT FOUNDATION :**

The contractor shall provide concrete foundations for the various equipments in accordance with the drawings. All concrete for equipment foundations shall be of specified grade as per drawing. Bolts, inserts and other anchoring features shall be left in their correctly assigned position to templates prepared for this purpose at the time of casting. Where it is not possible to leave bolts, etc., in position, pockets of suitable sizes shall be left in the concrete foundations to receive the bolts. Pockets shall be formed by suitable form work as directed by the Engineer. Bolts shall be grouted by expanding cement mortar, non-shrink grouting compound and finished neat.

It is essential that the Engineer who is in-charge of the construction of all concrete work, whether plain or reinforced shall be well experienced in this class of work and shall superintend personally the whole construction and pay special attention to:-

- a) Quality Control in respect of selection of materials, proportioning and mixing, etc.
- b) Placing and consolidation of concrete.
- c) Accuracy in cutting, bending, placing and binding of reinforcement.
- d) Accuracy in fabrication, assembly and erection of form work.
- e) Casting, handling, transportation and erection of precast members.

#### **4. TECHNICAL SPECIFICATION FOR STEEL REINFORCEMENT**

This specification covers the general requirements of steel reinforcement.

Steel reinforcement shall be either mild steel of tested quality high yield strength deformed bars of grade Fe-500D conforming to IS:1786 or as called for on the drawings. Fabric reinforcement where called for shall be of hard drawn mild steel wire mesh conforming to IS:1566. Bars shall be free from deleterious materials, mill scale, loose rust, oil or paint.

The contractor shall submit bar bending schedules for approval of the Engineer prior to commencement of fabrication. These shall indicate the accurate dimensions and bending of bars as called for on the structural drawings. Fabrication shall be accurately done to the dimensions, spacing and ensuring minimum cover as called for on structural drawings.

All reinforcing steel within the limit of a day's pour shall be in place and firmly wired atleast one day prior to the date of pour to permit inspection. The contractor shall also ensure that all conduits embedments and inserts are in position before placing concrete.

**Bending :**

All reinforcement bars shall be made straight before bending. Bars shall be bent cold gradually by machine or other approved means without the use of heat. Bars having cracks or splits on the bends shall be rejected. Bars incorrectly bent once shall not be used without the approval of the Engineer.

The Contractor shall prepare bar bending schedules as per details given in IS 2502 and get them approved before proceeding with cutting and bending of bars.

All bars shall be carefully and accurately bent by the Contractor in accordance with the drawings and special care shall be taken such that :

- a) the depth of the crank is correct as per the drawing or the Bar Cutting and Bending Schedule.
- b) the rods are placed in exact positions. The bars should not be bent or straightened in any manner that will injure the material
- c) hooks where indicated shall be either a complete semi-circular turn with a radius of not less than four and not more than six bar diameters, plus an extension of at least four bar diameters at the free end, or a 90 degree bend having a radius of not less than 4 bar diameters plus an extension of 12 bar diameters, as shown or implied on the drawings.

No reinforcement shall be bent when in position in the works without approval whether or not it is partially embedded in hardened concrete.

**Lapping :**

As far as possible bars of maximum length available shall be used.

Unless otherwise specified or shown on the drawings, all laps shall be 50 times the diameter of bar. Not more than 33% (Thirty Three Percent) of the bars shall have lapped joints at the same location.

**Welding :**

Only where specifically shown on the drawings, reinforcement shall have welded joints.

All welding shall be carried in accordance with IS : 2751. Only qualified welders shall be permitted to carry out such welding.

The welding procedure shall be approved by the Engineer and tests shall be made to prove the soundness of the welded connection.

Rate quoted for steel reinforcement work shall be deemed to include the cost of such weldings wherever specified.

**Cleaning, Placing and Fastening :**

All reinforcement shall be cleaned to remove loose mill scale, loose rust, oil and grease or any other harmful matter immediately before placing the concrete. Dowel bars will be provided where shown on drawing or where required.

All steel reinforcement shall be accurately placed in position shown on the drawing tied with 18 gauge GI annealed steelwire and firmly held during the placing and setting of concrete.

The vertical distance required between successive layers of bars shall be maintained by providing space bars, inserted at such intervals that main bars do not perceptibly sag between adjacent space bars.

**COVER FOR REINFORCEMENT :**

Reinforcement shall have cover as shown on the structural drawings and where not specified the thickness of cover shall be as follows.

- a) At each end of reinforcing bar not less than 25 mm. nor less than twice the diameter of such bar.
- b) For a longitudinal reinforcing bar in a column not less than 40 mm nor less than the diameter of such bar. In the case of columns of minimum dimension of 20 cm. or under whose reinforcing bars do not exceed 13 mm., the cover 25 mm shall be used.
- c) For longitudinal reinforcing bar in a beam not less than 25 mm., nor less than the diameter of such bar.
- d) For tensile, compressive, shear or other reinforcement in a slab not less than 13 mm., nor less than the diameter of such reinforcement.
- e) For any other reinforcement not less than 13 mm., nor less than diameter of such reinforcement. For giving the necessary covers, concrete cover blocks of same strength of concrete proposed for the structure shall be used. All cover blocks shall be secured firmly so that they are not disturbed during compaction.

## 5. TECHNICAL SPECIFICATION FOR STRUCTURAL STEEL WORK

### **General :**

This Specification covers the Supply, Fabrication, Painting, Transportation to site and Erection on prepared Foundations, Structural Steelwork consisting of Columns, Beams, Lattice girders, trusses, purlins, bracings, built-up sections, sag rods, girts, etc. Fabrication, Erection and approval of Steel Structures shall be in compliance with :

- These General Specifications, IS : 800 and other relevant Indian Standards as listed in clause 12.
- Drawings and supplementary drawings to be supplied to the Contractor by Engineer during execution of the work.

In case of conflict between the clauses mentioned here and the Indian Standards, those expressed in this Specification shall govern.

### **Scope :**

The Fabrication and Erection of the Steelwork consist of accomplishing of all Works herein enumerated including providing all labour, tools and plants, all materials and consumables such as welding electrodes, bolts and nuts, oxygen and acetylene gases, oils for cleaning, etc. of approved quality as per relevant Indian Standards. The work shall be executed in a workman like manner to the complete satisfaction of Engineer.

### **Fabrication Drawings :**

Fabrication and erection drawings shall be prepared by the Contractor on the basis of Design drawings supplied to him and submit the same to Engineer (EIC) for review in triplicate. Engineer may review at his option some, all or none of the Fabrication drawings. Wherever such reviews are carried out, the same shall be restricted to the following :

- Structural layout, orientation and elevation of Structures and Members.
- Sizes of members
- Adequacy of critical connections and joints for required strength.



- Shop / Field welding details from viewpoint of erection.

In those cases where EIC carries out either full, or partial review, one copy of drawing submitted by the Contractor shall be returned to him and Contractor shall incorporate the amendments and submit further three copies of amended drawings for final review. In those cases where EIC does not review the drawings, he shall return 1 copy of drawings, stamped "Not reviewed proceed at Contractor's responsibility", to the Contractor for further action.

Fabrication drawings shall include the following :

- Structural layout and Elevations
  - Sizes of Structural Members
  - Adequacy of Connections and joints
  - Design and detailing of structural joints for required strength and erection
  - Type and dimension of welds and bolts
  - Shapes and sizes of edge preparation for welding
  - Details of shop and field joints included in the Assembly
  - Bill of Materials
  - Quality of Structural steel, welding electrodes, bolts, nuts and washers to be used
- Erection assemblies identifying all transportable parts and sub-assemblies associated with special erection instructions, if required.
  - Non Destructive Testing (NDT)
    - Crane Girders - 20% Dye Penetrant Examination (DPE) of rootruns.
    - 10% radiography of all butt welds
    - Others - 10% DPE

Review by Engineer fully/partially or non-review of Fabrication drawings submitted by Contractors shall not absolve the Contractor of his responsibility and he shall modify /rectify the structures at any stage of work when pointed out by Engineer that such work is not in conformity with specification and/or standard practice.

Connections, splices etc. other details not specifically detailed in Design drawings shall be suitably given on Fabrication drawings considering normal detailing practices and developing full member strengths. Where asked for calculations for the same, these shall also be submitted for approval.

Any alternate design or change in section is allowed only when approved in writing by the Engineer.

However if any variation in the scheme is found necessary later, the Contractor shall incorporate these changes in his Shop Drawings, at no extra cost and resubmit for review.

The contractor shall supply six prints each of the final reviewed drawings to Engineer within a week from the date of final review, at no extra cost, for reference and record of Main Contractor.

The Engineer will verify the correct interpretation of his requirements.

If any modification is made in the Design drawing during the course of execution of the work, revised Design drawings will be issued to the Contractor. Further changes arising out of these shall be incorporated by the Contractor in the Fabrication

drawings already prepared at no extra cost and the revised Fabrication drawings shall be duly got reviewed as per the above clauses.

### **MATERIALS :**

#### **Rolled Sections**

The following grades of steel shall be used for steel structures.

Structural steel shall conform to IS 2062 Gr. 'A' (for thickness upto 20 mm) & IS 2062 Gr. 'B' (for thickness above 20 mm).

For purlins and girts cold rolled Z sections of TI Metal sections Ltd. or equivalent shall be used.

Z sections shall be manufactured from tested HR coils to IS : 10748 and the sections shall conform to IS : 801 and IS : 811.

The size and sectional properties shall be as follows :

Span	Size	Thickness (mm)	Z <sub>x</sub> (top) cm <sup>3</sup>	Z <sub>x</sub> (bottom) cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>
4 M	150230	2.3	31.14	29.92	8.56
5 M	165255	2.55	36.40	35.55	8.26
6 M	230255	2.55	65.08	63.39	11.22

Z purlin shall be supplied with sleeves duly drilled / punched, sag rods and fasteners.

### **WELDING MATERIALS :**

Welding Electrodes shall conform to IS : 814 & AWS

E 6013

| For thickness  
upto 20mm

| For thickness  
AWS

| above 20mm-

| E7018

Approval of welding procedures shall be as per IS : 816

### **BOLTS, NUTS AND WASHERS :**

Bolts and nuts shall be as per IS 1363 & IS 1367 class 8.8. Washers shall be as per IS : 2016, IS : 5372 & IS : 5374.

All materials shall conform to their respective specifications. The use of Equivalent or higher grade or alternate materials will be considered only in very special cases subject to the approval of the Engineer in writing.

Any defective material used, pointed out at any stage of work, shall be replaced by Contractor at his own expenses. Care shall be taken to prevent any damage to the other portion of work during removal.

### **Receipt and Storing of Materials :**

Each rolled section must be marked for identification and each lot should be accompanied by Manufacturer's quality certificate, confirming chemical analysis and mechanical characteristics.

All steel parts furnished by Supplier shall be checked, sorted out, straightened and arranged by grades and qualities in stores.

Structural with surface defects such as pitting, cracks, laminations etc. shall be rejected if the defects exceed the allowable tolerances specified in relevant Standards. Welding electrodes shall be stored separately by qualities and lots inside a dry and enclosed room, in compliance with IS : 816 and as per instructions given by Engineer. Electrodes shall be perfectly dry and drawn from an Electrode oven, if required. Checking of quality of bolts of any kind as well as storage of same shall be made conforming to relevant standards.

Each lot of electrodes, bolts, nuts etc. shall be accompanied by Manufacturer's test certificates.

The Contractor may use alternative materials as compared to Design Specifications only with the written approval of Engineer.

**Material Tests :**

Contractor shall be required to produce Manufacturer's quality certificate for the material or wherever quality certificates are missing or incomplete or when material quality differs from standard Specifications the Contractor shall conduct all appropriate tests as directed by the Engineer, at no extra cost, in approved test houses. Materials for which Test Certificates are not available or for which test results do not tally with relevant standard Specification, shall not be used.

**Fabrication :**

Fabrication shall be in accordance with IS : 800 Section - V in addition to the following :

Fabrication shall be done as per approved Fabrication drawings adhering strictly to work points and work lines on the same. The connections shall be welded or bolted as per Design drawings. Work shall also include fabricating built up sections. (Fabrication of basic rolled sections equivalent from plates is not included).

All the fabricated and delivered items shall be suitably packed to be protected from any damage during transportation and handling. Any damage caused at any time shall be made good by the Contractor at his cost.

Any faulty fabrication pointed out at any stage of work shall be made good by the Contractor at his cost.

**Preparation of Materials :**

Prior to release for fabrication, all rolled sections warped beyond allowable limits shall be pressed or rolled straight and free from twists, taking care that uniform pressure is applied.

Minor warpings, corrugations etc. in rolled sections shall be rectified by cold working.

The sections shall be straightened by hot working where the Engineer so directs and shall be cooled slowly after straightening.

Warped members like plates and flats may be used as such only if wave like deformation does not exceed  $L/1000$  but limited to 3 mm ( $L$  = Length).

Surfaces of Members that are to be joined by lap or fillet welding or bolting shall be even so that there is no gap between overlapping surfaces.

**Marking :**

Marking of Members shall be made on horizontal pads, or on appropriate racks or supports in order to ensure horizontal and straight placement of such Members.

Marking accuracy shall be within  $\pm 1$  mm.

**Cutting :**

Members shall be cut mechanically (by saw or shear) or by oxyacetylene flame.

All sharp, rough, or broken edges, and all edges of joints which are subjected to tensile or alternating stresses, shall be ground.

No electric metal arc cutting shall be allowed.

All edges cut by oxyacetylene process shall be cleaned of impurities and slag prior to assembly.

**Cutting tolerances shall be as follows :**

a) For members connected at both ends  $\pm 1$  mm

b) Elsewhere  $\pm 3$  mm.

The edge preparation for welding of members more than 12 mm thick shall be done by flame cutting and grinding. Cut faces shall not have cracks or be rough.

Edge preparation shall be as per IS : 816

**Drilling :**

Bolt holes shall be drilled. Materials of thickness upto 16 mm, may be punched.

Drilling shall be made to the diameter specified in drawings.

No enlarging of holes by filing, mandrilling or oxyacetylene flame shall be allowed.

Allowable variations for holes (out of roundness, eccentricity, plumb-line deviation) shall be as per IS : 800.

- Maximum deviation for spacing of two holes on the same axis shall be  $\pm 1$  mm.

- Two perpendicular diameters of any oval hole shall not differ by more than 1 mm.

Drilling faults in holes may be rectified by reaming holes to the next upper diameter, provided that spacing of new hole centres and distance of hole centres to the edges of members are not less than allowed and that the increase of hole diameter does not impair the structural strength. Hole reaming shall be allowed if the number of faulty holes does not exceed 15% of the total number of holes for one joint.

Unless otherwise noted in the drawing - Pitch of holes -  $3D$

Edge distance-Shear  
and edge -  $1.5 D$

Rolled edge -  $1.25 D$

**Bending :**

Bending of plates, flats and sections shall be carried out on bending rolls or in presses.

Cold bending may be accepted when bending radius is equal or more than ;

- 25 times member thickness for plates and flats
- $25h$  or  $25b$  for rolled steel beams and channels according to bending plane
- $45b$  for angle

Where  $h$  = section height and  $b$  = flange width.

When bending radius is less than that indicated in 5.6.2, bending shall be done by heating the member up to  $850 - 900^{\circ}\text{C}$  (light red radiance). Cooling shall be done slowly as directed by Engineer.

Bending shall be discontinued when temperature drops below 500°C.

Accuracy of bending operations shall be checked by means of Templates and the clearance between member and template shall not be more than 1 mm.

Bent members shall not have cracks or deep indentations from bending equipment.

**Preparation of Members for Welding :**

Assembly of structural Members shall be made with proper jigs and fixtures to ensure correct positioning of members (angles, axes, nodes, etc.)

Sharp edges, rust of cut edges, notches, irregularities and fissures due to faulty cutting shall be chipped or ground or filled over the length of the affected area, deep enough to remove faults completely.

Edge preparation for welding shall be carefully and accurately made so as to facilitate a good joint.

Generally no special edge preparation shall be required for members under 8 mm thick.

Edge preparation (bevelling) denotes cutting so as to result in V,X,K or U seam shapes as per IS : 816.

