***TENDER DOCUMENT***

**(E-Tender Notice No:01/RGNUL/CMW/17**

**Dated: 15/05 /2017**

**Construction of Mess First Floor for Boys &**

**Girls including internal & external Public**

**Health & Electrical Servicesin RGNUL Campus**

**at village Sidhuwal, Patiala.**

**VOLUME – I**



(Construction and Maintenance Wing)

Rajiv Gandhi National University of Law, Punjab, Patiala

ARCHITECT/

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**RGNUL, PUNJAB**

**(Construction and Maintenance Wing)**

**TENDER DOCUMENT**

|  |  |  |
| --- | --- | --- |
| **E-Tender NOTICE No.**  | : | **01/RGNUL/CMW/17** |
| **Name of Work** | **:** | **Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services in RGNUL Campus at village Sidhuwal, Patiala.** |
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59-8259-82

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**(NOTICE INVITING TENDER)**

**E-TENDER NOTICE**

 **NIT No. 01/RGNUL DATED 15.05.2017**

RGNUL invites item rate tenders from Registered Companies, Vendors of the company/Integrators & approved Government contractors particularly in this field / Labour& co-operative Societies, fulfilling the qualifying criteria as per bidding documents, on a two bid system for the following work. Bids originally due on 05.06.2017 will now be received up to 11.30 AM on 29.06.2017

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name of work** | **Estimated amount** | **Bid Security (Rs.)** | **Tender Processing Fee (Rs.)** | **Tender form fee (Rs.)** | **Period of completion** |
| 1 | 2 | 3 | 4 | 5 | 6 |
| **Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services.** | Rs 298.80 lac | 598000/- | 5750/- | 5000/- | 09Months |

**Schedule of Tenders**

|  |  |  |  |
| --- | --- | --- | --- |
| **Availability of Tenders online for Bidding** | **Last date of submission for online bids** | **Date & time of opening of Technical bids** | **Date and time of opening of Financial Bids**  |
| From 22.06.17 11.00 AM to 29.06.17 Up to 11:00 AM | 29.06.17Up to11.30 AM | 30.06.17At11.30 AM | 02.07.17 at 11.30 AM |

**Terms & Conditions:-**

1. It is mandatory for the interested bidders/ contractors to get themselves registered with [**www.etender.punjabgovt.gov.in**](http://www.etender.punjabgovt.gov.in/)& get User Id, password & Class-III Digital signatures for participating in this E-tendering process. The Tender documents shall be purchased, accessed, filled and submitted online from the site as mentioned above ([**www.etender.punjabgovt.gov.in**](http://www.etender.punjabgovt.gov.in/)).
2. The processing fees, earnest money & tender form fee shall have to be deposited online. For any query regarding this online deposition; PICTCL Numbers: - 092572-09340, 0172-3934667 may be contacted.
3. For any clarification regarding E-tendering process please contact Mr. Pavitar Singh **081466-99866**.
4. The detailed DNIT and other terms & conditions duly uploaded can be accessed online [**www.etender.punjabgovt.gov.in**](http://www.etender.punjabgovt.gov.in/) and <https://www.rgnul.ac.in/tender.aspx?page=50> site.
5. Apart from this the same can be seen in this office on any working day between 9.00 A.M to 5.00 P.M.
6. Pre-Bidding conference shall be held in the office of the Registrar, RGNUL on 27.06.2017 at 3.00 PM. Queries/suggestions in this regard should reach latest by 10.00 AM on 27.06.2017 either through registered post or email cmw@rgnul.ac.in. No query after this date shall be entertained. The University reserves the right to accept or reject the query/suggestion.
7. The conditional tenders contrary to DNIT will not be accepted.
8. The Tender of any bidder or all the bidders can be rejected on the recommendations of the committee or due to any administrative grounds without assigning any reason.
9. The bidder should keep checking the website for any Agenda/ Corrigenda in the notice/ bidding document till the last date of submission for online Bids.
10. Bidders / contracting firms should have completed only in their own name & style, similar works during the last five years:

One similar work costing **Rs 239.04 Lac**

 Or

 Two similar works costing **Rs. 149.40 Lac.**

 Or

Three similar work costing **Rs 119.52 Lac.**

**Completion certificate from the authority for which the work has been executed shall include information towards cost, time of completion and date of completion for each work).**

1. Bidder should have Service Tax number, PAN, Punjab VAT Registration. Anyhow, if any bidder is not having Punjab VAT registration /Service Tax Number & is found to successful, will get himself registered with the concerned department, before release of any payment.
2. Average Annual financial turnover during the last three years ending **31.03.2017** should be at least **Rs 89.65 lac.**
3. If date of opening of Technical Bid/Financial bid, is declared holiday by RGNUL, the tender will be opened on the next working day.
4. Original documents can also be seen by the RGNUL, any document found fake at any time can be debarred & black listed & the earnest money or any other amount due to the respective agency can be forfeited
5. The bidder will abide himself by all the labour laws.
6. Financial bid is required to be submitted in Indian Rupees**.**
7. Quoted rates deemed to be inclusive of all taxes including service tax.
8. Performance Guarantee @ 5% of the contract value shall be deposited by the contractual agency within 10 days from the date of issue of the letter of intimation. Earnest money shall be released on receipt of the performance guarantee.
9. Date of start shall be considered after 21 days from the date of issue of letter of intimation.

 **Registrar**

 **RGNUL**

**SECTION -I**

**INSTRUCTIONS TO BIDDERS**

**(ITB)**

**Section 1: Instructions to Bidders**

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1. **General**

**1. Scope of Bid**

The Employer (named in Appendix to ITB) invites bids for **Construction of Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services in RGNUL Campus at village Sidhuwal, Patiala.**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Particulars** | **Approximate Covered Area in Sq ft.** |
|  |
| 1. | **Construction of Mess First Floor for Boys & Girls in RGNUL Campus at village Sidhuwal, Patiala** | **21300** |
|  | **TOTAL** | **21300Sqft** |

Including campus development and Pubic Health & Electrical Service. **\***

 As defined in these documents and referred to as "the works") the bidders shall submit bid for the works as detailed in the document.

**\*** However this quantum of work can be **increased decreased or change**. No claim in this respect will be entertained.

1.2 **BRIEF DETAILS:**

 The project location is in area of Punjab, India in village Sidhuwal on Patiala- Bhadson road Tehsil &Distt. Patiala. The proposed construction package consists of framed structures as well as load bearing walls structures as per drawing. The scope of work also includes Public Health & Electrical Services. The design and scope may vary as per site requirement. The completion period of different building may be different depending on their size and services involved but defect liability period of all the buildings to start after completion of last building in the contract. Overall project completion period is **09 months**. The total cost of project is estimated to **Rs. 298.80 Lac”** Further details if desired, may be obtained from the Office of the University Engineer,Patiala on prior appointment.

1.3 The successful bidder will be expected to complete the works by the intended completion date specified in the Contract Data.

1.4 Throughout these bidding documents, the terms 'bid' and 'tender' and their derivatives (bidder/ tenderers, bid/tender, bidding/tendering, etc.) are synonymous.

**2. Source of Funds**

2.1 Funds will be arranged by RGNUL.

**3. Eligible Bidders**

3.1 The bid is open to established and reputed Contracting Agencies who fulfill requirements laid down in Clause 4.8 of ITB.

3.2 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a statement that the Bidder is neither associated, nor has been associated, directly, or indirectly, with the RGNUL or any other entity that has prepared the design, specifications, and other documents for the Project. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the works, and any of its affiliates shall not be eligible to bid

**4. Qualification of the Bidder**

4.1 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including conceptual drawings/ structural drawings and charts, as necessary. The proposed methodology should include programme of construction backed with equipment planning and deployment duly supported with broad calculations and quality assurance procedures proposed to be adopted justifying their capability of execution and completion of work as per technical specifications, within stipulated period of completion.

4.2 Necessary documents for pre-qualification of potential bidders shall be included in Technical Bid Documents towards pre-qualification .The bidders shall submit following along with information detailed to Section 2:

1. Copies of original documents defining the constitution or legal status, place of registration and principal place of business; written power of attorney to the signatory of the Bid to commit the Bidder.
2. List of building works executed during past five years duly supported with performance certificate from authority for whom work has been completed and information shall include name of work, estimated cost, date of start and date of completion.
3. List of equipment and machinery available with documentary proof of ownership and machinery proposed for deployment for execution of work.
4. Evidence of access to or availability of credit facilities certified by the banker’s equivalent of the estimated cash flow of **Rs. 89.65 lac*.***
5. Details of turnover for last three years in respect of construction works with audited balance sheet.
6. Undertaking that bidder would be able to invest an amount of **Rs. 89.65lac** of the contract value of work during implementation of contract.
7. Proposal, if, any, for sub contracting of elements of work, costing not more than 10% of bid amount.
8. Authority to seek references from the Bidder’s bankers.
9. Latest Income Tax clearance certificate from concerned department.
10. Affidavit attested by Executive Magistrate of not having been debarred/black-listed by any Govt./Semi Govt. Organization/Corporation at any stage.
11. Affidavit attested by Executive Magistrate that information being submitted is correct and true, and that any false information shall lead to disqualification at any stage.
12. Bench mark (Experience in similar works) in percentage will also be applicable to sub contractors for public health and electrical, if such works are to be got executed through sub contracting.
13. Affidavit by the lead partner/lead member of agency, if so in the case, as per clause 4.5(d)
14. Undertaking that the bid shall remain valid for the period specified in Clause15.1.
15. Copy of service Tax number (original copy will also be shown). In case the bidder is not having Service number, he will undertake that, he will get service number, in such case no payment will be released till service number is furnished.
16. Copy of PAN
17. Copies of PVAT
18. List of existing commitments/ongoing works

4.3 Deleted.

4.4 The bidder could be an individual, Limited Company/ Corporation, Proprietary firm, Partnership, Joint Ventures are not allowed.