Unless otherwise noted in the drawing :

$\leq 6$ mm	- Square butt
8 - 11 mm	- Single V
$\geq 12$ mm	- Double V

The members to be assembled shall be clean and dry on the welding edges. Under no circumstances shall wet, greasy, rust or dirt covered parts be assembled. Joints shall be kept free from any foreign matter, likely to get into the gaps between members to be welded.

Before assembly the edges to be welded as well as adjacent areas extending for atleast 20 mm shall be cleaned (until metallic polish is achieved).

When assembling members, proper care shall be taken of welding shrinkage and distortions, as the drawing dimensions cover finished dimensions of the Structure. The elements shall be got checked and approved by the Engineer or his authorised representative before assembly.

The permissible Tolerances for assembly of members preparatory to welding shall be as per IS : 816.

After the assembly has been checked, temporary tack welding in position shall be done by electric welding, keeping in view finished dimensions of the Structure.

Preheating of members to be joined to be carried out as per standards wherever necessary.

**Welding Procedures :**

Welding shall be carried out only by fully trained and experienced welders as tested and approved by the Engineer or his representative or the Inspectors. The cost involved for such tests shall be borne by the Contractor himself.

Qualification tests for Welders as well as tests for approval of electrodes will be carried out as per IS : 816. The nature of test for performance qualification of welders shall commensurate with quality of welding required on this work as judged by the Engineer.

Unless otherwise noted in the drawing :  $\leq 20$  mm - Electrodes to AWS E 6013  
> 20 mm - Electrodes to AWS E 7018

The Steel structures shall be automatically, semi-automatically or manually welded. Welding shall begin only after the checks shown under 5.7 have been carried out. Welding procedures and Tests for Welders skill shall be conducted as per IS : 816 and approved by the Engineer.

The welder shall mark his Identification mark on each element welded by him. When welding is carried out in open air, steps shall be taken to protect the place of welding against wind or rain. The electrodes, wires and parts being welded shall be dry.

Before beginning the welding operation, each joint shall be checked to ensure that the parts to be welded are clean and root gaps provided as per IS : 816.

For continuing the welding of seams discontinued due to some reason, the end of the discontinued seam shall be melted in order to obtain a good continuity. Before resuming the welding operation, the groove as well as the adjacent parts shall be well cleaned for a length of approximately 50 mm.

For single butt welds (in V, 1/2V or U) and double butt welds (in K, double U, etc) the rewelding of the root butt is mandatory but only after the metal deposition on the root has been cleaned by back gouging or chipping.

The welding seams shall be left to cool slowly. The Contractor shall not be allowed to cool the welds quickly by any method.

For multi-layer welding, before welding the following layer, the formerly welded layer shall be cleaned by light chipping and wire brushing. Backing strips shall not be allowed.

The order and method of welding shall be so that :

- no unacceptable deformation appears in the welded parts
- due margin is provided to compensate for contraction due to welding in order to avoid any high permanent stresses.

The defects in welds must be rectified according to IS : 816 and as per instruction of Engineer.

**Weld Inspection :**

The weld seams shall satisfy the following :

- shall correspond to Design shapes and dimensions
- shall not have any defects such as cracks, incomplete penetration and fusion, under-cuts, rough surfaces, burns, blow holes and porosity etc. beyond permissible limits (See Annexure-I).

During the welding operation and approval of finished elements, inspections and tests shall be made as shown in Annexure - II.

The mechanical characteristics of the welded joints shall be as in IS : 816.

**Preparation of Members for Bolting :**

The Members shall be assembled for bolting with proper jigs and fixtures to sustain the assemblies without deformation and bending.

Before assembly, all sharp edges, shaving, rust, dirt etc. shall be removed.

Before assembly, the contacting surfaces of the members shall be cleaned and given a coat of red oxide primer.

The members which are bolt assembled shall be set according to drawings and temporarily fastened with erection bolts (minimum 4 pieces) to check the coaxiality of the holes.

The members shall be finally bolted after the deviations have been corrected, after which there shall not be gaps.

Before assembly, the member shall be checked and got approved by the Engineer.

The difference in thickness of the Sections that are butt assembled shall not be more than 3% or maximum 0.8 mm whichever is less. If the difference is large, it shall be corrected by grinding or filling.

Reaming of holes to final diameter or cleaning of these, shall be done only after the parts have been check assembled.

As each hole is finished to final dimensions (reamed if necessary) it shall be set and bolted up. Erection bolts shall not be removed before other bolts are set.

#### **Bolting Up :**

Final bolting of the members shall be done after the defects have been rectified and approval of joints obtained.

The bolts shall be tightened starting from the centre of the joint towards the edge.

#### **Holes for Field Joints :**

Holes for field joints shall be drilled in the shop to final diameters and tested in the shop, with trial assemblies. Gas cutting of holes shall not be permitted.

When three-dimensional assembly is not possible in the shop, the holes for field joints may be drilled in shop and reamed on site after Erection, on approval by the Engineer.

For bolted steel structures, trial assembly in shop is mandatory.

The tolerance for spacing of holes shall be  $\pm 1$  mm.

#### **Tolerances :**

All tolerances regarding dimensions, geometrical shapes and sections of Steel Sections, shall be as per IS 808 & IS 1852, if not specified in the drawing.

#### **Marking for Identification :**

All elements and members prior to despatch for Erection shall be shop marked.

The members shall be visibly marked with a weatherproof light coloured paint. The size and thickness of the numbers shall be so chosen as to facilitate the identification of members.

For the small members that are delivered in bundles or crates, the required marking shall be done on small metal tags securely tied to the bundle, while the crates shall be marked directly.

Each bundle or crate shall be packed with members for one and the same assembly in the same bundle or crate, general utility members such as bolts, gussets, etc. may be packed.

All bills of materials showing weight, quality and dimension of contents shall be placed in the crates.

The members shall be marked with a durable paint, in a visible location, preferably at one end of the member so that these may be easily checked during storage and erection.

The members shall be marked in the shop before inspection and acceptance.

When the member is being painted, the marking area shall not be painted but bordered with white paint.

The marking and job symbol shall be registered in all shop delivery documents (transportation, for erection etc.)

**Shop Test Pre-assembly :**

For Steel Structures that have the same type of welding the shop test pre-assembly shall be performed on one out of every 10 members minimum.

In case one member does not meet the limiting deviations specified in the general specification in pre-assembly shop test, all members shall be shop tested.

For bolted Steel Structures, shop test pre-assembly is mandatory for all elements as well as for the entire structure in conformity with clause 5.12.

**Shop Inspection and Approval :**

**General :**

The Engineer or his representative shall have free access at all reasonable times to the Contractor's Fabrication Shop and shall be afforded all reasonable facilities for satisfying himself that the Fabrication is being undertaken in accordance with Drawings and Specifications.

Technical approval of the Steel Structure in the shop by the Engineer is mandatory.

The Contractor shall not limit the number and kinds of Tests, final as well as intermediate ones, or extra tests requested by the Engineer.

The Contractor shall furnish necessary tools gauges, instrument etc. and technical and non-technical personnel for shop tests required by Engineer, free of cost.

**Shop Acceptance :**

The Engineer shall inspect and approve at the following stages.

The following approvals may be given in shop :

- Intermediate approvals of work that cannot be inspected later.
- Partial approvals.
- Final approvals.

Intermediate approvals of work shall be given when a part of the work is performed later

- Inspection would be difficult to perform and results not be satisfactory.
- Cannot be inspected later

Partial approval in the shop is given on members and assemblies of Steel Structures before the primer coat is applied and includes :

- Approval of material
- Approval of field joints
- Approval of part with planed surface
- Test Erection
- Approval of members
- Approval of markings
- Inspection and approvals of special features, like rollers, loading

platform mechanism etc.

During the partial approval, intermediate approvals as well as former approvals shall be taken into consideration.

**Final Approval in the Shop :**



The final approval refers to all elements and assemblies of the Steel Structures with shop primer coat, ready for delivery from shop, to be loaded for transportation or stored.

The final approval comprises :

- Partial approvals.
- Approvals for shop primer coat
- Approval of mode of loading and transport
- Approval of storage (for materials stored)

Inspection by EIC shall be only at random and on critical factors and shall not absolve the contractor of the responsibility to fabricate the structures as per the specified standards & specifications.

#### **Painting and Delivery :**

Preparation of Parts for Shop Painting and Site Painting :

Painting shall consist of providing sand blasting to standard SSPC - SP10 (Sa 2-1/2) and two coats of epoxy polyimide based red oxide zinc phosphate primer of Dry Film Thickness (DFT) 25 microns for each coat and over this painting one coat of epoxy polyimide based finish to DFT of 35 microns as specified under specialised painting work given elsewhere to Steel members before despatch from shop.

#### **Site Painting :**

Two coats of primer as per the specification in Schedule of Quantities to be done at shop. 2 coats of Epoxy polyimide based finish is to be done at site only. Touchnig up shall be done wherever required and as directed by the Engineer.

Primer coat shall not be applied unless :

- Surfaces have been sandblasted to clean, dust, oil, rust, etc.
- Erection gaps between members spots that cannot be painted or where moisture or other aggressive agents may penetrate have been filled with an approved type of oil and putty.
- The surfaces to be painted are completely dry.
- Members and parts have been inspected and accepted.
- Welds have been accepted.

The following are not to be painted or protected by any coating.

- Surfaces which are in the vicinity of joints to be welded at SITE.
- Surfaces bearing markings.
- Other surfaces indicated in the Design.

The following shall be given a coat of hot oil or any approved resistant lubricant only:

- Planed surfaces.
- Holes for links.

The surfaces that are to be embedded or in contact with the concrete, shall not be painted.

The other surfaces shall be given a primer coating.

Special attention shall be given to locations not accessible, where water can collect and which after assembly and erection cannot be inspected, painted and maintained.

Holes shall be provided for water drainage and inaccessible box type sections shall be hermetically sealed by welds.

#### **Packing, Transportation, Delivery :**

After final shop acceptance and marking, the item shall be packed and loaded for transportation.

Packing must be adequate to protect items against warping during loading and unloading.

Proper lifting devices shall be used for loading, in order to protect items against warping.

Slender projecting parts shall be braced with additional steel bars before loading for protection against warping during transportation.

Loading and transportation shall be done in compliance with transportation rules.

If certain parts cannot be transported in the lengths stipulated in the Design, the position and type of additional splice joints shall be approved by Engineer.

Items must be carefully loaded on platforms for transportation with adequate means to prevent warping, bending or falling during transportation.

The small parts such as fish plates, gussets etc. shall be securely tied with wire to their respective parts.

Bolts, nuts and washers shall be packed and transported in crates or bags.

The parts shall be delivered in the order stipulated by the Engineer and shall be accompanied by documents showing :

- Quality and quantity of structure of members
- Position of member in the structure
- Particulars of structure
- Identification number/job symbol

**Field Erection :**

The Contractor shall satisfy himself about the levels, lines etc. of the Foundations well in advance, before starting the Erection. Minor chipping etc. shall be carried out by the Contractor at his expense.

Any faulty Erection done by the Contractor, shall be made good at his cost.

Approval by the Engineer or his representative at any stage of work does not relieve the Contractor of any of his required guarantees of the Contract.

**Storage and Preparation of Parts prior to Erection :**

The storage place for Steel Parts shall be prepared in advance and got approved by the Engineer before the Steel structures start arriving from the shop.

A platform shall be provided by the Contractor near the Erection Site for preliminary Erection work.

The contractor shall make the following verifications upon receipt of material at site.

For Quality Certificates regarding Materials and Workmanship according to these general Specifications and Drawings.

Whether parts received are complete without defects due to transportation, loading and unloading and defects, if any, are well within the admissible limit.

For the above work sufficient space must be allotted in the storage area.

Step shall be taken to prevent warping of items during unloading.

The parts shall be unloaded, sorted and stored so as to be easily identified.

The parts shall be stored according to construction symbol and markings so that these may be taken out in order of Erection.

The parts shall be set at least 150 mm clear from ground on wooden or steel blocks for protection against direct contact with ground and to permit drainage of water. If rectification of members like straightening etc. are required, these shall be done in a special place allotted which shall be adequately equipped.

The parts shall be clean when delivered for Erection.

**Erection and Tolerances :**

Erection in general shall be carried out as required and approved by the Engineer. Positioning and levelling of the structure, alignment and plumbing of the Stanchion and fixing every member of the structure shall be in accordance with the relevant drawings and to the complete satisfaction of the Engineer.

The following checks and inspection shall be carried out before, during and after Erection.

- Damages during transportation.
- Accuracy of alignment of Structures
- Erection according to Drawings and Specifications.
- Progress and workmanship.

In case there be any deviations regarding positions of foundations, or anchor bolts, which would lead to Erection deviations, the Engineer shall be informed immediately. Minor rectifications in foundations, orientation of bolt holes etc. shall be carried out as a part of the work, at no extra cost.

The various parts of the Steel Structure shall be so erected as to ensure stability against inherent weight, wind and Erection stresses.

The structure shall be anchored and final erection joints completed after plan and elevation positions of the Structural members have been verified with corresponding drawings and approved by the Engineer.

The bolted joints shall be tightened so that the entire surface of the bolt heads and nuts shall rest on the member. For parts with sloping surfaces, tapered washers shall be used.

Site painting after erection shall be as per clause 7.1.1

**Final Acceptance and Handling Over of Structure :**

At acceptance, the Contractor shall submit the following documents :

a) Shop and Erection Drawings - either in tracings or reproducibles.

b) 6 copies each of the following.

- Shop acceptance documents
- Quality Certificates for Structurals, Plates, electrodes, welding wire, bolts, nuts, washers etc.
- List of Certified Welders, who worked on Erection of Structure. ( With documents or qualification tests)
- Acceptance and Intermediate Control Procedure of Erection Operations.

Approval by the Engineer at any stage of work does not relieve the Contractor of any of his required guarantees of the Contract.

**Miscellaneous Steelwork :**

**Anchor Bolts :**

All materials supplied by the Contractor shall be of tested quality as per Specifications below and Test Certificates of raw materials shall be provided by the Contractor.

Fabrication of Anchor Bolts shall be in compliance with the Specifications. Complete Anchor Bolt assembly shall be as per drawings, and will include the cost of sleeve pipes, bottom plates, and other fixtures including all welding work if involved.

- a) Bolts shall be turned from M.S rounds conforming to IS 2062 Gr 'A'
- b) Nuts shall be Hexagonal type conforming to IS 1363.
- c) Plain washers shall be of mild steel conforming to IS 2016/IS 2062 Grade 'A'
- d) Threads shall be of coarse type conforming to IS 1367 & IS 4218.

The surface not to be covered with concrete shall be greased and protected from damage by wrapping and tying jute cloth/polythene.

#### **Tolerances allowed in the Erection of Plant Building without Cranes :**

The maximum tolerances for line and level of the Steelwork shall be  $\pm 3.0$  mm on any part of the Structure. The Structure shall not be out of plumb more than 5.0 mm on each 10 M section of height and not more than 8.0 mm per 30 M section.

These tolerances shall apply to all parts of the Structure unless the Drawings issued for Erection purposes state otherwise.

<b>Component</b>	<b>Description</b>	<b>Variation Allowed</b>
Main column and roof posts	Shifting of column axis at foundation level with respect to building line :	
	In longitudinal direction	$\pm 5.00$ mm
	In lateral direction	$\pm 5.00$ mm
	Deviation of both Major Column Axis from Vertical between Foundation and Other Member connection Levels.	
	For a Column upto and including 10 M height.	$\pm 5.00$ mm from True Vertical.

Component	Description	Variation Allowed
	For a column greater than 10 M but less than 40 M height.	$\pm 5.00$ mm from True Vertical for any 10 M length measured between connection levels, but not more than $\pm 8.00$ mm for upto 40 M height.
	For Adjacent Pairs of Columns across the width of the Building prior to placing of Truss.	$\pm 5.00$ mm of True Span.
	For individual Column Deviation of any Bearing or resting level from levels shown on Drawings.	$\pm 5.00$ mm
	For Adjacent Pairs of Columns either across the width of Building or Longitudinally Level Difference allowed between Bearing or Seating Level supposed to be at the same level.	$\pm 5.00$ mm
Trusses	Deviation of Centre of Span or Upper Chord Member from Vertical Plane running through Centre of Bottom Chord.	1/1500 of the span or 10 mm whichever is less.

Component	Description	Variation Allowed
	Lateral Displacement of Top Chord at Centre of Span from Vertical Plane running through Centre of Supports.	1/250 of Depth of Truss or 20 mm whichever is less.
Crane girders and tracks	Difference in levels of Crane rail measured between Adjacent columns.	$\pm 2.0$ mm
	Deviation to Crane rail gauge	$\pm 3.0$ mm
	Relative Shifting of Ends of Adjacent Crane Rail in Plan and Elevation after Thermit Welding.	$\pm 2.0$ mm
	Deviation of Crane Rail Axis from Centre Line of Web.	$\pm 3.5$ mm
Setting of Expansion Gaps	At the time of setting of the Expansion Gaps, due regard shall be taken of the Ambient Temperature above or below 30°C. The co-efficient of Expansion or Contraction shall be taken as 0.000012 per unit Length per degree Celsius.	

**INDIAN STANDARD SPECIFICATIONS (BIS) RELEVANT TO**  
**STEEL CONSTRUCTION & CLOAKING**

IS 123 :RED OXIDE PRIMER  
IS 277 :GALVANIZED STEEL SHEETS (PLAIN & CORRUGATED)  
IS 459 :CORRUGATED & SEMI-CORRUGATED A.C. SHEETS  
IS 730 :HOOK BOLTS FOR CORRUGATED SHEET ROOFING  
IS 800 :COP FOR GENERAL CONSTRUCTION IN STEEL  
IS 806 :COP FOR USE OF STEEL TUBES IN GENERAL BUILDING  
CONSTRUCTION  
IS 808 :DIMENSIONS OF HR STEEL BEAMS, CHANNELS & ANGLES  
IS 811 :COLD FORMED LIGHT GAUGE STRUCTURAL STEEL SECTIONS  
IS 812 :GLOSSARY OF TERMS RELATING TO WELDING & CUTTING  
IS 813 :SCHEME OF SYMBOLS FOR WELDING  
IS 814 (P 1 & 2) :COVERED ELECTRODES FOR METAL ARC WELDING OF  
STRUCTURAL STEELS  
IS 815 :CLASSIFICATION CODING OF COVERED ELECTRODES FOR METAL  
ARC WELDING OF STRUCTURAL STEELS  
IS 816 :COP FOR METAL ARC WELDING FOR GENERAL CONSTRUCTION  
IN MS  
IS 817:COP FOR TRAINING & TESTING OF METAL ARC WELDERS  
IS 822:COP FOR INSPECTION OF WELDS  
IS 875(P 1 TO 5):COP FOR DESIGN LOADS FOR BUILDINGS & STRUCTURES  
IS 961:HIGH TENSILE STRUCTURAL STEELS  
IS 1079: HR CARBON STEEL SHEET & STRIP  
IS 1161 :STEEL TUBES FOR STRUCTURAL PURPOSES  
IS 1239 (P 1 & 2):MS TUBES & TUBULARS  
IS 1254 : CORRUGATED ALUMINIUM SHEETS  
IS 1363(P 1 TO 3):HEXAGON HEAD FASTENERS OF PRODUCT GRADE 'C'  
IS 1364(P 1 TO 5):HEXAGON HEAD FASTENERS OF PRODUCT GRADE A&B  
IS 1367:TECHNICAL SUPPLY CONDITIONS FOR THREADED  
(P1 TO 18):STEEL FASTENERS  
IS 1477 (P 1 & 2) :COP FOR PAINTING OF FERROUS METALS IN BUILDINGS  
IS 1626 (P 2 & 3):A.C. GUTTERS, PIPES & ROOFING ACCESSORIES  
IS 1852 :ROLLING & CUTTING TOLERANCES FOR HR STEEL PRODUCTS  
IS 1977 :STRUCTURAL STEEL - ORDINARY QUALITY  
IS 2016 :PLAIN WASHERS  
IS 2062 :WELDABLE STRUCTURAL STEEL  
IS 2074 :RED OXIDE ZINC CHROME PRIMER  
IS 2339 :ALUMINIUM PAINT  
IS 2527 :COP FOR FIXING GUTTERS & RAIN WATER PIPE FOR ROOF  
DRAINAGE  
IS 2932 :SYNTHETIC ENAMEL PAINTS  
IS 3007 (P 1 & 2) :COP FOR LAYING A.C. SHEETS

IS 3444:CRANE RAIL SECTIONS  
IS 3502 :STEEL CHEQUERED PLATES  
IS 3548 :COP FOR GLAZING IN BUILDING  
IS 4000 :COP FOR ASSEMBLY OF STRUCTURAL JOINTS USING HSFG FASTENERS  
IS 4923 :HOLLOW STEEL SECTIONS FOR STRUCTURAL USE  
IS 5372 :TAPER WASHERS FOR CHANNELS  
IS 5374 :TAPER WASHERS FOR BEAMS  
IS 5624 :FOUNDATION BOLTS  
IS 6639 :HEXAGONAL BOLTS FOR STEEL STRUCTURES  
IS 7205 :SAFETY CODE FOR ERECTION OF STRUCTURAL STEELWORK  
IS 7215 :TOLERANCES FOR FABRICATON  
IS 8869 : WASHERS FOR CORRUGATED SHEET ROOFING  
IS 12093: COP FOR LAYING & FIXING SLOPED ROOF COVERINGS USING PLAIN & CORRUGATED GALVANISED STEEL SHEETS  
IS 12843:TOLERANCES FOR ERECTION OF STEEL STRUCTURES  
COP:Code of Practice

### **COMMON WELD DEFECTS FOR FILLER WELDS IN STRUCTURAL STEEL FABRICATION**

1. Incomplete Fusion - is defined as the failure to fuse together adjacent layers of weld metal or weld metal and base metal.

Causes :

- i) Failure to raise the temperature of base metal (or previously deposited weld metal) to the melting point.
- ii) Improper cleaning of the oxides or other foreign material present on the surface to which the deposited metal must fuse.
- iii) In-experienced welders.

2. Inadequate Penetration is defined as the failure of the filler metal and base metal to fuse integrally at the root of the weld.

Causes :

Heat transfer conditions such as,

- i) Use of too large an electrode.
- ii) An abnormally high rate of travel.
- iii) Use of insufficient welding current, is a frequent source of this defect.

3. Cracks :

In multilayer welds, cracking mostly occurs in the first layer of the weld and unless repaired, will continue through other layers as they are deposited. Cracks may be longitudinal, transverse or crater cracks.

Causes :

- i) Improper electrode manipulation or electrical conditions.
- ii) Higher speed of travel resulting in lesser thickness of the deposit.
- iii) Higher base metal thickness (which may require pre-heating.)



iv) Wrong type of electrode.

4. Under cut - is defined as the melting away of the sidewall of a joint at the edge of a layer or bead thus forming a sharp recess in the sidewall.

Causes :

i) Too high a current

ii) Too long an arc.

iii) Magnetic arc below.

5. Slag inclusions - are defined as oxides and non-metallic solids that are entrapped in weld metal or between weld metal and base metal.

Causes :

i) High viscosity of the weld metal.

ii) Rapid solidification of weld metal.

iii) Too low a welding temperature.

iv) Improper cleaning between passes.

v) Improper electrode manipulation.

6. Porosity - is defined as gas pockets or voids, free of any solid material, that are frequently found in welds. It may be present as uniformly scattered porosity, cluster porosity or linear porosity.

Causes :

i) Excessive Current.

ii) Excessive arc length.

iii) Wet/unclean joint surfaces.

iv) Eccentric burning of electrode.

v) Frequent interruptions.

7. (a) Incorrect Weld Profiles.

Causes :

i) Desirable weld profile.

ii) Acceptable fillet weld profile.

iii) Insufficient lag.

(b) Insufficient throat.

(c) Excessive convexity.

8. Overlap - is the condition in which weld metal protrudes beyond the bond lines at the toe of a weld.

Causes :

i) Incorrect welding technique.

ii) Improper electrical conditions i.e. excessive current or arc length

### **EXTENT OF INSPECTION AND TESTING**

Sl. No.	Inspection of Test	Coverage	Procedure	Evaluation Findings and remedy of defect
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1.	Inspection of weld seam appearance.	All Welds	Naked eye or lens.	All faulty welds shall be rectified.
2.	Checking of sizes.	Atleast one for each weld seam.	Ordinary Measuring instruments (rule, templates)	Should faulty weld be found, all welds shall checked and all defect shall be rectified
3.	Mechanical Test for welding procedures performance and Electrodes.	---	As per IS 816	As per IS 816

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## 6. TECHNICAL SPECIFICATION FOR SPECIALISED PAINTING WORK

### ANTI CORROSIVE TREATMENT FOR STRUCTURAL STEEL

The surface shall be sand blasted to standard SSPC - SPIO (Sa 2-1/2) with surface profile not exceeding 50 microns.

#### First Coat :

One coat of epoxy polyimide based Red Oxide Zinc Phosphate Primer of Dry Film Thickness (DFT) 25 microns. Berger paints epilux 610 primer or equivalent should be used.

Mixing Ratio : Base : Catalyst 3:1 by volume

Application : Brush roller airless and conventional spray.

Theoretical spreading rate : 13 Sqm / Ltr.

#### Drying Time

Touch Dry : 1 hour

Dry to handle : 4 hours

Hard Dry : Overnight

Curing Time : 6 - 7 days  
 Colour : Red Oxide

**Second Coat :**

Shall be as per first coat given above.

**Third Coat :**

One coat of Epoxy Polymide based finish - Berger paints Epilux 4, Shalimar enamel or equivalent to DFT of 35 microns. Colour should be specified by the Engineer.

Type : Two pack, cold cured  
 Composition : Catalyzed epoxy resin suitably pigmented  
 Mixing Ratio : Base : Catalyst 3:1 by volume  
 Application : Brush, roller, airless & conventional spray  
 Theoretical spreading rate : 13 Sqm / Ltr.

**Drying Time**

Touch Dry : 2 - 3 hours  
 Dry to handle : 6 - 8 hours  
 Hard Dry : Overnight  
 Curing Time : 6 - 7 days

**Overcoating Interval**

Minimum : Overnight  
 Maximum : 5 days  
 Finish : Glossy

**Fourth Coat :**

Shall be as per third coat given above.

**TOTAL DRY FILM THICKNESS (DFT) - 120 MICRONS.**

The DFT shall be checked with Elcometer.

## 7. TECHNICAL SPECIFICATION FOR MASONRY WORKS

The specification covers the general requirements for stone and brick masonry.

**MATERIALS :**

**Cement :**

Ordinary Portland cement of 43 grade conforming to IS : 8112 (latest) shall be used for all masonry works. Cement shall be fresh when delivered at site.

**Sand :**

Sand shall conform to IS : 383 & IS : 2116. Sand shall be hard, durable, clean and free from dirt, clay, organic matter or other impurities. Sand shall not be too fine nor too coarse and shall fall within the grading zones I to IV given in Table III of IS : 383. The silt content of sand shall not exceed 5% by volume.

**Stones :**

Stones shall be the type specified and shall be of hard granite be salt or trap stone, of uniform colour and texture. It shall be hard, sound, durable, free from flaws, cracks, injurious veins, decay and weathering and shall be freshly quarried from an approved quarry. Discoloured or distorted stones with boulders skin or earth or porous matter or stones with round surface shall not be used.

The crushing strength of the rubble for use in the stone masonry should not be less than 150 Kg/Sqcm.

The stones, when immersed in water for 24 hours, shall not absorb water by more than 5 percent of their dry weight when tested in accordance with IS : 1124.

**Bricks :**

Bricks shall conform to the requirements of IS : 1077.

Bricks shall conform to the requirements of IS 1077. Bricks of normal size 8-3/4" x 4-1/2" x 2-3/4" shall be used. All bricks shall be chamber burnt and of first class quality sound, hard, well burnt throughout but not over burnt, of regular uniform size, shapes and colour (generally deep red or copper) homogenous in texture and free from flaws and cracks. They shall have plane rectangular faces with parallel sides and square, straight and sharply defined arisers. Brick shall not be broken, cracked, stratified, under burnt, over burnt or soft. A fractured surface shall show a compact fine grained, uniform and dense texture free from lumps of lime, laminations, cracks, air holes, grit, soluble salts causing efflorescence or other defects which may in any way impair the strength, durability appearance and usefulness of the brick. A clear metallic ringing sound shall be emitted when two bricks are struck together. After 24 hours immersion in cold water, water absorption by weight shall not exceed 20 percent of the dry weight of the brick. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 600 mm. The minimum compressive strength of bricks shall be 35 Kg/Sq.cm.

The tolerance permitted in the accepted size of the bricks shall be plus or minus 3 mm in any dimension. Representative samples of bricks shall be submitted to the Engineer for approval before supply to site and the approved samples shall remain with the Engineer. All bricks proposed to be used shall conform to the approved samples in all respects. Any brick found not upto the specification shall be removed immediately from the site at the Contractor's cost.

**Water :**

Water used for mixing mortar and curing shall be clean and free from oil, acid, salt and other injurious materials and shall be in accordance with clause 4.3 of IS : 456. Water fit for drinking will generally be found suitable.

**Mortar Mixing :**

Mixing of mortar shall be done in a mechanical mixer. Hand mixing shall be resorted to only when specifically permitted by the Engineer. Cement and sand shall be mixed dry in specified proportions thoroughly and then water shall be added gradually. Wet mixing shall be continued till mortar of the consistency of a stiff paste and uniform colour is obtained. Only the quantity of mortar which can be used within thirty minutes of its mixing shall be prepared at a time.

Mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within thirty minutes after the water is added to the dry mixture. Mortar left unused for more than thirty minutes after mixing shall be rejected and removed from the site of work.

**SIZE STONE MASONRY :**

Size stones shall be of hard granite, basalt or trap stone obtainable from approved quarry. The stones shall be clean and wetted before they are used.

Height of course, shall not be less than 15 cms. and all courses shall be of uniform height. Unless otherwise instructed the depth of higher courses should not be more than the depth of lower courses. Bed and sides shall be hammer or chisel dressed from the face 75 mm and 35 mm respectively.

No face stone shall be less in depth than in height or shall tail into the work to a length less than the height. Stones shall break joints atleast half the height of the course. Faces of stones shall be hammer dressed and bushing not be more than 25 mm. Thickness of joints shall not be more than 20 mm. edges of face stones of exposed faces shall be chiselled true to both longitudinal and vertical lines. Exposed faces of corner stones to be line dressed 50 mm wide.

Bond or through stones shall be provided not exceeding 2.0 metre in each course and shall be staggered. Bond stone shall be from the front to the back of the walls. For wall upto 60 cms thick, bond stones shall be in one piece and for walls over 60 cms. thick they shall either be in one piece (if available locally) or be in the series of headers. Each header overlapping the adjoining one by not less than 150 mm. Alternatively bond stones may be provided with 9"\*9" header. bond or through stones shall be marked as directed to enable their being easily detected even after having been built in position. The interior or filling shall be with flat bedded stones laid in mortar. Chips, spalls shall be used to avoid thick mortar joints and shall not exceed 10% of the quantity of stone masonry. Care is to be taken that no dry work or hollow spaces shall be left anywhere in the masonry.

#### **UNCOURSED RUBBLE MASONRY :**

The stones as received from quarry are to be set in work after knocking off weak corners and edges with mason's hammer. They are to be laid carefully so as to break joint as much as possible and shall be solidly bedded in mortar. No joint shall exceed 20 mm chips of stone and spalls shall be wedged into the work wherever necessary to avoid thick beds or joints of mortar. No dry work or hollow spaces shall be allowed, every stone whether large or small shall be set flush in mortar, smaller stones used in filling being carefully selected to fit snugly the interstices between the larger ones. The face stone shall be selected from the mass of quarry stones for proper size good beds and uniform colour and shall be laid as far as possible without pinning in front. One through stone shall be provided for every sq.m. of facing and shall run back into full depth of the work. The quoins for exposed corners unless otherwise specified shall be of selected stone neatly dressed with hammer and chisel to form required angle and laid header and stretcher alternatively.