4.5 A. Deleted.

 B. Each bidder should further demonstrate:

1. Availability (either owned or leased or by procurement against mobilization advances) of the following key and critical equipment for this work:

 Based on the studies, carried out by the Engineer the minimum suggested major equipment to attain the completion of works in accordance with the prescribed construction schedule are shown in the Annexure-I.

(b) Availability for this work of personnel with adequate experience as required as per Annexure-II.

(c) Liquid assets and/or availability of credit facilities not less than amount indicated in Appendix.

(d) Deleted.

C. Deleted.

4.6 Deleted.

4.7 The bid capacity of the prospective bidders will be calculated as under:

 Assessed Available Bid capacity = (A x N x 2 - B)

 Where

A = Maximum value of Civil Engineering works executed in any year during the last three years (updated to the price level of year indicated in Appendix) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which bids are invited.

B = value (updated to the price level of the year indicated in Appendix) of existing commitments and on-going works to be completed during the next one year (period of completion of the works for which bids are invited).

**Note:** The statement showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Executive Engineer or equivalent.

* 1. The following table gives the criteria for pre-qualification of prospective bidders based on contents/ enclosures of Technical Bid. The financial bid shall be opened in respect of agencies who would be pre-qualified for the purpose.

|  |  |  |
| --- | --- | --- |
| **Sr. No.** | **Item** | **Bench Mark** |
| 1. | Experience in similar works**. ( Similar Works means const. of RCC framed building including related Civil, P.H. & Electrical Works )** | : Experience of having successfully completed similar works during last 5 years ending last day of month previous to the one in which applications are invited should be either of the following:-(a) **Three similar** completed works costing not less than the amount equal to 40% of the bid cost i.e. **Rs. 119.52 Lac.** OR(b) **Two similar** completed works costing not less than the amount equal to 50% of the bid cost i.e. **Rs. 149.40 Lac**. OR(c) **One similar** completed work costing not less than the amount equal to 80% of the bid cost i.e. **Rs. 239.04 Lac.** |
| 2. | Turnover in similar activities. | : Average Annual financial turnover during the last three years ending **31.03.2017** should be at least **Rs89.65 lac.** |
| 3. | Cash flow capability | : Certificate from bank for cash flow for **Rs. 89.65 lac.**  |
| 4. | Capability of key personnel | : As per DNIT |
| 5. | Proposed work plan | : Proposed methodology and program of construction backed with equipment planning and deployment, and quality control procedure to be adopted. |
| 6. | Equipment capability | : As per annexure I of sub clause 4.5B (a) |
| 7. | Bid capacity | : As per DNIT |
| 8. | Quality Assurance Mechanism | : As per DNIT |

* + 1. Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:
* made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
* record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc., and/or
* **In the opinion of the Employer, violated or attempted to back out of any Undertaking furnished in favour of RGNUL or in the context of any project during the past five years.**
* Participated in the previous bidding for the same work, had quoted unreasonably high bid prices, and could not furnish rational justification to the employer.

**5. One Bid per Bidder.**

5.1 Each bidder shall submit only one bid. A bidder who submits or participates in more than one Bid will cause all the proposals with the Bidder's participation to be disqualified.

**6. Cost of Bidding**

6.1 The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.

**7. Site Visit**

7.1 The bidder, at the Bidder's own responsibility and risk is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract of construction of the Works. The costs of visiting the site shall be at the Bidder's own expense.

 The bidder may reassure himself at his own cost about the soil properties at the site. The Employer shall not be responsible for any variation in soil strata from than given in this document.

**(B) BIDDING DOCUMENTS**

1. Contents of Biding Documents
	1. The set of bidding documents comprises the documents listed below and addenda issued in accordance with Clause 10.

|  |  |  |
| --- | --- | --- |
| **Section** | **Particulars** | **Section**  |
|  **VOLUME-I** |
| 1. | Instructions to Bidders  | Section I |
| 2. | Qualification Information  | Section II |
| 3. | Conditions of Contract | Section III |
| 4. | Contract Data  | Section IV |
| 5. | Technical specification of contract  | Section V |
| 6. | Form for security and performance Guarantee | Section VI |
| 7. | Drawings | Section VII |
| **VOLUME-II** |
| 1 | B.O.Q. | Section I |
| 2 | FORM OF BID  | Section11 |

* 1. One copy of the bidding documents will be issued to the bidder. Documents to be furnished by the bidder in compliance to section 2 will be prepared by him and furnished as section -I in two parts (refer Clause 12).
	2. The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms, and technical specifications, bill of quantities, forms, Annexes and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder’s own risk. Pursuant to clause 26 hereof, bids which are not substantially responsive to the requirements of the Bid Documents shall be rejected.

**9. Clarification of Bidding Documents.**

* 1. A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing at the Employer’s Address indicated in Appendix. The Employer will respond to any request for clarification pursuant to Clause 9.2. Copies of the Employer’s response will be forwarded to all purchasers of the bidding documents including a description of the enquiry but without identifying its source.
	2. **Pre-bid Meeting**
		1. The bidder or his official representative is invited to attend a pre-bid meeting, which will take place at the address, venue, time and date as indicated in appendix. The presence of the representative of the lead partner of agencies necessary in case of participation in the pre-bid meeting.
		2. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
		3. The bidder is requested to submit any questions in writing to reach the Employer not later than one day before the meeting.
		4. Minutes of the meeting, including the text of the questions raised (without identifying the source of inquiry) and the responses given will be transmitted without delay to all purchasers of the bidding documents. Any modification of the bidding documents listed in Sub-Clause 8.1, which may become necessary as a result of the pre-bid meeting, shall be made by the Employer exclusively through the minutes of the pre-bid meeting.
		5. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

**10. Amendment of Bidding Documents.**

* + 1. Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.
	1. Any addendum thus issued shall be part of the bidding documents and shall be communicated in writing, either by the Engineer or the Employer, to all the purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Engineer and the Employer. The Employer will assume no responsibility for postal delays.
	2. To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at his discretion, extend as necessary the deadline for submission of bids, in accordance with Sub-clause 20.2 below.

**(C) Preparation of Bids**

**11. Language of the Bid.**

11. 1 All documents relating to the Bid shall be in the English language.

**12. Deleted.**

**12.1 Deleted**

* 1. Deleted.
	2. Following documents, which are not submitted with the bid, will be deemed to be part of the bid.

**Section Particulars Section No.**

 **Volume-I**

 1. Instructions to Bidders Section – I

 2. Qualification information Section - II

 3. Conditions of Contract Section - III

 4. Contract Data Section - IV

 5. Technical specification of contract Section - V

 6. Form for security and performance Section - VI

guarantee

 7. Drawings Section VII

 **Volume-II**

1**.** B.O.Q.Section I

 2. Form of Bid Section II

**13. Bid Price**

13.1 The contract shall be for the whole works as described in Sub-Clause 1.1

13.2 The Bidder shall fill the percent basis (both in figures and words) for the Works described in the Bidding Document.

13.3 All duties, taxes inclusive of VAT / Service Tax / GST etc as the case may be and other levies payable by the contractor under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder.

13.4 Deleted.

**14. Currencies of Bid and Payment**

14.1 The bidder will quote his offer **plus or minus** over the amount exhibited in the bill of quantity. All payment shall be made in Indian Rupees.

**15. Bid Validity.**

15.1 Bids shall remain valid for a period not less than **120 days** after the deadline date for bid submission specified in Clause 20. A bid valid for a shorter period shall be rejected by the Employer as non-responsive. In case of discrepancy in bid validity period between that given in the undertaking pursuant to Clause 12.1 (iv) and the Form of Bid submitted by the bidder, the latter shall be deemed to stand corrected in accordance with the former and the bidder has to provide for any additional security that is required.

15.2. In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified additional period. The request and the bidder’s responses shall be made in writing. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his bid security for a period of the extension, and in compliance with Clause 16 in all respects.

**16. Bid Security**

Earnest money / tender form fee & processing Earnest etc shall have to be deposited online, as per amounts shown in the tender notice. For any query regarding this online deposition; PICTCL Numbers: - 092572-09340, 0172-3934667 may be contacted.

* 1. Deleted.
	2. Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clause 16.1 above shall be rejected by the Employer as non-responsive.
	3. The Bid Security of unsuccessful bidder will be returned within 28 days of the end of the bid validity period specified in 15.1
	4. The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.
	5. The Bid Security may be forfeited.