#### **RANDOM RUBBLE MASONRY :**

The face stone shall be laid absolutely without pinnings on the face. Every stone shall be carefully fitted so as to form neat and close joints and if necessary the edges shall be dressed with chisel so as to ensure close joints work. The thickness of joint will be as specified for each work and in no case more than 20 mm. The thickness of joint should be uniform on the face variation being within 25%. Mortar in joints should be scraped 12 mm deep for pointing.

The stones shall be roughly chisel dressed to ensure equal size on face as far as possible. They shall be of uniform colour and they shall be carefully laid and solidly bedded in mortar and shall tail back and bond well into the backing and shall not be of greater than either breadth of face or length of tail into the work.

One header or through stone shall be inserted for every square metre of face and shall run right through the wall. Stones shall be arranged to break joints as much as possible and long vertical lines of joining shall be avoided in face work. The quoins unless otherwise specified shall be of selected stones neatly dressed with hammer chisel to form required angle and laid header and stretcher alternatively. The masonry work has to be kept wet for 10 days

In the case of cement mortar, the proportion specified is on volume basis. But cement shall be weighed on the assumption that one cubic metre of cement weighs 1440 kgs. The Engineer may also require the cement to be measured by volume but on the same assumption. Weep holes for Retaining wall shall be provided at the rate of one weep hole per one sq.metre.

### **BRICK WORK :**

Brick work shall conform to IS : 2212.

Bricks shall be stacked in regular tiers, even as they are unloaded to minimise breakages and defacement bricks. Samples of each type of brick taken at random from the lot shall be deposited with the Engineer for his approval before being used in the work. All subsequent deliveries shall be upto the standard of the sample approved.

First quality chamber burnt bricks shall conform to IS 1077. Bricks shall be thoroughly cleaned and well wetted. Bricks shall be soaked for at least 2 hours in fresh water before being used on the work. No bats or cut bricks shall be used.

All brick work should be carried out as shown on the drawings with set backs, projections, cuttings, toothings etc. Wherever the proportion of cement mortar has not been specifically mentioned, cement mortar in the proportion of 1:6 shall be used. Flat brick arches shall be provided wherever required without any extra cost. Brick work shall be kept wet while in progress till mortar has properly set. On holidays or when the work is stopped, top of all unfinished masonry shall be kept wet. Should the mortar be dry, white or powdery, for want of curing, work shall be pulled down and rebuilt at the contractor's expense.

Unless otherwise specified, brickwork shall be done in English bond with frog upwards. The bricks shall be bedded & joined with mortar in such a manner as not to leave voids. When laying the bricks shall be slightly pressed so that mortar can get into all the pores of the brick surface to ensure proper adhesion. Each brick shall be correctly bedded into position by tapping with the handle of the trowel, grouting of mortar slurry will not be allowed, except where necessary for special reasons and in such cases, prior permission of the Engineer shall be obtained.

Care shall be taken that each course of brick work is truly horizontal & perfect in bond and the face of the wall is straight, plumb and even. Verticality of the walls and horizontality of the courses shall be checked very often with plumb-bob and spirit

level respectively. The mortar joints shall be 10mm in thickness, except where extra thickness is required for the purpose of bringing the brick work to the required height or level. Half bricks or bats shall not be used except for obtaining the bond & where absolutely necessary.

**Brick work in 230 mm wall :**

In the case of 230mm thick walls, if bricks are of size such that the width of the header course does not come equal to the width of the stretcher course, the difference shall be made up during construction of brick work itself by the same mortar as used for construction of masonry to provide a plane vertical surface. The surface should also be scarified to receive plaster.

All junctions of walls and cross walls shall be carefully bonded into the main walls. The rate of laying masonry will be upto a height of 100 cm per day if cement mortar is used. Greater heights may be built only if permitted by the Engineer.

During rains, the work shall be carefully covered to prevent mortar from being washed away, should any mortar or cement be washed away, the work shall be removed and rebuilt at the contractor's expense.

**MIX PROPORTION :**

The mortar shall consist of One part of cement and six parts of sand for brick work 230 mm thick and above or as specified in the Bill of Quantities (BOQ). For brick piers, half brick walls, honey combed brickwork and hollow (cavity) walls, the mortar mix shall consist of one part of cement and four parts of sand or as specified in the BOQ.

**HALF BRICK WORK :**

This work shall be set in cement mortar as specified. Unless otherwise specified the walls will be provided with R.C.C. binders reinforced with 2 nos. of 8 mm mild steel / tor steel bars with M.S. tie bars at 1 metre interval from floor level. The cost of half brick work shall include the cost of reinforcement and form work for binders. RCC band shall be of size 115mm wide x 80mm high and shall be continuous, unless where broken by openings in walls.

**CURING :**

All fresh brick work shall be protected from the effects of sun, rain, etc., by suitable covering. All brick works shall be kept constantly moist on all the faces for atleast 10 days.

**SCAFFOLDING :**

Unless otherwise instructed by the Engineer, double scaffolding having two sets of vertical supports shall be provided for all building work. The supports shall be sound, strong and tied together with horizontal pieces over which scaffolding planks shall be fixed. The contractor shall be responsible for providing and maintaining sufficiently strong scaffolding so as to with stand all loads likely to come upon it. No wooden scaffolding is allowed. Poles and platform other items should be steel / stronger / similar materials.

## **8. TECHNICAL SPECIFICATION FOR BLOCK MASONRY**

### **Indian Standards**

Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies/ conflict noticed shall be directed to the ENGINEER for his direction/ approval. However, as a general rule more stringent specification shall take precedence.

- a) IS 269 Specification for ordinary and low heat portland cement grade 33.
- b) IS 383 Specification for Coarse and fine aggregates from natural sources for concrete.
- c) IS 455 Specification for Portland slag cement
- d) IS 456 Code of Practice for plain and reinforced concrete.
- e) IS 2185 Specification for concrete masonry units <sup>[1]</sup><sub>SEP</sub> Part – 1 Hollow and solid concrete blocks <sup>[1]</sup><sub>SEP</sub> Part – 2 Hollow and solid light weight concrete blocks Part – 3 Autoclave Cellular (Aerated) concrete blocks
- f) IS 2572 Code of Practice for construction of hollow concrete block masonry.
- g) IS 2645 Specification for integral waterproofing compound.
- h) IS 8112 Specification for ordinary Portland cement grade 43.
- i) IS 9103 Specifications for admixtures for concrete.

### **Scope of Work**

This section of the specification, when read in conjunction with the Tender Drawings, provides particular requirements with respect to the following:

Provide, construct with specified strength, quality concrete block masonry conforming to IS Code of Practices, approved method of statement by ENGINEER, including providing leveling course PCC 1:3:6 to adjust with full size blocks, approved mix of mortar, construction and expansion joint fillers, metal reinforcement wherever required of type, size and shape, providing special bond adjusting blocks, reinforced patti (course runner) beams of concrete M 15 required double – legged scaffolds, etc complete. The concrete block masonry shall be finished with plaster, Plaster with ceramic tiles, metal clad, or left with natural fair face.

Particular Interfaces <sup>[1]</sup><sub>SEP</sub> i) Complete the Detailed Design of all interfaces with adjoining trades prior to commencement of manufacture. <sup>[1]</sup><sub>SEP</sub> ii) Ensure that all interfaces are fully co-ordinated prior to commencement.

Complete Detailed Design drawings of all control joints, movement joints, ties, restrains, tolerances prior to commencement of construction to be approved by Engineer.

### **SYSTEM DESCRIPTION**

Concrete block walling

#### **Samples, Mock-ups, Prototypes and Quality Benchmarks**

Post Contract Samples <sup>[1]</sup><sub>SEP</sub> Provide post contract samples in accordance with Section A. Submittals:

- i) Concrete blocks of each size and type
- ii) Ties <sup>[1]</sup><sub>SEP</sub>
- iii) Joint fillers
- iv) Reinforcing joint fillers
- v) All fixing types <sup>[1]</sup><sub>SEP</sub>



vi) Control joints, if any

#### Mock-ups

The contractor shall prepare and install mockup samples as per approved shop drawings. Mockup samples shall be to full size and shall be true representation of actual works to be carried out at site. Mockups may be part of completed work if undistributed.

Test Requirements<sup>[1]</sup><sub>[SEP]</sub> Carry out test or provide published and certified data to demonstrate all structural performance requirements.

#### Shop Drawings

The contractor shall prepare shop drawings for layouts based on architectural concept drawings. Drawings shall include –

- a) Detail plan with material & sizes of each element.
- b) Details shall show expansion, contraction, control and isolation joints in Structure and finished surfaces.
- c) Method of fixing.

### QUALITY ASSURANCE

- a) Contractor shall procure block from approved concrete block<sup>[1]</sup><sub>[SEP]</sub> manufacturer.
- b) Block manufacturer should have minimum five years experience in<sup>[1]</sup><sub>[SEP]</sub> manufacturing of blocks.
- c) Manufacturer shall give certificates that blocks manufactured are<sup>[1]</sup><sub>[SEP]</sub> of specified minimum crushing strength conforming to IS and are<sup>[1]</sup><sub>[SEP]</sub> fully cured.
- d) Manufacturer shall confirm materials used and method of casting, <sup>[1]</sup><sub>[SEP]</sub> required plants, equipments meets conform to IS.

### MATERIAL

#### Cement

- a) Cement used shall be ordinary Portland cement conforming to IS<sup>[1]</sup><sub>[SEP]</sub> and shall be of grade 43 or 33.
- b) It shall be received in bags of 50 kg or loose in tankers and each<sup>[1]</sup><sub>[SEP]</sub> batch shall be accompanied with a test certificate of the factory. Also it shall be tested before use to ascertain its strength, setting time, etc. In case cement has been stored for over 3 months or for any reasons the stored cement shows signs of deterioration or contamination, it shall be tested as per the direction of the Engineer prior to use in the works.
- c) Cement complying with any of the following Indian Standards may be used at the discretion of the Engineer : IS 269-1989, 455-1989, 1489-1999, 6909- 1990, 8041-1990, 8043-1991. When cement conforming to IS: 269-1989 is used, replacement of cement by fly ash conforming to IS:3812-1981 may be permitted up to a limit of 20%. However, it shall be ensured that blending of fly ash with cement is as intimate as possible, to achieve maximum uniformity.

#### Aggregates

- a) Aggregate shall conform to IS 383 requirements. Coarse<sup>[1]</sup><sub>[SEP]</sub> aggregate shall be obtained from natural sources such as stone, gravel etc. crushed or uncrushed from approved quarries. Aggregate shall be hard, durable, clean and free from adherent coatings. Grading shall be as indicated in IS 383. Fineness modules of the combined aggregates shall be between 3.6 and 4. Coarse aggregates shall be free from harmful

materials such as iron, pyrites, coal, mica, shale or similar laminated material, clay, alkali, soft fragments sea shells, organic impurities etc. Impurities present within acceptable limits shall not adversely affect strength and durability.

b) Fine aggregates<sup>[SEP]</sup> Sand shall be hard, durable, clean and free from adherent<sup>[SEP]</sup> coatings and organic matter and shall not contain any appreciable amount of clay. Sand shall not contain harmful impurities such as iron, pyrites, coal particles, lignite, mica shale or similar laminated material, alkali, and organic impurities in such form or quantities as to affect the strength or durability of concrete or mortar.<sup>[SEP]</sup> When tested as per IS 2386 part I & II, fine aggregate shall not exceed permissible quantities of deleterious materials as given in IS 383 table 1 “Limits of deleterious materials (Aggregate)”.

Water

a) Water used for mixing and curing shall be clean reasonably clear<sup>[SEP]</sup> and free from objectionable quantities of selfs, silts, alkalies, acids<sup>[SEP]</sup> etc.

b) Water tested shall be in accordance with IS 3025. Maximum<sup>[SEP]</sup> permissible limits of deleterious materials in water as given in IS 456.

### **Concrete Block<sup>[SEP]</sup>**

a) Concrete blocks may be hollow (open or closed cavity) or solid and shall be referred to by its nominal dimension. The term nominal dimension includes the thickness of the mortar joint. Actual dimensions shall be 10 mm short of the nominal dimensions.

b) Blocks shall be made in sizes and shapes to fit different construction needs. It includes stretcher, corner, double corner or pier, jambs, header, bull nose, partition block and concreted floor units. Nominal dimensions of concrete blocks shall be<sup>[SEP]</sup> Length - 400, 500, or 600 mm<sup>[SEP]</sup> Height - 200 or 100 mm<sup>[SEP]</sup> Width - 100, 150, 200, 250, or 300 mm

c) Maximum variations in length shall be 5% in length and 3% in width and height. Face shells and webs shall not be less than the values given in IS 2185 Part I – Table 1 “Minimum face shell and web thickness”.

d) Concrete shall be mixed in the mechanical mixer. Blocks shall be moulded, laid and compacted with automatic machines. No hand/manual compaction shall be permitted unless approved by the PM in writing for special blocks. Care shall be taken to see that the mix is placed in layers and each layer thoroughly tamped until the whole mould is filled up. Blocks shall be protected until they are sufficiently hardened to permit handling without damage.

e) Blocks shall be cured in the curing yard by keeping them continuously moist for at least 14 days. Steam-cured blocks shall be preferred. Cured blocks shall be allowed to dry for a period of 4 weeks before being used. The blocks shall be allowed to complete their initial shrinkage before they are laid in the wall.<sup>[SEP]</sup> Blocks may be manufactured either at construction site or in factory on a central casting platform using steel moulds with or without surface vibration for compaction of cement concrete.

f) Mould<sup>[SEP]</sup>

Moulds shall be fabricated using mild steel plates and mild steel angles for stiffening the plates. The mould shall be either fixed type (box with four side walls fixed at

corners, and top and bottom open) or split type. Split type may be either individual or gang mould. Where the compaction of the concrete is done manually, the mould may be either fixed type or split type. When the compaction of the blocks is done with surface vibrator, the mould shall be only split type (individual or gang mould).

g) All blocks shall be sound and free of cracks or other defects. For exposed construction face or faces shall be free of chips, or other imperfections, and the overall dimensions of the blocks shall be in accordance to tolerance as specified.

h) Number of Tests<sup>[1]</sup><sub>SEP</sub>

All the 20 blocks shall be checked for dimensions and inspected for visual defects.

Out of the 20 blocks, 3 blocks shall be subjected to the test for block density, 8 blocks to the test for compressive strength, 3 blocks to the test for water absorption and 3 blocks to the test for drying shrinkage and later to the test for moisture movement.

The remaining 3 blocks shall be reserved for retest for drying shrinkage and moisture movement if a need arises.

i) Blocks shall be considered as per IS if requirements of conditions mentioned in 11.2 to 11.5 of IS 2185 (Part I) are satisfied.

1. The number of blocks with dimensions outside the <sup>[1]</sup><sub>SEP</sub> tolerance limit and/ or with visual defects, among those inspected shall not be more than two.
2. Density and compressive strength shall be greater than or <sup>[1]</sup><sub>SEP</sub> equal to the minimum limit specified in table 2 of IS 2185 <sup>[1]</sup><sub>SEP</sub> (part I) "Physical requirements (Concrete blocks)".
3. Drying shrinkage shall not exceed 0.1 percent.
4. Water absorption shall not be more than 10 percent by <sup>[1]</sup><sub>SEP</sub> mass.

#### **Light Weight Blocks**

1. Light weight cement concrete blocks as manufactured by M/s Siporex or equivalent approved. Blocks are manufactured under patent and brand. Blocks sizes are  
650x240x100mm  
650x240x150mm  
650x240x200mm
2. Blocks should have minimum crushing strength 15 Kg/ Sq cm for 100mm thick blocks and 30 Kg/ Sq cm for 150mm and 200mm thick blocks.<sup>[1]</sup><sub>SEP</sub>
3. Block shall be manufactured conforming to IS 2185 Part-III.
4. All blocks shall be sound and free of cracks or other defects. For exposed construction face or faces shall be free of chips, or other imperfections, and the overall dimensions of the blocks shall be in accordance to tolerance as specified

#### **Admixtures**

Additives or admixtures may be added to the cement or concrete mix conforming to the following Indian Standard specifications.

- a) IS 9103 Specifications for admixtures for concrete.
- b) IS 3812 Specification for fly ash for use as pozzolana and <sup>[1]</sup><sub>SEP</sub> admixture.
- c) IS 2645 Specifications for integral water proofing compound. <sup>[1]</sup><sub>SEP</sub> Other additives or admixtures not being governed by Indian Standards shall be tested and checked that the same are not detrimental to durability. Any usage shall only be after the approval of the Engineer.

**Joint Fillers**

Bituminous impregnated, premoulded joint filler board shall be of approved quality, manufacturer and conform to IS 1838 part I.

**Metal Reinforcement<sup>[1]</sup><sub>[SEP]</sub>**

Expanded metal used shall comply with IS 412.

**Delivery/ Storage**

- a) Load, unload deliver, store all concrete blocks with due care, at <sup>[1]</sup><sub>[SEP]</sub> site to be free from damage, dirt, intrusion of foreign materials etc.
- b) Store all concrete block units on raised solid platforms.
- c) Protect block from any excess of weather conditions

**SITE INSTALLATION****GENERAL<sup>[1]</sup><sub>[SEP]</sub>**

- a) Concrete blocks shall not be wetted like brick masonry prior to use. In total dry climate top and sides may be slightly moistened to avoid absorption of water from mortar.
  - b) Concrete block work shall be laid in English bond. Joints shall not be bigger than 10 mm and will be perfectly horizontal and vertical. Joints shall be raked 10 mm deep while mortar is green.
  - c) Cut blocks shall not be used. Special solid precast blocks at site shall be cast well in advance to be used as spacers and to adjust breaking of vertical joints.
  - d) Cracks in block masonry are due to shrinkage or expansion of blocks or due to load settlement, thermal expansion or changes in moisture content in the structural members enclosing the block walls. The following measures are recommended to prevent formation of cracks.
1. While curing, the block masonry should be lightly sprinkled with water and not made excessively wet.
  2. Expansion joints shall be provided in walls exceeding 30 m in length.
  3. Reinforcement should be provided in the bed joints in block work, one course above and one course below windows and above doors in order to distribute the shrinkage/temperature stresses occurring at the corners of openings, more uniformly throughout the walls.
  4. In framed structures, erection of partition and panel walls should be delayed to take care of deformations due to structural loads.
  5. <sup>[1]</sup><sub>[SEP]</sub> Partition walls should be suitably reinforced in lower courses to strengthen against excessive deflections of floor slabs and should be separated from the ceiling by a layer of resilient material. Joint shall be carried out in plaster or any other finish.
- e) Where required damp proof course layer shall be laid as specified.

**Provisions for door and window frames**

- <sup>[1]</sup><sub>[SEP]</sub> a) A course of solid concrete block masonry shall be provided under door and window openings (or a 10cm thick pre-cast concrete sill block under windows). The solid course shall extend for at least 20cm beyond the opening on either side. For jambs of very large doors and windows either solid unit are used, or the hollows shall be filled in with concrete of mix 1:3:6 using 12.5 mm nominal size aggregates
- b) Exposed faces and corners of masonry damaged during construction shall be removed and

repaired as acceptable to Engineer

### **Scaffolding**

- a) Scaffolding independent of block work i.e. double legged ~~[[SEP]]~~scaffolding shall be provided. It should be tied to block work or structure at suitable intervals in both directions. Two rows of planks shall be provided all around. Planks shall be at least 50 mm thick and well-tied to scaffolding. Railing to the outside face shall be provided.
- b) While erecting scaffolding, the following points must be noted and closely followed:
  1. Minimum number of holes in the horizontal direction.
  2. No holes near the skew backs of arches.
  3. Scaffolding must be sound and strong and easy to maintain.
  4. Holes left must be closed while finishing the plaster.
- c) Raking back shall be carried out at an angle not steeper than 45 degrees in case all the block work is not raised together.
- d) The block should be of full height and no cut pieces shall be allowed. PCC leveling course shall be laid to fill up the gap.

## **9. TECHNICAL SPECIFICATION FOR PLASTERING WORKS**

This Specification covers the general requirements for wall and ceiling plastering. The contractor shall furnish all materials labour scaffolding equipments, tools, plant and incidentals necessary and required for the completion of all plaster and wall finishes, subject to approval by the Engineer.

Plaster as herein specified shall be applied to all internal and external surfaces where called for. Glazed tile dado, terrazzo dado and other wall finishes shall be provided where indicated on drawings and schedule of finishes. Areas called for on drawings and typical shall be considered to apply to appropriate adjoining areas whether shown on same drawings or not and whether indicated or not.

All plaster work and other wall finishes shall be executed by skilled workmen in a workmanlike manner and shall be of the best workmanship and in strict accordance with the dimensions on drawings subject to the approval of the Engineer.

### **PLASTER WORK :**

The primary requirement of plasterwork shall be to provide absolutely water tight enclosure, dense, smooth and hard and devoid of any cracks on the interior and/or exterior. The contractor shall do all that is necessary to ensure that this objective is achieved. All plastering shall be finished to true plane, without any imperfections and shall be square with adjoining work and form proper foundation for finishing materials such as paint etc.

Masonry and concrete surfaces which call for applications of plaster shall be clean, free from efflorescence, damp and sufficiently rough and keyed to ensure proper bond, subject to the approval of the Engineer.

Wherever directed by the Engineer, all joints between concrete frames and masonry in filling shall be expressed by a groove cut in the plaster. The said groove shall coincide with the joints beneath as directed. Where grooves are not called for, the joints between concrete members and masonry in filling shall be covered by 24 gauge galvanised chicken mesh strips 400 mm wide or as called for on drawings/documents which shall be in position before plastering.

**CHASING & BREAKAGES :**

All chasing, installations of conduits, inserts boxes etc., shall be completed before any plastering or other wall finish is commenced on a surface. No chasing or cutting of plaster or other finish on a surface shall be permitted. Broken corners shall be cut back not less than 150 mm on both sides and patched with plaster of paris as directed. All corners shall be rounded to a radius of 8 mm or as directed by the Engineer.

**SAMPLES :**

Samples of each type of plaster & other wall finish shall be prepared well in advance of undertaking the work for approval by the Engineer.

**MATERIALS :**

CEMENT : Ordinary Portland cement of 43 Grade conforming to IS:8112 shall be used and as specified under concrete work

WATER : As specified under concrete work

SAND : For internal plaster - washed fine sand.

WATERPROOFING

COMPOUND : CICO NO.1 or approved quality.

**PROPORTIONS :**

The materials used for plastering shall be proportioned by volume by means of gauge boxes.

**PREPARATIONS OF SURFACES :**

The joints in all walls, both existing and freshly built shall be raked to a depth of 15 mm, brush cleaned with wire brushes, dusted and thoroughly wetted before starting plastering work. Concrete surfaces to receive plaster shall be roughened by hacking over the entire surface so that the skin of the concrete is completely removed, as approved by the Engineer to ensure proper key for the plaster.

**PLASTER TO WALLS :**

Plaster to internal faces of walls shall be 12 to 15 mm thick comprising of one part cement and five part clean fine sand or as specified in the item specification. The external surfaces of external wall shall have plaster of 12 mm thickness comprising of one part of cement and five parts of clean fine sand or as specified in the item specification to form base for vapour barrier.

**MORTAR MIXING :**

Mixing of mortar shall be done in a mechanical mixer. Hand mixing shall be resorted to only when specifically permitted by the Engineer. Cement and sand shall be mixed dry thoroughly and then water shall be added gradually. Wet mixing shall be continued till mortar of the consistency of a stiff paste and uniform colour is obtained. Only the quantity of mortar which can be used within thirty minutes of its mixing shall be prepared at a time.

Mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within thirty minutes after the water is added to the dry mixture. Mortar left un-used for more than thirty minutes after mixing shall be rejected and removed from the site of work.

**APPLICATIONS :**

Plaster application shall be commenced only after the preparatory work is approved by the Engineer. Correct thickness of plaster shall be obtained by laying plaster screeds (gauges) at intervals of 1.5 mtrs. as directed. Mortar shall be firmly applied, spread evenly well pressed into the joints, rubbed, smoothened with straight edge, wooden float and trowel and finished as approved by the Engineer to give a smooth, true and even surface.

**CURING :**

Finished plaster shall be kept wet for at least 10 days after completion. In hot weather, walls exposed to such shall be screened with matting kept constantly wet or by any other approved means.

**CEILING PLASTER :**

Plaster to ceilings, soffits or stairs flight slabs and similar locations, where called for, shall be 12 mm thick and comprise of one part of cement and three parts of clean fine sand or as specified in the item.

**PREPARATION OF SURFACE :**

The surfaces to be plastered shall be prepared as called for earlier. The surface shall be brushed, swept clean and thoroughly wetted before plastering.

**APPLICATIONS :**

Mortar shall be applied firmly, pressed to the surface rubbed and finished to a smooth and even surface subject to the approval of the Engineer.

**CHICKEN MESH TO WALLS :**

Galvanized chicken mesh (24 gauge, 12 mm size) shall be provided at junctions of brick masonry and concrete members, to be plastered and other locations 150 mm on either side of the junction in double fold or as called for, properly stretched and nailed, ensuring equal thickness of plaster on both sides of the mesh. The rate includes in the plaster works.

**CEMENT MORTAR :**

Cement mortar shall be of proportion specified for each type of work. It shall be composed of portland cement of 43 grade and sand. The ingredients shall be accurately gauged and shall be evenly mixed together in a mechanical mixer. Care should be taken not to add more water than necessary. If hand mix is allowed it shall be done on pucca waterproof platform. The gauged materials shall be put on platform, and thoroughly mixed dry. Water shall then be added and the whole mixed thoroughly until the mix is homogeneous and of uniform colour, quantity of mortar mixed should not be more than what can be consumed within half an hour of mixing.

Cement mortar mix are specified as 1:2, 1:3, 1:4, 1:5 etc. The first figure will mean one part of portland cement by volume, the second figure will mean so many parts of sand by volume. For example, cement mortar 1:4 would mean one part of cement and four parts of sand. Cement & sand must conform to relevant IS specification.

Plaster shall not in any place be thinner than specified. Any extra thickness of plaster required to be plastered in the case of brick masonry or extra thickness required due to raking of the joints or filling up depressions formed in concrete surface during the course of roughening or due to bad casting or centering shall not be paid separately, but shall be covered by the general rate for plastering.

The rate for plastering shall include the cost of scaffolding (NO WOODEN SCAFFOLDING IS ALLOWED), platform, swing etc. needed for carrying out the plaster work and shall cover the extra labour for plastering the joints, sills and soffits of openings. No extra payment shall be made for roughening the surface to obtain key for plastering work.

## 10. TECHNICAL SPECIFICATION FOR PAINTING WORKS

### **PAINTING GENERAL :**

The specification covers the general requirements for various types of painting and finishing of all surfaces throughout the interior and exterior of the building. The scope shall include furnishing of all materials, labour, scaffolding, tools and appliances to do all painting and / or white / colour washing of both interior and exterior surfaces of plastering, ceiling and all carpentry works. This also include painting structural and miscellaneous steel, railings, gratings, steel doors and frames, steel sashes, windows, louvers and frames, steel rolling shutters, MS grills etc. The number of coats required in various situations and also the types of finish required for the several items of work such as cement based paint, plastic emulsion paint, oil bound distemper, synthetic enamel paint, etc., are specified in the schedule of quantities and specifications.

Before the commencement of the work the contractor shall provide sample panels of painting at his own cost for the approval of the Engineer to enable him to keep an accurate check on the materials supplied and final shade to be painted. It is however the express responsibility of the contractor to provide any deviations and defects shall have to be rectified by the contractor at his own cost.

Contractor shall protect not only his own work at all times but also all the adjacent work and materials by suitable covering, protection or other methods acceptable to the Engineer during progress of painting. It is the responsibility of the contractor upon completion of painting work to remove all paint and varnish spots from floors, walls, glass panes and other surfaces and restore them to the original conditions. The work generally to be touched up shall be attended to after all other workmen have left. All accumulated material, rubbish etc. have to be cleared and the premises left in clean, orderly and acceptable conditions.

Contractor shall provide scaffolding wherever necessary erected on double supports tied together by horizontals, no ballies, bamboo's or planks shall rest on or touch the surface which is being painted. Contractor is deemed to have considered the following while tendering and no extra claim on account of these will be entertained

- A) Supplying the paint and other materials required of approved colour and brand.
- B) Preparing the surfaces to be painted.



- C) Providing and erecting scaffolding and removing the same after completion of the work.
- D) Lifting of materials to any height and painting at all levels.
- E) Application of paint as per the specification & to manufacture's instructions.
- F) Curing, protecting the painted surface, adjacent work and thoroughly cleaning of the premises.

All doors, partitions etc., shall be finished in the manner specified in the drawing, specifications and schedules, wherever painting and polishing are specified, although three coats finishes specified are to be included in the rates quoted, the contractor shall be required to carry out additional coats of paint/polish to obtain uniform and good finish at no extra cost, wherever such additional coats are considered necessary in the opinion of the Engineer. If directed, putty shall be applied over the entire surface to ensure smooth and neat finish at no extra cost.

**MATERIAL :**

The paint shall generally conform to the chemical composition and other characteristics laid down in the relevant Indian standard specification. The entire materials required for painting work shall be obtained direct from approved manufacturers or their authorised agents and brought to site in original manufacturer's containers with seals unbroken.

Paint shall be ready mixed and of 1st quality of the approved brand and manufacture. Mixing of paint by the contractor at site will not be allowed, except with preparation of ingredients and their quality shall be strictly maintained as per manufacturer's instructions and all as directed by the Engineer. All the materials shall be kept properly protected when not actually in use. Lids of containers shall be kept closed. Materials which have become stale or flat (in the opinion of the Engineer) shall not be permitted to be used on the works and shall be removed from site forthwith. Wherever the word 'approved' occurs in these specifications it shall mean that the competent authority for such approval is the Engineer. Any materials found not conforming to the relevant specification shall have to be removed by the contractor from the site at his own expenses. Colours shall be uniform and non-fading.

Protruding timber fibres shall be removed and all holes shall be filled with teakwood batten. The nail marks shall be covered with putty. The work shall then be sanded first with G/80 sand paper followed by G/120 or G/150 sand paper. Sanding should be taken up only when it can be followed immediately by painting.

The surface shall be thoroughly cleaned sand papered and / or rubbed with emery cloth if necessary to remove grease, mortar or any other foreign materials. In case of rusted surface, it shall be first cleaned with steel wire brushes till the corroded crust is removed. The cleaned surface shall be shiny and free from brush marks, patches, blisters and other irregularities. The surface thus finished shall be got approved before painting.

Concrete / plaster and cement plastered surfaces shall be thoroughly cleaned of mortar droppings and other stickings. All loose scales and flakes shall be removed by rubbing with hessian cloth or sand papering. All holes shall be filled and the surface rubbed smooth to get evenness of the existing surface. Area to be distempered shall

be applied with one coat of white chalk solution mixed with required quantity of glue or plaster of paris and shall be sand papered before distempering. The area to be cement painted shall be wetted by sprinkling of water with fine spray. The surface shall be sprayed several times with a few minutes intervals between each spraying to allow the moisture to seek into the surface.

The sanded surface shall be dusted and a priming paint, brush coated in thin even layers. For all flush doors and teakwood approved aluminium wood primer shall be applied. If some time passes after priming another coat of primer shall be applied before under coating is done.

The cleaned surface shall be dusted and a priming coat of anticorrosive paint shall be applied.

Stopping and filling carpentry work should be done when the primer is just dry. For deep scratches, holes etc. stopping shall be done with putty of plastic wood (IS 423). Putty can be white lead with linseed oil base or synthetic metal putty.

For all minor scratches and rough surfaces, like flush door's faces filling made out of one part of white lead, two parts of whiting (powdered chalk) mixed and kneaded in double boiled linseed oil shall be evenly applied and rubbed down with G/220 or G/240 sand paper after allowing it to dry overnight.

Painting shall be done by skilled labourers in a workmanlike manner. All materials shall be evenly applied so as to be free from sags, runs, crawls, or other defects. All coats shall be of proper consistency and shall be well brushed out, so that no brush marks are visible, except varnish and enamels which shall be uniformly flowed on.

The brushes shall be cleaned and in good condition before application of paint. No work shall be done under conditions that are unsuitable for production of good results.

The undercoating should be nearest to the specified colour of the finishing coat.

Ready mixed synthetic enamel paint or fill paint may be used for the undercoat. The undercoat shall be uniform and free of all brush marks.