 (a) If the Bidder withdraws the Bid after Bid opening during the period of Bid validity.

 (b) If the Bidder does not accept the correction of the Bid Price, pursuant to clause 27; or

 (c) In the case of a successful Bidder, if the Bidder fails within the specified time limit to:

1. Sign the Agreement; or
2. Furnish the required Performance Security.

**17. Alternative Proposals by Bidders.**

17.1 Deleted.

**18. Format and Signing of Bid.**

18.1 Deleted.

18.2 Deleted.

* 1. The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

**(D) Submission of Bids**

**19. Bids are to be submitted online.**

**20. Deadline for Submission of the Bids as notice inviting tender.**

* 1. The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

**21. Deleted**

**22**. **Modification and withdrawal of Bids is not allowed.**

**(E) BID Opening And Evaluation**

**23. Bid Opening**

23.1 The Employer will open technical bid of all the agencies and financial bid will be opened of qualifying bidders only.

23.2 The Employer shall prepare minutes of the Bid Opening.

**24. Process to be Confidential**

* 1. Information relating to the examination, clarification, evaluation, pre-qualification of agencies, comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by a Bidder to influence the Employer's processing of Bids, pre-qualification or award decisions may result in the rejection of his Bid.

**25. Clarification of Financial Bids.**

25.1 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdown of unit rates. The request for clarification and the response shall be in writing, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 27.

25.2 Subject to sub clause 25.1, no Bidder shall contact the Employer on any matter relating to his bid from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.

25.3 Any effort by the Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidder’s bid.

**26. Examination of Bids and Determination of Responsiveness**

26.1 During the detailed evaluation of “Technical Bids” and pre-qualification of Agencies, the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clause 3 and 4; (b) documents has been properly signed; (c) is accompanied by the required securities (d) is substantially responsive to the requirements of the Bidding documents; and During the detailed evaluation of the “Financial Bid”, the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e. priced bill of quantities. Financial bids shall be opened in respect of Agencies who shall be pre-qualified on the basis of contents/ enclosures/ documents and information included in Technical Bid.

26.2 A substantially responsive “Financial Bid” is one which conforms to all the terms, conditions and specifications of the Bidding documents, without material deviation reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Bidding documents, the Employer’s right of the Bidder’s obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.

26.3 If a “Financial Bid” is not substantially responsive, it will rejected by the Employer and may not subsequently by made responsive by correction or withdrawal of the non-conforming deviation or reservation.

**27. Correction of Errors**

27.1 “Financial Bids” determined to be subsequently responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

1. Where there is a discrepancy between the rates in figures and in words, the rate in words will govern.

27.2 Deleted

**28. Deleted.**

**29. Evaluations and Comparison of Financial Bids.**

* 1. The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Sub Clause 26.2
	2. In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid price by adjusting the Bid Price as follows :
1. making any correction for errors pursuant to Clause 27, or
2. making an appropriate adjustments for any other acceptable variations, deviations, and
3. Making appropriate adjustments to reflect discounts or other price modifications offered in accordance with sub clause 23.6.
	1. The Employer reserves the right to accept or reject any variation or deviation. Variations and deviations and other factors, which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for the Employer, shall not be taken into account in Bid evaluation.
	2. Deleted.
	3. Deleted.

**30. Deleted.**

# (F) AWARD OF CONTRACT

**31. Award Criteria**

* 1. Subject to clause 32, the Employer will award the Contract to the Bidder whose Bid has been determined:
1. To be substantially responsive to the Bidding documents and who has offered the lowest evaluated Bid Price; and

(ii) To be within the available bid capacity adjusted to account for his bid price which is evaluated the lowest in any of the packages opened earlier than the one under consideration.

**32.** **Employer’s Right to accept any Bid and Reject any or all Bids.**

* 1. The Employer reserves the right to accept or reject any Bid, and to cancel the Bidding process and rejects all Bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer’s action.

**33. Notification of Award and Signing of Agreement**

33.1 The Bidder whose bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the “Letter of Acceptance”) will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the “Contract Price”).

33.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause 34.

33.3 The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be signed by the Employer (as stated in contract data) and the successful Bidder within 21 days of the facsimile intimation sent to the Bidder.

33.4 Upon the furnishing by the successful bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

**34. Performance Security**

* 1. Within 21 days of receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Engineer on behalf of Employer a Performance Security in any of the forms given below for an amount equivalent to 5% of the Contract as per Clause 52 of Conditions of Contract valid up to 28 days after the date of expiry of the defect liability period.

- a bank guarantee in the form given in security & other forms/ FDR duly pledged in favour of Registrar RGNUL.

.

* 1. If the performance security is provided by the successful bidder in the form of a Bank Guarantee, it shall be issued either (a) at the Bidder’s option, by a Nationalized Indian Bank acceptable to the Employer.
	2. Failure of the successful Bidder to comply with the requirements of Sub-clause 34.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security.

**35. Advance Payment and Security.**

35.1 The Employer will provide an Advance Payment on the Contract Price as stipulated in the Conditions of Contract, subject to maximum amount, as stated in the Contract Data.

**36. Deleted.**

**37. Corrupt or Fraudulent Practices.**

37.1 The Employer will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question and will declare the firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract with State PWD, CPWD, NHAI, AAI, DRDO or any other Government Agencies or Private sector undertaking, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for the contract, or in execution.

37.2 Furthermore, Bidders shall be aware of the provision stated in Sub –clause 23.2 and Sub-clause 59.2 of the Conditions of Contract.

**APPENDIX TO I.T.B.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | **Clause Reference** **With respect to** **Section – I** |
| 1. | Name of the Employer | **:** | Registrar, Rajiv Gandhi National University of Law, Sidhwal Campus,, Patiala. |  |
|  |  |  |  |  |
| 2. | Liquid assets and/or availability of credit facilities | **:** | **Rs89.65 lac.** | [CI.4.5B(c)] |
| 3. | Price level of the financial year | **:** | Rate of inflation may be taken as per the index given at sr. no. 12 below. | [CI.4.7] |
| 4. | The pre-bid meeting will take Place on / at (Date, Time & Venue)  | **:** | **Date: 27.06.2017** **Time: 3.00 P.M.**Venue: In the office of Registrar, RGNUL,Sidhuwal campus,Patiala. |  |
| 5. | The technical bid will be opened at | **:** | As per tender notice. |  |
| 7. | Identification  | **:** | **Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services.**  | [CI.19.2(b)] |
| 8. | The bid should be submitted latest by | **:** | As per tender notice. | [CI.20.1(a)] |
| 10. | The Bank Guarantee in favour of | **:** | Registrar, RGNUL,Sidhuwal campus, Patiala. .Payable at Patiala. | [CI.34.1] |
| 11 | The name of Dispute Review Expert | **:** | (To be intimated later) is to be appointed by the Vice chancellor, RGNUL, PatialaDaily fee and reimbursable expenses shall be intimated later. | [Cl.36.1] |
| 12. | Escalation factors (for the cost of works executed and financial figures to a common base value for works completed . | **:** |  Cost of work executed shall be updated @ 5% per annum. |  |
|  |  |  |  |  |

**ANNEXURE-I**

**List of Key Plant & Equipment to be deployed on Contract Work**[Reference Cl. 4.5(B) (a)]

|  |  |  |  |
| --- | --- | --- | --- |
| **S.****No.** | **Type of Equipment** | **Maximum age as on 31.03.2017** | **Minimum No.****Qty.** |
| 1. | Concrete Batching and Mixing plant (12 cum per hour capacity) ISO certified | 5 | 1 |
| 2. | Concrete Mixers with lift | 5 | 2 |
| 3. | Concrete pump complete. | 5 | 1 |
| 4. | Bar Bending Machines | 5 | 1 |
| 5. | Bar Cutting Machines | 5 | 1 |
| 6. | Vibrators | 5 | 4 |
| 7. | Front end Loader (JCB) | 5 | 1 |
| 8. | Vibratory Plate Compactor | 5 | 2 |
| 9. | Dumpers 14 cum | 5 | 1 |
| 10. | Tankers | 5 | 2 |
| 11. | Tractors | 5 | 1 |
| 12. | Tractor Trailer | 5 | 1 |
| 13. 14.  15.  16. 17. | Concrete needle vibratorsTransit mixer 7.50 cum. Bay batcherDiesel Generator of different capacity. Welding Sets. | 53 5 55 | As per requirement113As per requirement |
|  |  |  |  |
|  | **Laboratory Equipment** |  |  |
| S.No. | Type of Equipment |  | Minimum No. |
| 1. | Mechanical Concrete Cube testing machine | 100-150 T | 1 |
| 2. | Cement cube vibration machine |  | 1 |
| 3. | Vicat Apparatus with accessories |  | 1 |
| 4. | Sieve Shakers |  | 1 |
| 5. | Slump cones |  | 4 |
| 6. | Sieves set |  | 2 |
| 7. | Rapid moisture testing machine |  | 1 |
| 8. | Cube moulds ISI |  | 40 |
| 9. | Trowel |  | 12 |
| 10. | Wall thermometer |  | 2 |
| 11. | Oven |  | 1 |
| 12. | Metal Container |  | 3 |
| 13. | Trays |  | 6 |
| 14. | Measuring Jars |  | 4 |
| 15. | Proctor Density Apparatus |  | 2 |
| 16. 17.  18.  | Electronic Weighing balance. Impact Test machineCore Cutter |  | 314 |
|  | **Surveying Equipment** |  |  |
|  | Theodolite |  | 1 |
| 1. | Dumpy level |  | 1 |
| 2. | Auto Level |  | 1 |
|  | **Centering–Shuttering& Scaffolding** |  |  |
| 1. | Steel Centering material (wall forms, spans, props etc.) |  | 1500 sqm. Of different standard sizes. |
| 2. | Wooden Centering material (ply, beam bottoms etc.) |  | 100 sqm. |
| 3. | Steel Scaffolding material (H frames, bracings etc.) |  | 1500 sqm |
|  |  |  |  |

 **NOTE:-**

**1. Contractor/agency will submit details of Locations where the machinery is**

**presently located/ working.**

 **2. Machinery should be in the name of contractor/Agency. Documentary proof**

**in this regard is required.Annexure-II**

**List of Key Personnel to be deployed on Contract Work**

**[Reference C1.4.5 (B)(b)]**

**Sr. Personnel Qualification Minimum No.**

1. Project Manager BE (Civil) + 15 years experience

 Of building Works. 1 No.