Undercoats should be completely dry before finishing coat is taken up. For synthetic enamels overnight and for oil paints, a whole day shall be left between undercoat and finishing coat. The undercoat shall then be rubbed with G/240 sand paper and dusted clean. The finishing coat of approved paint shall then be applied. If the surface is not satisfactory additional finish coats shall be applied at no extra cost. The paints shall be applied with bristle brushes and not horse hair ones.

#### **WHITE WASHING WALLS AND CEILINGS :**

Lime used shall conform to IS 712. The wash shall be prepared from lime of approved quality.

White wash shall be prepared from fat lime or shell lime slaked on site mixed with just enough water to make a thick paste and allowed to remain for atleast 7 days before use. At the time of using, the paste shall be diluted with just sufficient water and stirred until the mixture attains the consistency of a thin cream and strained through clean and coarse cloth. Four kgs. of gum dissolved in hot water shall be added to each cu.metre of the lime used. Ultra marine blue shall be added to give required whiteness. The number of coats shall be specified in the bill of quantities and shall be applied by using flat brushes or spray pumps, on surface prepared. Before the wash is applied the surface shall be thoroughly cleaned of all dust, dirt, scales, marks

and mortar drops. All holes and depressions shall be filled in with cement mortar 1:4 or lime putty. The wash shall be applied with brush with alternate coats of horizontals and verticals. When a coat is being given it shall be ensured that the previous one has dried up complete. Two or more coats of wash (as specified in the schedule of quantities) shall be applied to give uniform finished surface without any patches or cracks and brush marks. It should not come off when rubbed hard with hand. One coat of white wash shall consist of one stroke from top downwards, another from bottom upwards over the first stroke, and another from left to right before the previous one dries up. The final coat shall be perfectly uniform in appearance and free from brush marks.

**COLOUR WASH :**

Colour wash shall be prepared by adding mineral colours or approved pigments not affected by lime or light. Colour wash shall be applied as specified under 'white wash'. Approval of the Engineer shall be obtained in regard to exact shade before applying colour wash.

**CEMENT PAINT :**

The number of coats shall be indicated in the bill of quantities. The surface to be cement painted shall be thoroughly cleaned of dust, dirt, grease, oils marks, cement marks, loose scales, etc. by the use of a stiff wire brush or by coir rope. The cleaned surface should be wetted with clean water either by spray gun or any other convenient method, to ensure complete absorption. Cement paint shall not be applied on dripping or wet surface. All holes, depressions, cavities, etc. shall be filled in with cement mortar 1:4 or as directed by the Engineer, to render the entire surface smooth and even to receive the paint, at no extra cost. All fungus or organic matters, which may be present, shall be removed by scrapping and sand papering and the surface rendered smooth.

The cement paint shall be prepared in exact conformity and workable consistency as per specifications of the manufacturer. Approval of the Engineer shall be obtained in regard to the exact shade and colour before applying the cement paint. Cement paint shall be applied with good quality flat brush horizontally or vertically to ensure perfect covering. The first coat should be well brushed into the surface to form a good film appearance. The second or subsequent coats shall be applied carefully to give a good final satisfactory finish and may be applied by brushing or spraying. Each cement paint application should be wetted at the end of the day with a fine water spray. Twentyfour hours after the first coat has been applied, saturate the surface with water and second or subsequent coats can be applied when the surface is damp to touch. Rewater the surface with ample water after 24 hours to ensure perfect setting of the paint film.

**PAINTING OIL/ENAMEL/ACRYLIC EMULSION ETC. :**

Ready mixed oil paint, acrylic emulsion paint, ready mixed synthetic enamel paint, Aluminium paint, etc. shall be brought in original containers and in sealed tins. If for any reason thinner is necessary the brand and quantity of thinner recommended by the manufacturer or as instructed by the Engineer shall be used. The surface shall be prepared as specified above and a coat of approved primer shall be applied. After 24 hours drying, specified quality paint shall be applied evenly and smoothly. If required a filler putty coating may be given to give smooth finish.

Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and cleaned of dust before the next coat is applied. Number of coats shall be as specified in the item and if however the finish of the surface is not uniform additional coats as required shall be applied to get good and uniform finish at no extra cost. After completion no hair marks from the brush or clogging of paint puddles in the corners of panel angles of mouldings shall be left on the work. The glass panes floor etc., shall be cleaned of stains.

When the final coat is applied, if directed, the surface shall be rolled with a roller or if directed it shall be stippled with a stippling brush.

The following multiplying factors for obtaining equivalent areas shall be adopted.

S.No.	Description of work	How Measured Factor	Multiplying
(1)	(2)	(3)	
1.	Panelled, or framed and braced or ledged and battened and braced joinery	Measured flat (not girthed), including CHOWKAT or frame. Edges, chocks, cleats, etc., shall be deemed to be included in the item.	1.30 (for each side)
2.	Flush joinery	Measured flat (not girthed) including CHOWKAT or Frame. Edges, chocks, cleats, etc., shall be deemed to be included in the item.	1.20 (for each side)
3.	Fully glazed or gauzed joinery	Measured flat (not girthed), including	0.80 (for each side)

CHOWKAT or frame.

Edges, chocks,  
cleats, etc., shall  
be deemed to be  
included in the item.

- |    |   |   |                         |
|----|---|---|-------------------------|
| 4. | Partly Panelled<br>and Partly glazed<br>or gauzed joinery   | Measured flat (not<br>girthed), including<br>CHOWKAT or frame.<br>Edges, chocks,<br>cleats, etc., shall<br>be deemed to be<br>included in the item. | 1.00 (for<br>each side) |
| 5. | Fully venetioned<br>or louvred joinery<br>or gauzed joinery | Measured flat (not<br>girthed), including<br>CHOWKAT or frame.<br>Edges, chocks,<br>cleats, etc., shall<br>be deemed to be<br>included in the item. | 1.80 (for<br>each side) |
| 6. | Weather boarding  | Measured flat (not<br>girthed), support-<br>ing framework shall<br>not be measured<br>separately.   | 1.20 (for<br>each side) |

S.No.	Description of work	How Measured Factor	Multiplying
(1)	(2)	(3)	

7.	Wood shingle roofing	Measured flat (not girthed)	1.10 (for each side)
8.	Boarding with cover fillets and match boarding.	Measured flat (not girthed)	1.05 (for each side)
9.	Tile and slate battening.	Measured flat (not all) no deduction shall be made for open spaces.	0.80 (for painting all over)
10.	Trellis (or JAFRI work) one-way or two-way.	Measured flat over all; no deduction shall be made for open spaces; supporting members shall not be measured separately.	2.00 (for painting all over)
11.	Guard bars, balustrades,gates, gratings, grills expanded metal and railings.	Measured flat over all; no deduction shall be made for open spaces; supporting members shall not be measured separately.	1.00 (for painting all over)
12.	Gates, and open palisade fencing, including standards, braces, rails, stays, etc.	Measured flat over all; no deduction shall be made for open spaces; supporting members	1.00 (for painting all over)

shall not be  
measured separately.

13. Carved or enriched work. Measured flat 2.00 (for each side)

14. Steel roller shutters Measured flat (size of opening) Overall Jamb guides, bottom rails and locking arrangement, etc. shall be included in the item (top cover shall be measured separately). 1.10 (for each side)

S.No.	Description of work	How Measured Factor	Multiplying
(1)	(2)	(3)	
15.	Plain sheet steel doors and windows.	Measured flat (not girthed) including frame, edges, etc.	1.10 (for each side)
16.	Fully glazed or gauzed steel doors and windows.	Measured flat (not girthed) including frame, edges, etc.	0.50 (for each side)
17.	Partly Panelled and Partly glazed or gauzed steel doors.	Measured flat (not girthed) including frame, edges, etc.	0.80 (for each side)

18.	Collapsible gate.	Measured Flat (size of opening)	1.50 (for painting all over)
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**NOTE :**

The height shall be taken from the bottom of the lowest rail, if the palisades do not go below it (or from the lower end of palisades, if they project below the lowest rail) upto the top of palisades, but not upto the top of the standards, if they are higher than the palisades. Similarly for gates depth of roller shall not be considered while measuring the height.

## **11. TECHNICAL SPECIFICATION FOR WATERPROOFING TREATMENT SCOPE**

This specification covers the general requirements for water proofing to the underground structure, machinery foundation, pits, trenches, lift pits, roof slab, toilet sunken slab etc.

**GENERAL REQUIREMENTS**

Waterproofing treatment shall be done with waterproofing materials of approved reputed manufacturers and applied by specialist firms with long experience in the particular trade and proven track record.

The Contractor shall furnish all skilled and unskilled labour, plant, tools, tackle, equipment, men, materials required for complete execution of the work in accordance with the drawings and as described herein and/or as directed by the Engineer.

The Contractor shall strictly follow, at all stages of work, the stipulations contained in the Indian Standard Safety Code and the provisions of the Safety Rules as specified in the General Conditions of the Contract for ensuring safety of men and materials.

Any approval, instructions, permission, checking, review etc. whatsoever by the Engineer shall not relieve the Contractor of his responsibility and obligation regarding adequacy, correctness, completeness, safety, strength, workmanship etc.

The treatment shall include both external and internal type at different stages of execution involving various operations of preparation, application and induction of chemicals as water proof barrier in order of sequence.

The treatment shall be done as per the specifications and instructions of manufacturers including cost of all materials all leads and lifts, cleaning, scaffolding, curing, conducting, leakage test etc.

**All spaces underneath the tiered seating completely watertight and designed as habitable spaces**

**CODES AND STANDARDS**

The applicable Indian Standard and Code is given below :

IS : 2645	:	Integral cement water proofing compounds.
IS : 9103	:	Admixtures for Concrete



**MATERIALS**

Cement conforming	:	Ordinary Portland cement of 43 Grade to IS : 8112 shall be used.
Coarse Aggregate	:	Coarse aggregate shall conform to IS:383
Sand	:	Sand shall conform to IS : 383, IS :1542 and IS :2116
Water	:	Water shall conform to IS : 456.
Water Proofing Compound	:	Waterproofing compound shall conform to IS:2645

**SURFACE PREPARATION**

The surface to receive the waterproofing shall be cleaned of all dust, dirt, loose material, debris, mortar droppings, laitance, oil, grease or any other form of foreign matter which might affect adhesion and left in a saturated, surface dried condition and approval of Engineer taken before starting the work. The surface to be treated in underground structures shall be kept dry by continuous pumping of water. The surface preparation shall be done as per specification and instructions of the manufacturer.

**DIFFERENT STAGES OF TREATMENT TO UNDERGROUND STRUCTURES****Treatment on PCC levelling course :**

Treatment on the top surface of PCC levelling course before casting of base slab : After laying of PCC to proper level and line, the surface shall be cured for the required period.

The PCC surface shall be prepared as described above and kept dry by continuous pumping of water.

12 mm thick plaster with cement sand mortar (1:3) admixed with approved normal setting integral cement water proofing compound like **CICO No.1 – (Normal Setting Integral Waterproofing Compound) Conforming to IS : 2645 @ 2% by weight of cement**, or approved equivalent at the rate specified by the manufacturer shall be laid on top of the PCC surface as per specifications and instructions of the manufacturer. The plaster shall be finished smooth with a steel trowel and cured for 1 day.

The plastered surface shall then be coated with two (2) coats of **TAPECRETE – Acrylic Polymer modified cementitious coating**, or approved equivalent as per manufacturer's specification and instructions. The coating shall be cured with water for 1 day.

The surface shall then be covered with another 12 mm thick plaster as described under clause (c) above. The treated surface shall be cured for 5 days.

Base slab concrete admixed with **CICO No.1 (Normal Setting Integral Waterproofing Compound) Conforming to IS : 2645** or **CICO SUPAPLAST Super Plasticiser-cum-High Range Water Reducing Admixture-Cum-Waterproofer conforming to IS : 9103 as Plasticiser and IS : 2645 as Integral Waterproofer** as per recommended dosage or approved equivalent shall be laid over this treated surface.

**Note :**

Applicable to PCC levelling course below base slab of under ground sump, under ground structure, lift pit, machinery foundations, trenches etc.

**Chemical injection treatment to base slab :****Chemical injection treatment in the form of pressure grouting to the concrete mass of base slab :**

The treatment shall be as per manufacturers specification adopting following general operation details :

After casting of base slab and side wall, the surface shall be cured as per the standard practice.

18 mm dia. holes shall be drilled on top of base slab to required depth using pneumatic hammer drill in grid pattern at a spacing not exceeding 1 M centre to centre. Particular care should be taken to drill holes and fix nozzles along the construction joint line wherever it occurs and on other vulnerable areas.

The depth of nozzles shall be adequate to push the grout at all depth. GI nozzles shall be fixed in the holes drilled using single component rapid setting mortar like CICO No.3, or approved equivalent.

Cement slurry mixed with grout admixture like **CICO Non-Shrink Polymer Waterproof Grouting Compound** at 2% by weight of cement or approved equivalent as per specification and instruction of the manufacturer shall be prepared to the required consistency.

The prepared slurry shall be injected through the prefixed nozzles under pressure using grout pump to fill all possible pores and gaps left within the concrete mass.

When the flow of the grout stops the grout mains shall be disconnected.

The GI nozzles shall be sealed off with single component rapid setting mortar like **CICO NO. 3**, or approved equivalent after the injection operation is over.

The grout holes shall then be finished after cutting the projected nozzles.

**Note :**

Applicable to base slab of underground sump, underground structure, Footings, lift pit, trenches etc.

**Treatment to side wall****Treatment to side wall from exterior surface**

Casting of RCC walls shall be done with specified grade of concrete admixed with **CICO No.1 (Normal Setting Integral Waterproofing Compound) Conforming to IS : 2645** or **CICO SUPAPLAST Super Plasticiser-cum-High Range Water Reducing Admixture-Cum-Waterproofer conforming to IS : 9103 as Plasticiser and IS : 2645 as Integral Waterproofer** as per recommended dosage or approved equivalent, shall be laid over this treated surface.

After casting of side wall to the required height, the surface shall be cured as per the standard practice.

Chemical injection treatment in the form of pressure grouting shall be done as given below :

18 mm dia. holes shall be drilled on exterior surface of wall to required depth using pneumatic hammer drill in grid pattern at a spacing not exceeding 1 M centre to

centre. Particular care should be taken to drill holes and fix nozzles along the construction joint line wherever it occurs and on other vulnerable areas.

The depth of nozzles shall be adequate to push the grout at all depth. GI nozzles shall be fixed in the holes drilled using single component rapid setting mortar like CICO No.3, or approved equivalent.

Cement slurry mixed with grout admixture like **CICO Non-Shrink Polymer Waterproof Grouting Compound** at 2% by weight of cement or approved equivalent as per specification and instruction of the manufacturer shall be prepared to the required consistency.

The prepared slurry shall be injected through the prefixed nozzles under pressure using grout pump to fill all possible pores and gaps left within the concrete mass.

When the flow of the grout stops the grout mains shall be disconnected.

The GI nozzles shall be sealed off with single component rapid setting mortar like **CICO NO. 3**, or approved equivalent after the injection operation is over.

The grout holes shall then be finished after cutting the projected nozzles.

The outside surface of wall shall be prepared as described under head "Surface Preparation" after the chemical injection treatment is over.

The prepared exterior surface shall be coated (2 coats) with **TAPECRETE – Acrylic Polymer modified cementitious coating**, or approved equivalent as per Manufacturer's Specification and instructions. The surface shall be cured with water for 1 day.

On top of the coating a 12 mm thick plaster with cement sand mortar (1:3) admixed with **CICO NO. 1 – Normal Setting Integral Waterproofing Compound conforming to IS : 2645**, or approved equivalent at the rate specified by the manufacturer shall be applied as per specifications and instructions of the manufacturer. The plaster shall be finished smooth with a steel trowel and cured for 5 days.

In case of nil accessibility owing to constructional hazards, etc. the interior surface of wall may be treated as mentioned above to produce same effect.

**Note :**

Applicable to side walls of underground sump, underground structure, trenches and retaining wall. In the case of underground sump interior surface of walls shall be treated.