2. Site Engineer BE (Civil) + 7 years experience

 Of building works. 1 No.

 Or

 Diploma Civil + 10 years experience

 Of building work.

3. Site Engineer BE (Civil) + 7 years experience 1 No.

(Public Health works) or

 Diploma Civil + 10 years experience.

4. Site Engineer BE (Elect.) + 7 years experience 1 No.

(Electrical Works) or

 Diploma Electrical + 10 years experience.

5. Quality Assurance BE (civil) + 10 years Experience 1 No.

In quality control cell.

 Engineer

6. Quantity Surveyor BE (civil) +10 years Experience 1 No.

 Of building work.

#### SECTION - II

#### QUALIFICATION INFORMATION

**PRE-QUALIFICATION CRITERIA:**

1. Pre-Qualification will be based on meeting all the minimum criteria for pre-qualification and other qualification criteria regarding the Applicant’s work experience, personnel and equipment capabilities and financial position as demonstrated by the Applicant’s responses in the forms attached to the Letter of Application.

2. The Applicant should meet the following minimum criteria for Pre-Qualification:

3) **Experience in building works:**

* 1. Experience of having successfully completed similar works during last 5 years ending last day of month previous to the one in which applications are invited should be either of the following:-
1. Three similar completed works costing not less than the amount equal to 40% of the bid cost i.e. **Rs. 119.52 Lac.**

OR

1. Two similar completed works costing not less than the amount equal to 50% of the bid cost i.e. **Rs. 149.40 Lac.**

OR

 (c) One similar completed work costing not less than the amount equal to 80% of the bid cost i.e. **Rs. 239.04 Lac.**

2. In case the bidder do not have the experience of major specialized works like Plumbing and electrical and ancillary services etc., such specialized works shall be carried out by specialized agencies having sound financial background and experience of executing works of similar nature & magnitude. The bidder is required to give an undertaking as per enclosed format at Annexure- D

**2) Turnover in building works activities**:

i) Average annual financial turnover during the last three years ending **31.03.17** should be at least **Rs 89.65 lac**.

# 4.0 PERSONNEL, EQUIPMENT AND FINANCIAL CAPABILITIES

4.1 **Personnel Capabilities**: The firm should have suitable qualified and experienced personnel for the successful completion of the works. List of employees and bio-data of key officials shall be submitted stating clearly how these would be involved in this work.

 **(Fill enclosed ANNEXURE – I)**

Minimum requirement as per Annexure – I of I.T.B.

4.2 **Equipment Capabilities**: The Applicant should provide an undertaking regarding availability of equipments required for the completion of the project along with list of equipments indicating owned or to be hired. In case equipments are to be hired then source of equipments may also be indicated.

 **(Fill enclosed ANNEXURE -II).**

 Minimum requirement as per Annexure – II of I.T.B.

4.3 **Financial Capabilities**: The Applicant should submit Audited Balance Sheets for the last three financial years i.e. **2014-2015, 2015-2016 and 2016-2017** (**For 2016-17, Provisional BalanceSheet may be submitted if not finalized till date of submission**). These Balance Sheets should demonstrate the soundness of the applicant’s financial position, showing positive Net worth and Net Profit in last three financial years. **(Fill enclosed ANNEXURE-III).**

* 1. **Minimum Solvency Requirement** :
		1. A solvency certificate from applicant’s Bank Nationalized that applicant is solvent for 30% of the Project Estimated Cost. The certificate should be not more than one year old.
		2. The applicant should also submit an undertaking that minimum funds equivalent to about requirement of four months (average) can be managed by the applicant in case funds are delayed by the Employer.

**5.0 EXPERIENCE OF CONSTRUCTION OF PROJECTS OFBUILDING WORKS**

 The applicant shall submit information about their past experience in construction of similar works ie. Const. of RCC framed building works including related Civil, P.H. & Electrical Works, along with information about magnitude of the Projects, Type of Projects, Completion Certificate from Client, Time Overrun if any, Cost overrun if any. **(Fill enclosed ANNEXURE-IV).**

**6.0 OTHER INFORMATION TO BE SUBMITTED ALONGWITH APPLICATION**

6.1 Registration/ Licence: The firm should have Works Contract Tax/VAT Registration with the appropriate Authorities In case the firm is not registered at the time of submission of bid; they will submit an undertaking that they will get themselves registered with the concerned authorities in case they are awarded the work

6.2 The firm should submit an affidavit duly notarized that they have not abandoned any work of Government of Punjab / Union Government / other State Governments/ PSU’s etc. during the last 5 years. They should also submit an affidavit that they have not been blacklisted or expelled by Union Government/ State Governments/ PSU’s etc. during the last 5 years as per ANNEXTURE- “C”.

6.3. The applicant should provide information regarding litigation/ Arbitration cases for the last five years as per ANNEXTURE- V

6.4 The applicant shall submit the supporting documents regarding the information given in the ANNEXURE-I to ANNEXURE-V.

7**.0** Even though the Applicants meet the above criteria, they are subject to be disqualified, if they have:

* made misleading or false representation in the form, statement and attachments submitted; /or

 - Record of poor performance such as abandoning the work, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures, etc. /or

* The performance of any agency already worked/ working with PWD or any other department of Govt. of Punjab and is not found satisfactory./or

- found to have been black listed in any of the works.

**8.0** The bidder shall bear all costs associated with the preparation and submission of his bid, and the employer will in no case be responsible and liable for those costs.

**9.0** The applicants are advised to visit the site to get first hand information as regards its approach, accessibility, working conditions, site conditions, availability of labour and material etc. and other matters affecting cost and work. All costs incurred in connection with submission of the pre-qualification application shall be borne by the applicant irrespective of the outcome.

**10.0** If any information furnished by the applicant is found incorrect at a later stage, applicant shall be liable to be debarred from participating in tenders of Government of Punjab. The department reserves the right to verify the particulars furnished by the applicant independently.

**11.0** The competent authority to pre-qualify shall have the power to relax any condition/criterion for pre-qualification if it considers expedient to do so.

**12.0** Even though the agency meets all the criteria, the Employer reserves the right to accept or reject any applicant/disqualify any agency without assigning any reason whatsoever.

**13.0 UPDATING QUALIFICATION INFORMATION**

13.1 Applicants shall be required to update the financial information used for Pre-Qualification as and when asked for and at the time of submitting their bids, to confirm their continued compliance with the pre-qualification criteria and verification of information provided.

**14.0 GENERAL**

14.1Only agencies / firms who have been pre-qualified under this procedure will be intimated date & time of opening of bids.. If a firm submit more than one bid all bids of the party will be rejected.

14.2 The Employer / Consultant reserve the right to:

1. Reject or accept any application without assigning any reason or incurring any liability thereof
2. Cancel the pre-qualification process and reject all applications
3. Split the works into different packages if required
4. Amend the scope and value of any contract under this project, in such event the bids will only be called from those pre-qualified applicants who meet the requirements of the contract as amended.

14.3 No correspondence either from successful / pre-qualified applicant or unsuccessful

 Applicant will be entertained in this regard.

14.4 Check list format attached at Annexure VI must be filled and enclosed along with the application.

**LETTER OF APPLICATION**

NOTE: On the letterhead paper of the applicant including full postal address, telephone no., fax no., telex no. and cable address.

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

To,

The Registrar,

Rajiv Gandhi National University of Law,Pb

Village Sidhuwal,

Patiala.

Sir,

1. Being duly authorised to represent and act on behalf of ………………………….. (Hereinafter referred to as “the Applicant”) and having reviewed and fully understood all the pre-qualification information provided, the undersigned hereby apply to be considered by yourselves for the prequalification for the **Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services in RGNUL ,Campus at village Sidhuwal, Patiala**

2. Attached to this letter are copies or original documents defining:

1. the applicants legal status
2. the principal place of business
3. The place of incorporation (for applicants who are corporations) or the place of registration and the nationality of the owners (for applicants who are partnerships or individually owned firms).
4. application form no. 1 to 7

3. Your agency and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents and information submitted in connection with this application, and to seek clarification from our bankers and clients regarding any financial and technical aspects. This letter of application will also serve as authorization or any individual or authorized representative or any institution referred to in the supporting information, to provide such information deemed necessary and requested by your selves to verify statements and information provided in this application, or with regard to the resources, experience, and competence of the Applicant.

4. Your agency and its authorized representatives may contact the following persons for further information:

|  |
| --- |
| General, Personnel, Technical and Financial Enquiries |
| Contact 1 : | Telephone 1 : |
| Contact 2 : | Telephone 2 : |

5. This application is made in the full understanding that:

1. Bids by pre-qualified applicants will be subject to verification of all information submitted for pre-qualification at the time of bidding
2. Your agency reserves the right to :
	* amend the scope and value of the contract / bid under this project ; in such event, bids will only be called from pre-qualified bidders who meet the revised requirements ; and
	* reject or accept any application, cancel the pre-qualification process, and reject all applications without assigning reasons or incurring any liability thereof ; and
3. Your agency shall not be liable for any such actions and shall be under no obligation to inform the Applicant

6. The undersigned declare that statements made and the information provided in the duly completed application are, true and correct in every detail.

|  |
| --- |
| Sealed & Signed |
| **Name** |
| **For and on behalf of** |

**APPLICATION FORM NO. 1**

**GENERAL INFORMATION**

All individual firms applying for pre- qualification are requested to complete the information in this form. Information to be provided for all owners or APPLICANTS who are partnerships or individually owned firms.

|  |  |
| --- | --- |
|  1. | Name of firm |
|  2 | Head office address |
|  3 | Telephone | Contact |
|  4 | Fax | E-mail Adress. |
|  5 | Place of incorporation/ | Year of incorporation/ registrationRegistration | ||  |

**Authorized Signatory of bidder**

**APPLICATION FORM NO. 2**

**STRUCTURE AND ORGANIZATION**

1. Name & address of the applicant

2. Telephone No. / Telex No. / Fax No.

3. Legal status of the applicant (attach copies of original document defining the legal status)

 (a) An individual

 (b) A proprietor firm

 (c) A firm in partnership

1. A Limited Company or Corporation.

4. Particulars of registration with various Government bodies (attach attested photocopy)

 Organisation /Place of registration Registration No.

5. Name and Titles of Directors & Officers with designation to be concerned with this work.

6. Designation of individuals authorised to act for the organisation

7. Was the applicant ever required to suspend construction for a period of more than six months continuously after you commenced the construction? If so, give the name of the project and reasons of suspension of work.

8. Has the applicant ever abandoned the awarded work before its completion? If so, give name of the project and reasons for abandonment.

9. Has the applicant ever been debarred / black listed for tendering in any organisation at any time? If so, give details.

10. Has the applicant ever been convicted by a court of law? If so, give details.

11. Any other information considered necessary but not included above.

**Authorized Signatory of bidder**

**APPLICATION FORM NO. 3**

 **ANNEXURE- I**

**PERSONNEL CAPABILITIES**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sl. No. | Designation | Total Number | Number available for this work | Name | Qualification | Professional experience and details of work carried out | How these would be involved in this work | Remarks |
|  |  |  |  |  |  |  |  |  |

**Authorized Signatory of bidder**

**APPLICATION FORM NO. 4**

**ANNEXURE- II**

**EQUIPMENT CAPABILITIES**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl.No. | Name of Equipment | Present Status | Age | Condition | Ownership Status | Current Location | Remarks |
| Capacity or Type | Nos. |
| Presently owned | Leased | To be purchased |
|  |  |  |  |  |  |  |  |  |  |  |

**Authorized Signatory of bidder**

**APPLICATION FORM NO. 5**

 **ANNEXURE- III**

**FINANCIAL CAPABILITIES**

 **(Rs. In lac)**

|  |  |
| --- | --- |
| Financial Year | Annual Turn Over in Indian Rupees ( or equivalent to Indian Rupees ) as per Audited Balance Sheet  |
| 2014-2015 | Rs. |
| 2015-2016 | Rs. |
| 2016-2017(Provisional if not finalized ) | Rs. |
| Average Annual Turnover over the past three years | Rs. |

|  |  |  |  |
| --- | --- | --- | --- |
| Financial Information in Rs. Equivalent | For year2009-2010 | For year2010-2011 | For year2011-2012 (Provisional If not finalized) |
| 1. Total Assets |  |  |  |
| 2. Current Assets |  |  |  |
| 3. Total Liabilities |  |  |  |
| 4. Current Liabilities |  |  |  |
| 5. Profit before Tax |  |  |  |
| 6. Profit after Tax |  |  |  |
| 7. Net Worth |  |  |  |

**NOTE : The above data is to be supported by audited balance sheets**

1. Attach copies of audited balance sheets for all five years (2014-2015, 2015-2016& 2016-2017

Provisional for 2016-2017 if not finalized).

2. Attach recent solvency certificate from bankers

3. Indicate financial arrangements for carrying out the proposed work.

**Authorized Signatory of bidder**

**APPLICATION FORM NO. 6**

**ANNEXURE- IV**

**EXPERIENCE OF CONSTRUCTION OF PROJECTS OF BUILDING ACTIVITY**

(**During last Five years ending last day of month previous to the one in which applications are invited)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Name of work / project and location** | **Owner or sponsoring organization** | **Cost of work in Lacs** | **Date of commencement as per contract** | **Stipulated date of completion** | **Actual date of completion** | **Name and address/ telephone number of officer to whom reference may be made**  | **Remarks** |
|  |  |  |  |  |  |  |  |  |

**NOTE :Please attach supporting documents such as, Completion certificates along with work**

**order’s copies duly attested for the above information.**

**Authorized Signatory of bidder**

**APPLICATION FORM NO. 7**

 **ANNEXURE- V**

**Litigation Details Court Cases/arbitration**

|  |
| --- |
| **Name of Bidder :-** |
| **Year** | **Name of the work**  | **Name of the Client, with Address**  | **Title of the court Case/Arbitration**  | **Detail of the Court/ Arbitrator**  | **Status Pending/ Decided** | **Disputed Amount (Current Value, the equivalent) in case of Court Cases/arbitration** | **Actual Awarded Amount (Rs) in decided Court Cases/arbitration** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

**Authorized Signatory of bidder**

**ANNEXURE-“VI**

**Check-List**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Criteria**  | **Requirements** | **Cross Referencing / Page no. at which required information is available (To be mentioned)** | **Indicate Eligibility** **Y / N** |
| 1 | Legal status | Copies of original documents defining the constitution or legal status, place of registration and principal place of business; written power of attorney to the signatory of the Bid to commit the Bidder. |  |  |
| 2 | List of Building works | List of building works executed during past five years duly supported with performance certificate from authority for whom work has been completed and information shall include name of work, estimated cost, date of start and date of completion. |  |  |
| 3 | Equipment | List of equipment and machinery available with documentary proof of ownership and machinery proposed for deployment for execution of work. |  |  |
| 4 | Credit facility | Evidence of access to or availability of credit facilities certified by the banker’s equivalent of the estimated cash flow of **Rs. 89.65 lac*.*** |  |  |
| 5 | Turnover in building work activities | Details of turnover for last three years ending 31.03.17 in respect of construction works with audited balance sheet. At least 89.65 Lac  |  |  |
| 6 | Investment | Undertaking that bidder would be able to invest an amount of **Rs. 89.65 lac** of the contract value of work during implementation of contract. |  |  |
| 7 | Sub Contracting | Proposal, if, any, for sub contracting of elements of work, costing not more than 10% of bid amount.  |  |  |
| 8 | Income Tax | Latest Income Tax clearance certificate from concerned department. |  |  |
| 9 | Affidavit | Affidavit attested by Executive Magistrate as per annexure ‘C’ |  |  |
| 10 | Affidavit | Affidavit by the lead partner/lead member of agency, if so in the case, as per clause 4.5(d)  |  |  |
| 11 | Experience in similar building works **( ie. const. of RCC framed building including related Civil, P.H. & Electrical Works )** | During last five years1. Three similar completed works costing not less than the amount equal to 40% of the bid cost i.e. Rs. 119.52 Lac. OR
2. Two similar completed works costing not less than the amount equal to 50% of the bid cost i.e. Rs. 149.40 Lac.

 OR1. One similar completed work costing not less than the amount equal to 80% of the bid cost i.e. Rs. 239.04 Lac.
 |  |  |
| 12 | Personnel Capabilities | List of suitable qualified and experienced personnel in relevant field |  |  |
| 13 | Undertaking for Specialized works |  |  |  |
| 14 | Service Tax | Copy of service Tax number (original copy will also be shown). In case the bidder is not having Service number, he will undertake that, he will get service number, in such case no payment will be released till service number is furnished. |  |  |
| 15 | PAN | Copy of PAN |  |  |
| 16 | VAT | Copies of PVAT |  |  |
| 17 | Ongoing works | List of existing commitments/ ongoing works |  |  |

**Authorized Signature of Bidder with stamp**

**ANNEXURE – “ A”**

**DETAILS OF WORK PACKAGES**

**Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services in RGNUL Campus at village Sidhuwal, Patiala**

**ANNEXURE – “ B”**

**DETAILS OF WORK PACKAGES**

|  |  |  |
| --- | --- | --- |
| *Sr. No.* | *Name of Work* | *Brief Scope* |
|  | **Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services in RGNUL** **Campus at village Sidhuwal, Patiala** | **The works consists ofAppx21300 sqft** |

**ANNEXURE-“C”**

**AFFIDAVIT\***

1. I/ we, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.

2. The undersigned also hereby certifies that neither our firm M/s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have abandoned any work under Government of India or Govt. of Punjab nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this bid.

3. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding my (our) competence and general reputation.

4. The undersigned understand(s) and agree (s) that further qualifying information may be requested and agrees to furnish any such information at the request of the Departmental / Project implementing agency.

5. The under signed are not debarred for contract work by Govt. of Punjab or any other Agency of Government of India or any of the State Governments at present. Or the undersigned was debarred for contract work by \_\_\_\_\_\_\_\_\_\_\_ for a period of \_\_\_\_\_\_\_\_\_\_\_ and have completed my/our term.

6. The undersigned has never been convicted by any court of law for any of the offences under any Indian/ foreign laws.

7. The under signed will continue the project at the same pace even if department could not make payment up to a period of 4 months in case funds are delayed by the Client.

8. That information being submitted is correct and true, and that any false information shall lead to disqualification at any stage.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(Signed by an Authorized Officer of the Firm)

Title of office \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Firm \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date

**ANNEXURE-“D”**

**UNDERTAKING**

We do hereby undertake to engage a specialised agency after approval of Registrar, RGNUL Patiala for undertaking the execution of works of (\_\_\_\_\_\_**\***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name of the project\_\_\_\_ \_\_\_) whose minimum qualification shall be as under:

i) Experience of having successfully completed similar works during last 5 **years** ending last day of month previous to the one in which applications are invited should be either of the following:-

(a) Three similar completed works costing not less than the amount equal to 40% of the cost of the job. OR

(b) Two similar completed works costing not less than the amount equal to 50% of the cost of the job. OR

(c) One similar completed work costing not less than the amount equal to 80% of the cost of the job.

ii) We shall be solely responsible for successful execution of \_\_\_\_**\***\_\_\_\_\_\_\_\_ work.

**Note: -\* The bidder has to write name of the specialised works which he intends to carry out through specialised agency.**

**Authorized Signature of Bidder with stamp**

**ANNEXURE-“E”**

**UNDERTAKING**

I, the undersigned do hereby undertake that our firm M/s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ would invest a

minimum cash up to Rs.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ during implementation of the Contract.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Signed by an Authorized Office of the firm)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Title of Officer

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Firm

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date

**ANNEXURE-“F”**

**FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILIBILITY OF OVERDRAFT / CREDIT FACILITIES**

**BANK CERTIFICATE**

It is to certify that M/s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a reputed company with a good financial standing.

**If the contract for the work, namely “Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services in RGNUL Campus at village Sidhuwal, Patiala, is awarded to the above firm, we shall be able to provide overdraft / facilities to the extent of INR …………….. To meet their working capital requirements for executing the above contract.**

Name of the Bank

Senior Bank Manager

Address of the Nationalized Bank

**SECTION - III**

**CONDITIONS OF CONTRACT**

 **CONDITIONS OF CONTRACT**

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**CONDITIONS OF CONTRACT**

**A. GENERAL**

**1. Definitions.**

1.1 Terms, which are defined in the Contract Data, are not also defined in the Conditions of Contract, but keep their defined meanings. Capital initials are used to identify defined terms.

 The **Adjudicator** (synonymous with **Dispute Review Expert**) is the person appointed by the Registrar, RGNUL, Patiala to resolve disputes in the first instance, as provided for in Clauses 24 and 25. The name of the Adjudicator is defined in the Contract Data.

 **Bill of Quantities** means the period and completed Bill of Quantities forming part of the Bid.

 **The Completion Date**, the date of completion of the works, is certified by the Engineer in

accordance with Sub Clause 55.1.

 The **Contract** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.3 below.

 The **Contract Data** defines the documents and other information which comprise the Contract.

 The **Contractor** is a person or cooperate body whose Bid to carry out the Works has been accepted by the Employer.

 The **Contractor’s Bid** is the completed Bidding documents submitted by the Contractor to the Employer and includes Technical and Financial bids.

 The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

 **Days** are calendar days; monthsare calendar months.

 A **Defect** is any part of the works not completed in accordance with the Contract.

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date.

 The **Employer** is the party who will employ the Contractor to carry out the Works.

 The **Engineer** is the person named in the Contract Data for Civil, Public Health & Electrical Services (or any other competent person appointed and notified to the Contractor to act in replacement of the Engineer) who is responsible for supervising the Contractor, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, awarding extensions of time, and valuing the Compensation Events.

 **Equipment** is the Contractor’s machinery and vehicles brought temporarily to the Site to construct the works.

 The **Initial Contract Price** is the Contract Price listed in the Employer’s Letter of Acceptance.

 The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the works. The Intended Completion Date is specified in the contract Data. The Intended Completion Date may be revised only by the Engineer by issuing letter of extension of time.

 **Materials** are all supplies, including consumable, used by the Contractor for incorporation in the Works.

 **Plant** is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

 The **Site** is the area defined as such in the Contract Data.

 **Site Investigation Reports** are those which were included in the Bidding documents and are factual interpretative reports about the surface and sub surface conditions at the site.

 **Specifications** means the Specification of the works included in the Contract and any modification or addition made or approved by the Engineer.

 The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

 A **Subcontractor** is a person or corporate body, who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.

 **Temporary Works** are works designed, constructed, installed and removed by the Contractor which are needed for construction or installation of the Works.

 A **Variation** is an instruction given by the Engineer, which varies the works.

 The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer through the Engineer, as defined in the Contract Data.

**2. Interpretation**

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about the Conditions of the Contract.

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Data apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the following order of priority:

 (1) Agreement

 (2) Letter of Acceptance, notice to proceed with the works

 (3) Contractor’s Bid

 (4) Contract Data

 (5) Conditions of Contract including Special Conditions of Contract

 (6) Specifications

 (7) Drawings

 (8) Bill of quantities; and

 (9) Any other document listed in the Contract Data as forming the part of Contract.

**3. Language and Law**

3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

**4. Engineer’s Decisions**

4.1 Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

1. **Delegation**

5.1 The Engineer may delegate any of his duties and responsibilities to other people except to the Adjudicator after notifying the Contractor and may cancel any delegation after notifying the Contractor.

**6. Communications**

6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when they are delivered (in terms of Indian Contract Act).

**7. Sub-contracting**

7.1 The Contractor may sub-contract any portion of work, upto a limit specified in Contract Data, with the approval of the Engineer but shall not assign the Contract without the approval of the Engineer in writing. Sub-contracting does not alter the Contractor’s obligations.

**8. Other Contractors**

 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Engineer on behalf of the Employer between the dates given in the Schedule of other Contractors. The Contractor shall as referred to in the Contract Data, also provide facilities and services for them as described in the Schedule. The Engineer on behalf of the Employer may modify the schedule of other contractors and shall notify the Contractor of any such modification.

**9. Personnel**

9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

* 1. If the Engineer asks the Contractor to remove a person who is a member of the Contractor’s staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

**10. Employer’s and Contractor’s Risks**

10.1 The Employer carries the risks which this Contract states are Employer’s risks, and the Contractor carries the risks which this Contract states are Contractor’s risks.

**11. Employer’s Risks**

11.1 The Employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the works in India, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor’s employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the Works, other than the Contractor’s design.

**12. Contractor’s Risks**

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor

**13. Insurance**

13.1 The Contractor shall provide, in the joint names of the Engineer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor’s risks:

(a) Loss of or damage to the Works, Plant and Materials;

(b) Loss of or damage to Equipment;

(c) Loss of or damage of property (except the Works, Plant, Materials and Equipment) in connection with the Contract; and

(d) Personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer’s approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Engineer may affect the insurance which the Contractor should have provided and recover the premiums the Engineer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of insurance shall not be made without the approval of the Engineer.

13.5 Both parties shall comply with any conditions of the insurance policies.

**14. Site Investigation Reports**

14.1 The Contractor, in preparing the Bid, shall rely on any site Investigation Reports referred to in the Contract Data, supplemented by any information available to the Bidder.

**15. Queries about the Contract Data**

15.1 The Engineer will clarify queries on the Contract Data.

**16. Contractor to construct the Works**

16.1 The Contractor shall construct and install the works in accordance with the Specification and Drawings.

**17. The Works to be completed by the intended Completion Date**

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Programme submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

**18. Approval by the Engineer**

18.1 The Contractor shall submit Specifications and Drawings & location plan showing the proposed Temporary Works to the Engineer, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for design of Temporary Works.

18.3 The Engineer’s approval shall not alter the Contractor’s responsibility for design of the Temporary Works.

* 1. The Contractor shall obtain approval of third parties to the design of the Temporary Works where required.
	2. All drawings prepared by the Contractor for the execution of the temporary or permanent works are subject to prior approval by the Engineer before their use. In case of dispute, if any, decision of the Employer will be final.