**GUARANTEE**

Guarantee for watertight performance of the structure for a minimum period of 10 years from the date of completion shall be given in the prescribed form given below. This guarantee shall be in legal paper in an acceptable form. The guarantee shall be enforceable by the Owner. If, during the guarantee period, water leaks are noticed in the structure from the portions treated by the Contractor, the same shall be rectified when called upon immediately, all at no extra cost to the entire satisfaction of the Owner.

**ANNEXURE E – SAMPLE CONTRACTOR AGREEMENT**



**Contractor Agreement  
for  
Construction of Underground Water Tank Work for  
AIFF National Centre of Excellence, Kolkata**

**between**

**All India Football Federation**

**and**

***[insert name of agency]***

**This Agreement** made the

day of

Between

full name and physical address of Authority

(hereinafter called “the Authority”) of the one part

and

full name and physical address of Contractor

(hereinafter called “the Contractor”) of the other part

**Whereas** the Authority desires that the Works known as the building works for

should be executed by the Contractor, and has accepted a Tender by the Contractor for the execution and completion of these Works and the remedying of any defects therein.

In this Agreement, the term “**Party**” or “**Parties**” shall mean the Authority and the Contractor individually or collectively, as the context may require.

**WHEREAS:**

- (A) The Authority vide its Request for proposal document (“RFP”) dated October 27, 2018 invited proposals for Selection of Contractor (“Contractor”) for providing construction services for Construction of Underground Water Tank Work at the location listed in the RFP.
- (B) The Contractor submitted its proposals for the aforesaid work, wherein the Contractor represented to the Authority that it had the required professional and technical skills to fulfill the requirements, and in the said proposals the Contractor also agreed to provide the required Services to the Authority on the terms and conditions as set forth in the RFP and this Agreement;
- (C) The Authority, after opening of all bids, on accepted the proposal of the Contractor, and issued a Letter of Award dated [insert date] (the “LOA”),
- (D) In pursuance of the LOA, the parties have agreed to enter into this Agreement.

NOW, THEREFORE, in consideration of the foregoing and the respective covenants set forth in this Agreement, the Parties hereto hereby agree as follows:

## 1. GENERAL

### 1.1 Definitions and interpretation

1.1.1 The words and expressions beginning with capital letters and defined in this Agreement shall, unless the context otherwise requires, have the meaning hereinafter respectively assigned to them:

- (a) “**Agreement**” means this Agreement, together with all the Annexures;
- (b) “**Applicable Laws**” means the laws and any other instruments having the force of law in India as might be issued and be in force from time to time;
- (c) “**Authority Representative**” shall have the meaning set forth in Clause 1.8.2;
- (d) “**Award**” shall have the meaning set forth in Clause 8.3.3;
- (e) “**Confidential Information**” shall have the meaning set forth in Clause 3.3.1;
- (f) “**Conflict of Interest**” shall have the meaning set forth in Clause 3.2.1 read with the provisions of the Scope of Work;

- (g) “**Contractor Representative**” shall have the meaning set forth in Clause 1.8.3;
- (h) “**Dispute**” shall have the meaning set forth in Clause 8.1.1;
- (i) “**Effective Date**” means the date on which this Agreement comes into force and effect pursuant to Clause 2.1;
- (j) “**INR, Re. or Rs.**” means Indian Rupees;
- (k) “**Party**” means the Authority or the Contractor, as the context may require, and Parties means both of them collectively;
- (l) “**Personnel**” means persons or entities hired, retained or engaged by the Contractor as employees or sub-Contractors or in any other lawful manner whatsoever for the performance of the Services or any part thereof;
- (m) “**Scope of Work**” means the scope of work document dated insert date in response to which the Contractor’s proposal for providing Services was accepted;
- (n) “**Services**” means the work to be performed by the Contractor pursuant to this Agreement, as described in the Agreement and the Scope of Work hereto; and
- (o) “**Third Party**” means any person or entity other than the Government, the Authority and the Contractor.

All terms and words not defined herein shall, unless the context otherwise requires, have the meaning assigned to them in the Scope of Work.

1.1.2 The following documents shall be deemed to be formed and read and construed as a part of this agreement:

- (a) The Letter of Tender and Annexures to Tender
- (b) The Conditions of Contract
- (c) The Specifications
- (d) The Drawings, and
- (e) The Bill of Quantities with annexures and all documents referred to therein

## 1.2 Relation between the Parties

Nothing contained herein shall be construed as establishing a relationship of master and servant or of agent and principal between the Authority and the Contractor. The Contractor shall, subject to this Agreement, have complete charge of Personnel

performing the Services and shall be fully responsible to the Authority for the Services performed by them or on their behalf hereunder.

### 1.3 Rights and obligations

The mutual rights and obligations of the Authority and the Contractor shall be as set forth in the Agreement, in particular:

- (a) the Contractor shall carry out the Services in accordance with the provisions of the Agreement & RFP; and
- (b) the Authority shall make payments to the Contractor in lieu of the Services, in accordance with the provisions of the Agreement and RFP.

### 1.4 Governing law and jurisdiction

This Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the courts in Delhi shall have exclusive jurisdiction over all matters arising out of or relating to this Agreement.

### 1.5 Language

All notices required to be given by one Party to the other Party and all other communications, documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in the English language.

### 1.6 Notices

Any notice or other communication to be given by any Party to the other Party under or in connection with the matters contemplated by this Agreement shall be in writing and shall:

- (a) in the case of the Contractor, be given by e-mail and by letter delivered by hand or registered post or courier to the address given and marked for attention of the Contractor Representative set out below in Clause 1.8 or to such other person as the Contractor may from time to time designate by notice to the Authority;
- (b) in the case of the Authority, be given by e-mail and by letter delivered by hand or registered post or courier to the address given and marked for attention of the



Authority Representative set out below in Clause 1.8 and be addressed to the Authority or to such other person as the Authority may from time to time designate by notice to the Contractor; and

- (c) any notice or communication by a Party to the other Party, given in accordance herewith, shall be deemed to have been delivered when in the normal course of post it ought to have been delivered and in all other cases, it shall be deemed to have been delivered on the actual date and time of delivery; provided that in the case of facsimile or e-mail, it shall be deemed to have been delivered on the working days following the date of its delivery.

#### 1.7 Location

The Services shall be performed and provided in accordance with the provisions of Scope of Work of the RFP and directions of the Authority as may be issued from time to time, and at or from such locations as are incidental thereto, including the offices of the Contractor.

#### 1.8 Authorized representatives

- 1.8.1 Any action required or permitted to be taken, and any document required or permitted to be executed, under this Agreement by the Authority or the Contractor, as the case may be, may be taken or executed by the officials specified in this Clause 1.8.

- 1.8.2 The Authority may, from time to time, designate one of its officials as its authorized representative (“**Authority Representative**”). Unless otherwise notified, the Authority Representative shall be:

**Mr./Ms. [insert name]**  
**Special Projects & Infrastructure**  
**All India Football Federation**  
Football House, Sector – 19,  
Phase I, Dwarka,  
New Delhi, Delhi 110075,

India

Tel: [insert contact number]

E-mail: [insert email address]

- 1.8.3 The Contractor may designate one of its employees as the Contractor's authorized representative ("**Contractor Representative**"). Unless otherwise notified, the Contractor Representative shall be:

**Mr./Ms. [insert name]**

[insert designation]

[insert address]

Tel: [insert contact number]

Email: [insert email address]

1.9 Taxes and duties

Unless otherwise specified in this Agreement, the Contractor is required to pay all such taxes, duties, cess, fees and other impositions as may be directly payable by the Contractor under the Applicable Laws including Goods and Services Tax (GST) and the Authority shall perform such duties in regard for the deduction of such taxes, duties, cess, fees and other impositions as may be payable by it under the Applicable Laws.

2. COMMENCEMENT, COMPLETION AND TERMINATION OF AGREEMENT

2.1 Effective date of Agreement

This Agreement shall come into force and effect on the date of this Agreement (the "**Effective Date**").

2.2 Commencement of Services

The Contractor shall commence the Services within a period of 3 (three) days from the Effective Date, unless otherwise agreed in writing by the Parties.

2.3 Termination of Agreement for failure to commence Services

If the Contractor does not commence the Services within the period specified in Clause 2.2 above, the Authority may, by not less than 2 (two) week's notice to the Contractor, declare this Agreement to be null and void. In such an event, no payment would be

payable by the Authority to the Contractor and no expenses or charges incurred by the Contractor in any manner whatsoever would be reimbursed by the Authority.

## 2.4 Expiration of Agreement

**Unless terminated earlier pursuant to Clauses 2.3 or 2.9 hereof, this Agreement shall, unless extended by the Parties by mutual consent, expire upon the completion of the required Service with remedy of any defects therein and clearance of any final payment by the Authority, as specified in the RFP.**

## 2.5 Entire Agreement

2.5.1 This Agreement and the RFP with its Annexures together constitute a complete and exclusive statement of the terms of the agreement between the Parties on the subject hereof, and no amendment or modification hereto shall be valid and effective unless such modification or amendment is agreed to in writing by the Parties and duly executed by persons especially empowered in writing in this regard by the respective Parties. All prior written or oral understandings, offers or other communications of every kind pertaining to this Agreement are abrogated and withdrawn; provided, however, that the obligations of the Contractor arising out of the provisions of the Scope of Work shall continue to subsist and shall be deemed to form part of this Agreement.

## 2.6 Modification of Agreement

2.6.1 Modification of the terms and conditions of this Agreement, including any modification of the scope of the Services, may only be made by written agreement between the Parties. However, each Party shall give due consideration to any proposals for modification made by the other Party.

## 2.7 Force Majeure

### 2.7.1 Definition

(a) For the purposes of this Agreement, "Force Majeure" means an event which is beyond the reasonable control of a Party, and which makes a Party's performance of its obligations hereunder impossible or so impractical as reasonably to be considered impossible in the circumstances, and includes, but is not limited to, war,

riots, civil disorder, earthquake, fire, explosion, storm, flood or other adverse weather conditions, strikes, lockouts or other industrial action (except where such strikes, lockouts or other industrial action are within the power of the Party invoking Force Majeure to prevent), confiscation or any other action by government agencies.

- (b) Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's agents or employees, nor (ii) any event which a diligent Party could reasonably have been expected to both (A) take into account at the time of the conclusion of this Agreement, and (B) avoid or overcome in the carrying out of its obligations hereunder.
- (c) Force Majeure shall not include insufficiency of funds or failure to make any payment required hereunder.

#### **2.7.2 No breach of Agreement**

The failure of a Party to fulfill any of its obligations hereunder shall not be considered to be a breach of, or default under, this Agreement insofar as such inability arises from an event of Force Majeure and is duly acknowledged in writing in this regard by the other Party, provided that the Party affected by such an event has taken all reasonable precautions, due care and reasonable alternative measures, all with the objective of carrying out the terms and conditions of this Agreement.

#### **2.7.3 Measures to be taken**

- (a) A Party affected by an event of Force Majeure shall take all reasonable measures to remove such Party's inability to fulfill its obligations hereunder with a minimum of delay.
- (b) A Party affected by an event of Force Majeure shall notify the other Party of such event as soon as possible, and in any event not later than 7 (seven) days following the occurrence of such event, providing evidence of the nature and cause of such

event, and shall similarly give notice of the restoration of normal conditions as soon as possible.

- (c) The Parties shall take all reasonable measures to minimise the consequences of any event of Force Majeure.

#### **2.7.4 Extension of time**

Any period within which a Party shall, pursuant to this Agreement, complete any action or task, may be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure, subject to approval in writing in this regard from the other Party.

#### **2.7.5 Payments**

During the period of its inability to perform the Services as a result of an event of Force Majeure, the Contractor shall, subject to specific approval for this received in writing from the Authority, be entitled to be reimbursed for additional costs reasonably and necessarily incurred by it during such period for the purposes of the Services and in reactivating the Services after the end of such period.

#### **2.7.6 Consultation**

Not later than 15 (fifteen) days after the Contractor has, as the result of an event of Force Majeure, become unable to perform a material portion of the Services and informed the Authority in writing of the same, the Parties shall consult with each other with a view to agreeing on appropriate measures to be taken in the circumstances.

#### **2.8 Suspension of Agreement**

The Authority may, by written notice of suspension to the Contractor, suspend all payments to the Contractor hereunder if the Contractor is in breach of this Agreement or fails to perform any of its obligations under this Agreement, including the carrying out of the Services or any directions thereto as may be issued from time to time in this regard by the Authority; provided that such notice of suspension (i) shall specify the nature of the breach or failure, and (ii) shall provide an opportunity to the Contractor to remedy

such breach or failure within a period not exceeding 30 (thirty) days after receipt by the Contractor of such notice of suspension.

## 2.9 Termination of Agreement

### 2.9.1 By the Authority

The Authority may, by not less than 15 (fifteen) days' written notice of termination to the Contractor, terminate this Agreement if:

- (a) the Contractor fails to remedy any breach hereof or any failure in the performance of its obligations hereunder, as specified in a notice of suspension pursuant to Clause 2.8 hereinabove, within 30 (thirty) days of receipt of such notice of suspension or within such further period as the Authority may have subsequently granted in writing;
- (b) the Contractor becomes insolvent or bankrupt or enters into any agreement with its creditors for relief of debt or takes advantage of any law for the benefit of debtors or goes into liquidation or receivership whether compulsory or voluntary;
- (c) the Contractor fails to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause 8.3 hereof;
- (d) the Contractor submits to the Authority a statement which has a material effect on the rights, obligations, reputation or interests of the Authority and which the Contractor knows to be false;
  - i) any document, information, data or statement submitted by the Contractor in its proposals, based on which the Contractor was considered eligible or successful for providing the Services, is found to be false, incorrect or misleading;
- (e) as the result of Force Majeure, the Contractor is unable to perform a material portion of the Services for a period of not less than 15 (fifteen) days;

- (f) the Contractor brings the Project or the Authority or FIFA or AFC or AIFF to disrepute by maligning it publicly or acting in a manner which damages the image of the Project or the Authority or FIFA or AFC or AIFF; or
- (g) the Authority, in its sole discretion and for any reason whatsoever, decides to terminate this Agreement.

### **2.9.2 By the Contractor**

The Contractor may, by not less than 30 (thirty) days' written notice to the Authority, terminate this Agreement if:

- (a) the Authority fails to pay any money due to the Contractor pursuant to this Agreement and not subject to dispute pursuant to Clause 9 hereof within 45 (forty five) days after receiving written notice from the Contractor that such payment is overdue;
- (b) the Authority is in material breach of its obligations pursuant to this Agreement and has not remedied the same within 45 (forty five) days (or such longer period as the Contractor may have subsequently granted in writing) following the receipt by the Authority of the Contractor's notice specifying such breach;
- (c) as the result of Force Majeure, the Contractor is unable to perform a material portion of the Services for a period of not less than 30 (thirty) days; or
- (d) the Authority fails to comply with any final decision reached as a result of arbitration pursuant to Clause 8.3 hereof.

### **2.9.3 Cessation of rights and obligations**

Upon termination of this Agreement pursuant to Clauses 2.3 or 2.9 hereof, or upon expiration of this Agreement pursuant to Clause 2.4 hereof, all rights and obligations of the Parties hereunder shall cease, except (i) such rights and obligations as may have accrued on the date of termination or expiration, or which expressly survive such termination; (ii) the obligation of confidentiality set forth in Clause 3.3 hereof; (iii) the

Contractor's obligation to permit inspection, copying and auditing of such of its accounts and records set forth in Clause 3.5, as relate to the Services provided under this Agreement; and (iv) any right or remedy which a Party may have under this Agreement or the Applicable Laws.

#### **2.9.4 Cessation of Services**

Upon termination of this Agreement by notice of either Party to the other pursuant to Clauses 2.9.1 or 2.9.2 hereof, the Contractor shall, immediately upon dispatch or receipt of such notice, take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures, to be approved in writing by the Authority for this purpose, to a minimum. With respect to documents prepared by the Contractor and information and materials furnished by the Authority, the Contractor shall proceed as provided respectively by Clauses 3.8 or 3.9 hereof.