**19. Safety**

19.1 The Contractor shall be responsible for the safety of all activities on the site, including smooth flow of traffic at his own cost as per guidelines of IRC/MORT&H.

**20. Discoveries**

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Engineer on behalf of the Employer of such discoveries and carry out the Engineer's instructions for dealing with them.

**21. Deleted**

**22. Access to the Site**

22.1 The Technical Advisor’s, or any other person authorized by the Employer shall at all times have access to the Site and to all places where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured/ fabricated/ assembled for the works.

22.2 The Engineer shall be entitled, during manufacture, fabrication or preparation to inspect and test the materials and Plant to be supplied under the Contract. If materials or Plant are being manufactured, fabricated or prepared in workshops or places other than those of the Contractor, the Contractor shall obtain permission for the Engineer and his authorized representatives to carry out such inspection and testing in those workshops or places. All the expenses for such visits, inspection shall be borne by the Contractor. Such inspection or testing shall not release the Contractor from any obligation under the Contract.

22.3 The Contractor shall agree with the Engineer on the time and place for the inspection or testing of any materials for Plant as provided in the Contract. The Engineer shall give the Contractor not less than 24 hours notice of his intention to carry out the inspection or to attend the tests. If the Engineer, or his duly authorized representative, does not attend on the date agreed, the Contractor may, unless otherwise instructed by the Engineer, proceed with the tests, which shall be deemed to have been made in the presence of the Engineer. The Contractor shall forthwith forward to the Engineer duly certified copies of the test readings, if the Engineer has not attended the tests, he shall accept the said readings as accurate.

**23. Instructions**

23.1 The Contractor shall carry out all instructions of the Engineer pertaining to works which comply with the applicable laws where the Site is located.

23.2 The Contractor shall permit the Engineer to inspect the Contractor’s accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Engineer or the Employer, if so required by the Engineer or Employer.

**24. Disputes and Arbitration.**

24.1 If any dispute or difference of any kind what-so-ever shall arise between the RGNUL, its authorized representative and the contractor in connection with or arising out of this contract for the execution of work there under.

24.2 Whether before its commencement or during the progress of work of after the termination, abandonment or breach of the contract, it shall in the first instance, be referred for settlement to the Registrar of RGNUL and he shall, within a period of sixty days after being requested in writing by the contractor to do so convey his decision to the contractor. Such decision in respect of every matter so referred shall, subject to arbitration as herein after provided, be final and binding upon the contractor. Incase the work is already in progress, the contractor shall proceed with the execution of the work on receipt of the decision of the Registrar as aforesaid will all due diligence, whether any of the parties requires arbitration as herein after provided or not.

24.3 If the Registrar has conveyed his decision to the contractor and no claim for arbitration has been filed by the contractor within a period of sixty days from the receipt of the letter communicating the decision, the said decision shall be final and binding upon the contractor and will not be subject matter of arbitration at all.

24.4 If the Engineer-in-charge fails to convey his decision within a period of sixty days after being requested as aforesaid the contractor may within further sixty days of the expiry of the final sixty days from the date on which the said request was made by the contractor refer the dispute for arbitration as herein after provided.

24.5 All disputes or differences in respect of which the decision is not final and conclusive shall at the request of either party made in a communication sent through registered A.D. post be referred to the sole arbitration of the Technical Advisor(civil)of RGNUL acting as such at the time of reference unless debarred from acting as an Arbitrator by an order of RGNUL in which event, the Vice Chancellor shall appoint any other technical officer from the persons already on the panel of RGNUL to act as arbitrator, on receipt of request from either party.

24.6 Employer of work shall have the authority to change the arbitrator on an application by either the contractor of the Engineer-in-charge requesting change of the arbitrator giving reasons thereof, either before the start of the arbitration proceedings or during the course of the proceedings. The arbitration proceedings would stand suspended as soon as an application for change of Arbitrator filed before the Employer and a notice thereof is given by the applicant to Arbitrator. The Employer after hearing both the parties may pass a speaking order rejecting the application or accepting to change the arbitrator simultaneously, appointing a technical officer from the persons already on the panel of RGNUL to act as arbitrator, on receipt of request from either party. The new Arbitrator so appointed may enter upon the reference a fresh or he may continue the hearings from the point these were suspended before the previous Arbitrator.

24.7 The reference to the Arbitrator shall be made by the claimant party within one hundred twenty days from the date of dispute of claim arises during the execution of work. If the claim pertains to rates or recoveries introduced in the final bill the reference to the Arbitrator shall be made within six calendar months from the date of payment the final bill to the contractor or from the date of registered notice is sent to the contractor to the effect that his final bill is ready by the Engineer-in-charge (whose decision in this respect shall be final and binding) which ever is earlier.

24.8 It shall be an essential term of this contract that in order to avoid previous claims, the party invoking arbitration shall specify the disputes on facts and calculations stating the amount claimed under each claim and shall furnish a "deposit-at-call" for ten percent of the amount claimed, on a scheduled bank in the name of the Arbitrator, by his official designation who shall keep the amount in deposit till the announcement of the Award. In the event of an award in favour of the claimant, the deposit shall be refunded to him in the proportion to the amount awarded with respect to the amount claimed and the balance, if any, shall be forfeited and paid to the other party.

24.9 The provisions of the Indian Arbitration Act, 1996 or any other statutory enactment there under or modifications thereof and for the time being in force shall apply to the arbitration proceedings under this clause.

24.10 The Arbitrator shall award separately giving his award against each claim and dispute and counter claim raised by either party giving reasons for his award. Any lump sum award enforce able shall not be legally enforceable.

24.11 The Venue of arbitration shall be such place or places as may be fixed by the Arbitrator in his sole discretion. The work under the Contract shall continue during the arbitration proceedings.

24.12 The stamp fee due on the award shall be payable by the party as desired by the Arbitrator and in the even of such party's default, the stamp fee shall be recoverable from any other sum due to such party under this or any other contract.

24.13 Neither party shall be entitled to bring a claim for arbitration, if is not field as per the time period already specified or within six months of the following:

a) Of the date of completion of the work as certified by the Engineer-in-charge or

b) Of the date of abandonment of the work or breach of contract under any of its clauses or

C) Of its non-commencement or no resumption or work within 10 days of written notice for commencement or resumption as applicable, or

d) Of the cancellation, termination or withdrawal of the work from the contractor in whole or in part and/or revision for enclosure of the contract, or

 e) Of receiving an intimation from Engineer-in-charge that the final payment due or recovery from the contractor had been determined, for purpose of payment adjustment which ever is the latest.

If the matter is not referred to the arbitration within the period prescribed above, all the rights and claims of the either party under the contract shall be deemed to have been forfeited and absolutely barred by time for arbitration and even for civil litigation.

24.14 No questions relating to this contract shall be brought before any civil court without first invoking and completing the arbitration proceedings, if the issue is covered by the scope of arbitration under this contract. The pending of arbitration proceedings shall not disentitle the Employer to terminate the contract and to make alternate arrangement for completion of the works.

24.15 The arbitrator shall be deemed to have entered on the reference on the day, he issues notices to the parties fixing the first date of hearing. The Arbitrator may from time to time with the consent of the parties enlarge the initial time for marking and publishing the award.

24.16 The expiry of the contractual time limit, whether originally fixed or extended, shall not invalidate the provisions of this clause.

**25. Deleted.**

**26. Deleted.**

**B. TIME CONTROL**

**27. Programme**

27.1 Within the time stated in the Contract Data the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements, order, and timing for all the activities in the works along with monthly cash flow forecast.

27.2 An update of the Programme shall be a Programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

27.3 The Contractor shall submit to the Engineer, for approval, an updated Programme at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.

27.4 The Engineer’s approval of the Programme shall not alter the Contractor’s obligations. The Contractor may revise the Programme and submit it to the Engineer again at any time. A revised Programme is to show the effect of Variations and Compensation Events.

**28.Extension of the Intended Completion Date**

28.1 If the contractor shall desire an extension of the time for completion of the work on the ground of his having been unavoidably hindered in its execution or any other ground, he shall apply in writing to the University Engineer (with corresponding time extension in Performance Guarantee) within thirty days of the date of hindrance (before the expiry of time limit) on account of which he desires such extension as aforesaid and the Registrar, RGNUL shall, if in his opinion which shall if find reasonable grounds be should therefore authorize such extension of time, if any, as may in his opinion be necessary or proper. No application for extension of time received late or addressed to the Assistant University Engineer or any office other than the University Engineer shall be considered valid if the contractor fails to apply for extension as aforesaid and the work is not completed within the time limit, the contract shall be determined absolute for levy of liquidated damages. Price adjustment clause will not be operative in the extended time limit whatsoever the cause for extension of time limits.

**29. Deleted**

**30. Delays Ordered by the Engineer**

30.1 The Engineer may instruct the Contractor to delay the start or progress of any activity within the works.

**31. Management Meetings**

31.1Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

31.2 The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

**32. Early Warning**

32.1 The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of works. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate is to be provided by the Contractor as soon as reasonably possible.