#### **2.9.5 Payment upon termination**

Upon termination of this Agreement pursuant to Clauses 2.9.1 or 2.9.2 hereof, the Authority shall make the following payments to the Contractor (after offsetting against these payments any amount that may be due from the Contractor to the Authority):

- (a) remuneration pursuant to Clause 6 hereof for Services satisfactorily performed prior to the date of termination;
- (b) reimbursable expenditures pursuant to Clause 6 hereof for approved expenditures actually incurred prior to the date of termination; and
- (c) except in the case of termination pursuant to sub-clauses (a) through (f) of Clause 2.9.1 hereof, reimbursement of any reasonable cost incidental to the prompt and orderly termination of the Agreement.

#### **2.9.6 Disputes about Events of Termination**

If either Party disputes whether an event specified in Clause 2.9.1 or in Clause 2.9.2 hereof has occurred, such Party may, within 30 (thirty) days after receipt of notice of termination from the other Party, refer the matter to arbitration pursuant to Clause 9



hereof, and this Agreement shall not be terminated on account of such event except in accordance with the terms of any resulting arbitral Award.

### 3. OBLIGATIONS OF THE CONTRACTOR

#### 3.1 General

##### 3.1.1 **Standards of performance**

The Contractor shall perform the Services and carry out its obligations hereunder with all due diligence, efficiency and economy, in accordance with generally accepted professional techniques and best practices, and shall observe sound management practices and employ appropriate advanced and effective technology and methods. The Contractor shall always act, in respect of any matter relating to this Agreement or to the Services, as a faithful adviser to the Authority, and shall at all times support and safeguard the Authority's legitimate interests in any dealings with any Third Parties.

##### 3.1.2 **Applicable laws**

The Contractor shall perform the Services in accordance with the Applicable Laws and shall take all steps necessary to ensure that any Personnel comply with the Applicable Laws.

#### 3.2 **Conflict of interest**

3.2.1 The Contractor confirms that it does not have any current engagements which constitute a conflict of interest ("**Conflict of Interest**") with the requirements of providing the Services under this Agreement and agrees not to enter into any such arrangement in the future which may be a Conflict of Interest and thereby constitute a breach of the Agreement.

##### 3.2.2 **Contractor not to receive any additional benefits**

The remuneration of the Contractor pursuant to Clause 6 hereof shall constitute the Contractor's sole remuneration in connection with this Agreement or the Services and the Contractor shall not accept for its own benefit any commission or similar payment in connection with activities pursuant to this Agreement or to the Services or in the discharge of its obligations hereunder, and the Contractor shall use its best efforts to

ensure that any Personnel similarly shall not demand or receive any such additional remuneration.

- 3.2.3 The Contractor and its Personnel shall observe the highest standards of ethics and shall not have engaged in and shall not hereafter engage in any corrupt, fraudulent, coercive, undesirable or restrictive practice(s) (collectively the “**Prohibited Practices**”). Notwithstanding anything to the contrary contained in this Agreement, the Authority shall be entitled to terminate this Agreement forthwith by a communication in writing to the Contractor, without being liable in any manner whatsoever to the Contractor, if it determines that the Contractor has, directly or indirectly or through its Personnel or a representative, engaged in any Prohibited Practices pertaining to the selection process for the Contractor for providing the Services for the Project or before or after entering into of this Agreement. Additionally, in such an event, the Authority reserves the right to withhold partly or entirely, any payments to be made to the Contractor for the Services provided, towards compensation and damages payable to the Authority with regard to, *inter alia*, the time, cost and effort expended by the Authority, without prejudice to the Authority’s other rights or remedy hereunder or in law.

### 3.3 Confidentiality

- 3.3.1 In order for the Contractor to perform the Services under this Agreement, it may be necessary for the Authority to provide the Contractor with confidential information regarding the Authority’s business practices, development plans, strategies and events (“**Confidential Information**”). The Authority will rely upon the Contractor’s integrity and prudent judgment to use this information only in the best interests of the Authority and not use it in an unethical manner or for the benefit of any person other than the Authority, or disclose such confidential information without the written authorization of the Authority, either during or after the term of the Agreement.
- 3.3.2 Notwithstanding the aforesaid, the Contractor may disclose Confidential Information to the extent that such Confidential Information:
- (a) was in the public domain prior to its delivery to the Contractor or becomes a part of the public knowledge from a source other than the Contractor and its Personnel;

- (b) was obtained from a Third Party with no known duty to maintain its confidentiality;
- (c) is required to be disclosed by Applicable Laws or judicial or administrative or arbitral process or by any governmental instrumentalities, provided that for any such disclosure, the Contractor shall give the Authority prompt written notice and use reasonable efforts to ensure that such disclosure is accorded confidential treatment; and
- (d) is provided to the professional advisers, agents, auditors or representatives of the Contractor as is reasonable under the circumstances; provided, however, that the Contractor shall require their professional advisers, agents, auditors or its representatives, to undertake in writing to keep such Confidential Information, confidential and shall use its best efforts to ensure compliance with such undertaking.

### **3.4 Liability of the Contractor**

3.4.1 The Contractor's liability under this Agreement shall be determined by the Applicable Laws and the provisions hereof.

3.4.2 The Parties hereto agree that in case of negligence or willful misconduct on the part of the Contractor or on the part of any person or firm acting on behalf of the Contractor in carrying out the Services, the Contractor, with respect to damage caused to the Project or the Authority's reputation, shall be liable to the Authority for the following:

- (a) any direct or consequential loss or damage; and
- (b) any indirect loss or damage to the extent of (i) the Agreement Value, or (ii) the proceeds the Contractor may be entitled to receive from any insurance maintained by the Contractor to cover such a liability, whichever of (i) or (ii) is higher.

3.4.3 This limitation of liability specified in Clause 3.4.3 shall not affect the Contractor's liability, if any, for damage to Third Parties caused by the Contractor or any person or firm acting on behalf of the Contractor in carrying out the Services.

### **3.5 Insurance to be availed by the Contractor**

- 3.5.1 The Contractor, for the duration of the project, avail and maintain as its own cost, insurance against the risks relevant to the Agreement, and obtain coverage in accordance with good industry practice. The Authority may at its own discretion request the Contractor for the documentation for the same and the Contractor will be liable to provide the same to the Authority

### **3.6 Accounting, inspection and auditing**

The Contractor shall:

- (a) keep accurate and systematic accounts and records in respect of the Service provided under this Agreement, in accordance with internationally accepted accounting principles and in such form and detail as will clearly identify all relevant time charges and cost, and the basis thereof (including the basis of the Contractor's costs and charges); and
- (b) permit the Authority or its designated representative periodically, and up to one year from the expiration or termination of this Agreement, to inspect the same and make copies thereof as well as to have them audited by auditors appointed by the Authority.

### **3.7 Requirement of the prior approval of the Authority**

The Contractor shall obtain the Authority's prior approval in writing before taking any of the following actions:

- (a) Appointing, removing or substituting such Personnel who are directly involved in providing the Services;
- (b) entering into a subcontract for the performance of any part of the Services, it being understood that the Contractor shall remain fully liable for the performance of the Services by the sub-Contractor and its Personnel pursuant to this Agreement;
- (c) any expense, not covered under this Agreement, that the Contractor may incur on behalf of, or charge to, the Authority; or

- (d) any other action that is specified in this Agreement as requiring the approval of the Authority.

### 3.8 **Reporting obligations**

The Contractor shall submit to the Authority the reports and documents specified in the Agreement, in the form, in the numbers and within the time periods set forth therein or as may be communicated to the Contractor by the Authority from time to time.

### 3.9 Documents prepared by the Contractor to be property of the Authority

3.9.1 All drawings, specifications, designs, reports and other documents (collectively referred to as “**Service Documents**”) prepared or submitted by the Contractor or its representatives in performing the Services shall become and remain the property of the Authority.

3.9.2 The Contractor shall, not later than termination or expiration of this Agreement, deliver all Service Documents to the Authority, together with a detailed inventory thereof. The Contractor may retain a copy of such Service Documents. The Contractor shall not use these Service Documents for purposes unrelated to this Agreement without the prior written approval of the Authority.

3.9.3 The Contractor shall hold the Authority harmless and indemnified for any losses, claims, damages, expenses (including all legal expenses), awards, penalties or injuries (collectively referred to as ‘claims’) which may arise from or due to any unauthorized use of such Service Documents, or due to any breach or failure on part of the Contractor or a Third Party to perform any of its duties or obligations in relation to securing the aforementioned rights of the Authority.

### 3.10 **Information and material furnished by the Authority**

Any information and material made available to the Contractor by the Authority shall be the property of the Authority and shall be marked accordingly, and which shall be returned in full to the Authority by the Contractor upon termination or expiration of this Agreement.

### **3.11 Providing access to Personnel**

The Contractor shall ensure that the officials of the Authority are provided unrestricted access to the Personnel engaged in providing the Services to the Contractor during the period of this Agreement.

### **3.12 Accuracy of information**

3.12.1 The Contractor shall be responsible for accuracy of the data collected by it directly or procured from other sources/agencies/authorities, the designs, drawings, estimates and all other details prepared by it as part of these Services.

3.12.2 It shall indemnify the Authority against any inaccuracy in its work which might surface during implementation of the Project, if such inaccuracy is the result of any negligence or inadequate due diligence on part of the Contractor or arises out of its failure to conform to good industry practice.

3.12.3 The Contractor shall also be responsible for promptly correcting, at its own cost and risk, any inaccuracy or error in the Services provided by the Contractor to the Authority.

## **4. CONTRACTOR'S PERSONNEL**

### **4.1 General**

The Contractor shall employ, retain or engage and provide or make available to the Authority such qualified and experienced Personnel as may be required to carry out the Services.

### **4.2 Approval and replacement of Personnel**

4.2.1 The names of the Personnel involved in providing the Services is required to be pre-informed to the Authority by the Contractor and will deemed to be approved by the Authority unless otherwise specified in writing by the Authority. No existing Personnel shall be replaced and no other Personnel shall be engaged without prior written approval of the Authority for providing the Services.

4.2.2 The Authority may at any time, through directions issued in writing, instruct the Contractor to replace one or more of the Personnel involved in providing the Services without assigning any reasons thereof.

#### 4.3 Personnel on leave

The Contractor shall ensure that any absence of the Contractor's Personnel, on grounds of leave or any other reasons whatsoever does not delay the delivery and quality of the Services.

#### 4.4 Coordination

The person designated as the team leader of the Contractor's Personnel shall be responsible for the coordinated, timely and efficient functioning of the Personnel.

### 5. OBLIGATIONS OF THE AUTHORITY

#### 5.1 Assistance in obtaining permissions, clearances etc.

Unless otherwise specified in the Agreement, the Authority shall make best efforts to ensure that the government and various other concerned authorities shall:

- (a) provide the Contractor with permits and such other documents as may be necessary to enable the Contractor to provide the Services ; and
- (b) issue to officials, agents and representatives of the respective governmental and other local authorities all such instructions as may be necessary or appropriate for the prompt and effective implementation of the Services.

#### 5.2 Payment

In consideration of the Services performed, with remedy of defects therein by the Contractor under this Agreement, the Authority shall make to the Contractor such payments and in such manner as is provided as under:

FIRST PAYMENT MILESTONE	25% of the contract value within 30 days of signing of the contract.
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SECOND PAYMENT MILESTONE	40% of the contract value on 50% of completion of work certified in writing by the Authority.
THIRD PAYMENT MILESTONE	35% of the contract value within 30 days of Selected completion of the work certified in writing by the Authority.

### 5.3 Currency of payment

5.3.1 All payments shall be made in Indian Rupees. The Contractor shall be free to convert Rupees into any foreign currency as per Applicable Laws.

5.3.2 All payments under this Agreement shall be made to the account of the Contractor as may be notified to the Authority by the Contractor.

5.3.3 Before any payment is executed, the Contractor must raise an invoice to the Authority for the Services provided during the concerned period.

## 6. LIQUIDATED DAMAGES FOR UNSATISFACTORY WORK

6.1 The Contractor will always ensure that the all the works are being carried out as per scope of work section of this RFP unless otherwise informed by the Authority. The authorised representative of the authority will conduct site inspections and in case of unsatisfactory quality of workmanship by the contractor they will subject to liquidated damages up to 10% of the contract value. For every event of unsatisfactory work as notified by the authority liquidated damages up to 1% will be levied. In case the Authority feels there are severe issues with the construction work, the Authority shall have the right to make alternate arrangements for satisfactory carrying out the required works, at the risk and cost of the Contractor.



## **7. FAIRNESS AND GOOD FAITH**

### **7.1 Good Faith**

The Parties undertake to act in good faith with respect to each other's rights under this Agreement and to adopt all reasonable measures to ensure the realization of the objectives of this Agreement.

### **7.2 Operation of the Agreement**

The Parties recognize that it is impractical in this Agreement to provide for every contingency which may arise during the life of the Agreement, and the Parties hereby agree that it is their intention that this Agreement shall operate fairly as between them, and without detriment to the interest of either of them, and that, if during the term of this Agreement either Party believes that this Agreement is operating unfairly, the Parties will use their best efforts to agree on such action as may be necessary to remove the cause or causes of such unfairness.

## **8. SETTLEMENT OF DISPUTES**

### **8.1 Dispute resolution**

8.1.1 Any dispute, difference, claim or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the "**Dispute**") shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure set forth in Clause 8.2 below.

### **8.2 Conciliation**

The Parties agree to use their best efforts to resolve and settle amicably any Dispute, difference or claim whatsoever arising out of, or in connection with, this Agreement or the interpretation thereof in a prompt and equitable manner and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non-privileged records, information and data pertaining to any Dispute.

### 8.3 **Arbitration**

8.3.1 Any Dispute which is not resolved amicably by conciliation, as provided in Clause 8.2, shall be finally decided by reference to arbitration by a sole arbitrator (“**Arbitrator**”) appointed in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi (the “**Rules**”), or such other rules as may be mutually agreed by the Parties, and shall be subject to the provisions of the Arbitration and Conciliation Act, 1996.

8.3.2 The venue of such arbitration shall be Delhi and the language of arbitration proceedings shall be English.

8.3.3 The Arbitrator shall issue a reasoned award (“**Award**”) and such Award shall be final and binding on the Parties, and the Contractor and the Authority agree and undertake to carry out such Award without delay.

8.3.4 This Agreement and the respective rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.

## 9. **SEVERABILITY AND ENFORCEABILITY**

If any term or provision of this Agreement is held by a judicial or other competent authority of competent jurisdiction to be contrary to law or becomes otherwise invalid, illegal or unenforceable in any respect after execution hereof, such provisions shall be severed from this Agreement and the other remaining provisions of this Agreement shall remain in full force and effect. Such invalidity or un-enforceability shall not affect the rights of the Parties with regard to any claim which any Party has for any activities undertaken by either Party, advantage whereof has already been taken/availed of by the other Party.

## 10. **ASSIGNMENT**

10.1 Save as provided herein, this Agreement, or any right or obligation or interest accruing to the authority hereunder may be freely transferred by the authority, in whole or in part, by way of assignment or novation or in any other form, to any third party, including, but not limited to, any authority affiliate, subsidiary or associate entity, provided that the

Contractor is duly informed of the same.

- 10.2 Save as provided herein, this Agreement, or any right or obligation or interest hereunder accruing to the Contractor cannot be transferred or assigned in any form to any other entity by the Contractor without the prior written consent of the Authority.

#### 11. NON-WAIVER

Any waiver or consent from the Authority, if any granted, shall be in writing only and no implied waiver and / or consent shall be presumed for any purpose(s) of this Agreement and/or work order(s) in relation thereto. No waiver by the Authority, if any granted, of any breach, default or violation of any term, warranty, representation, covenant, condition or provision of this Agreement shall constitute a waiver by the Authority of any subsequent breach, default or violation of any term, warranty, representation, agreement, covenant, condition or provision. Further, failure by the Authority to enforce any provision of this Agreement shall not be deemed a waiver of future enforcement of that or any other provision in this Agreement.

#### 12. COUNTERPARTS

This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which together shall constitute 1 (one) instrument.

**IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be signed in their respective names as of the day and year first above written.**

SIGNED, SEALED AND DELIVERED

For and on behalf of

**[Insert name of Contractor]:**

SIGNED, SEALED AND DELIVERED

For and on behalf of

**ALL INDIA FOOTBALL  
FEDERATION**

Name:

Designation:

Address:

Tel No.: (+91)

Name:

Designation:

Address:

**ANNEXURE F – DRAWINGS**