32.2 The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

**C. QUALITY CONTROL**

**33. Identifying Defects**

33.1 The Engineer shall check the Contractor’s work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor’s responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

33.2 **Consultants for Quality Control:** It is expected that Contractor will have proper quality control staff and procedures in order to ensure quality. They are also expected to improve their procedures in line with **ISO 9002** and get the certification. The Contractor shall engage a competent and Independent Quality Control Consultant approved by University Engineer in charge of work to exercise effective control over the construction operations in the field so as to produce quality works. The fully equipped laboratory shall be set up at site of work within 21 days of award of contract and trained staff shall be employed by the said consultant. The contractor shall supply to the Engineer-in-charge a copy of his agreement and the fee for quality control which should generally be between 0.5% and 1.5% of the contract value. The payment to the quality control consultant shall be made by the RGNUL direct as per the copy of the agreement supplied by the contractor. This payment will be recoverable from the Contractor. The consultant will guide the contractor for production of quality works at all stages and shall maintain records, reports and test results so as to indicate the extent of quality achieved to the University Engineer regularly. The consultant shall also attach a copy of these reports, tests and checks with his bill without which no payment shall be made. The consultant shall also certify that cement has been stored properly as per guide lines and steel has been stored on a raised platform. The University Engineer can also order the change of consultant, if in his opinion, he is not performing competently. The Engineer will be free to conduct surprise, random or in situ checks so as to have cross check on quality control consultant, the Engineer-in-charge may order employment of a consultant at the cost of the contractor or may order the department staff or carry out the quality control checks and a deduction @ 1.50% of the total cost of the work shall be deducted from the bill of the contractor, even if the actual expenditure incurred on private consultant or departmental quality control is less. Nothing in this clause shall reduce the overall responsibility of the Contractor regarding quality and he shall remain liable for any defect in the execution.

33.3 a) The Employer have already engaged a consultant for the project. The representative Engineer of the consultant will visit the works regularly and make quality control tests to ensure execution of works as per specifications & drawings by the contractor.

 b) Besides this the representative of the consultant firm will visit the site to guide/implementation of plans & specifications etc. for the smooth execution of works. The visit charges of the representative will be borne by the contractual agency and paid by the RGNUL directly recoverable from the bills of the contractor.

**34. Tests**

34.1 University will have the right to get up to 10% quality control test carried out from independent reputed quality control laboratory at the expenses of contractual agency.

**35. Correction of Defects**

35.1 The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

* 1. Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Engineer’s notice.

**36. Uncorrected Defects**

**36.1** In case the defects pointed out by the University Engineer have not been attended

by the contractor, the University Engineer will have the right to release payment of such items on reduced rates subject to the condition that such defects in the opinion of University Engineer does not effect the Safety/ Performance of the building.

36.2 If the Contractor has not corrected a Defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

**D. COST CONTROL**

**37. Bill of Quantities**

37.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

37.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of work done at the rate in the Bill of Quantities for each item.

**38. Change in the Quantities**

38.1 Quantities as shown in bill of quantities can be changed during the course of work. No claim in respect of increase and decrease in quantities with respect to bill of quantities will be entertained.

1. **Variations**

39.1 All variations shall be included in updated Programmes produced by the Contractor.

**40. Payments for Variation**

40.1 The Contractor shall provide the Engineer with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Engineer and before the Variation is ordered.

40.2 If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Engineer, the quantity of work above the limit stated in Sub Clause 38.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

40.3 If the Contractor’s quotation is unreasonable, the Engineer may order the Variation and make a change to the Contract Price which shall be based on Engineer’s own forecast of the effects of the Variation on the Contractor’s costs.

40.4 If the Engineer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

40.5 The Contractor shall not be entitled to additional payment for costs which could have been avoided by giving early warning.

**41. Cash Flow Forecasts**

41.1 When the Programme is updated, the contractor is to provide the Engineer with an updated cash flow forecast.

**42. Payment Certificates**

* 1. The Contractor shall submit to the Engineer monthly statements of the estimated value of the work completed less the cumulative amount certified previously.
	2. The Engineer shall check the Contractor’s monthly statements within 14 days and certify the amount to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub clause 51(3) of the Contract Data (Secured Advance). Consultant appointed by the RGNUL will also check the advance / monthly bill prepared by the contractor & will recommend approval for release of payment.

42.3 The value of work executed shall be determined by the Engineer.

42.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

42.5. The value of work executed shall include the valuation of Variations and Compensation Events.

42.6 The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in light of later information.

**43. Payments**

43.1 Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of the contract and taxes at source, as applicable under the law. The Employer shall pay the Contractor the amounts certified by the Engineer and on recommendation of the consultant within 28 days of the date of each certificate.

43.2 If an amount certified is increased in a later certificate as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid accordingly.

43.3 Items of the Works for which no rate or price has been entered in, will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

**44. Deleted.**

44.1 Deleted.

44.2 Deleted.

44.3 Deleted.

44.4 The Contractor shall not be entitled to compensation to the extent that the Employer’s interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Engineer.

**45. Tax**

45.1 The rates quoted by the Contractor shall be deemed to be inclusive of VAT / Service Tax / GST, labour welfare cess and other taxes that the Contractor will have to pay for the performance of this Contract or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder. The Engineer on behalf of the Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

**46. Currencies**

 All payments shall be made in Indian Rupees.

**47. Price Adjustment**

47.1 Rate quoted by the Bidder is inclusive of Price Adjustment. Nothing extra will be payable on this account on any item of the work.

**48 Retention**

48.1 The Engineer on behalf of the Employer shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.

48.2 On Completion of the whole of the Works half the total amount retained is repaid to the Contractor and half when the Defects Liability Period has passed and the Engineer has certified that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.

**49. Liquidated Damages**

49.1 The Contractor shall pay liquidated damages to the Engineer on behalf of the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Engineer on behalf of the Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor’s liabilities.

49.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the over payment calculated from the date of payment to the date of repayment at the rate specified in Sub Clause 43.1.

49.3 If the contractor fails to comply with the time for completion as stipulated in the tender, then the Contractor shall pay to the Employer (through the Engineer), the relevant sum stated in the Contract Data as Liquidated damages for such default and not as penalty for everyday or part of day which shall elapse between relevant time for completion and the date stated in the taking over certificate of the whole of the works on the relevant section, subject to the limit stated in the contract data.

49.4 If, before the Time for Completion of the whole of the Works or, if applicable, any Section, a Taking - Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over Certificate, and in the absence of alternative provisions in the Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

**50.** Deleted.

**51. Advance Payment**

51.1 The Engineer on behalf of the Employer shall make advance payment to the Contractor of the amounts stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Engineer on behalf of the Employer in amounts and currencies equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest shall be charged at the rate of 12% per annum on the advance payment.

51.2 The Contractor is to use the advance payment only to pay for Equipment, Plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Engineer.

51.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done.

**51.4 Secured Advance**

The Engineer shall make advance payment in respect of materials intended for but not yet incorporated in the Works in accordance with conditions stipulated in the Contract Data.

**52. Securities**

 The Performance Security (including additional security for unbalance bids) shall be provided to the Engineer on behalf of the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and for and by a bank or surety acceptable to the Engineer on behalf of the Employer and denominated in Indian Rupees. The Performance Security shall be valid until a date 28 days pursuant to the date of expiry of the Defects Liability Period and the additional security for unbalanced bids shall be valid until a date 28 days from the issue of the certificate of completion.

**53. Deleted.**

**54. Cost of Repairs**

54.1 Loss of damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at Contractor’s cost if the loss or damage arises from the Contractor’s acts or omissions.

**E. FINISHING THE CONTRACT**

**55. Completion**

55.1 The Contractor shall request the Engineer to issue a Certificate of Completion of the works and the Engineer will do so upon deciding that the work is completed.

**56. Taking Over**

56.1 The Engineer on behalf of the Employer shall take over the Site and the Works within seven days of having issued a Certificate of Completion to the Contractor.

**57. Final Account**

57.1 The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor’s account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor’s revised account.

**58. Operating and Maintenance Manuals**

58.1 If “as built” Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

58.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Engineer’s approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

**59. Termination**

59.1 The Engineer on behalf of the Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. For this purpose, 14 days notice in writing shall be served by either party on the other party clearly mentioning the particular grounds of Breach of Contract with a copy to the Employer.

59.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) The Contractor stops work for 28 days when no stoppage of work is shown on the current programme and the stoppage has not been authorized by the Engineer;

(b) The Engineer instructs the Contractor to delay the progress of the Works and the instruction is not withdrawn within 28 days;

(c) The Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(d) A payment certified by the Engineer is not paid by the Employer to the Contractor within 56 days of the date of the Engineer’s certificate;

(e) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;

(f) the Contractor does not maintain a security which is required;

(g) the Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and

(h) If the Contractor, in the judgment of the Engineer or the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

(i) In case the contractor is a joint venture of consortium or partnership firm or any other such legal entity having more than one constituent, the contractor shall not change its legal constitution in any manner during the subsistence of contract. The share holding, percentage/extent of partnership or other interest of the original constituents of the Contractor shall not be diluted or varied during the subsistence of Contract.

(j) The Contractor shall not engage the services of any sub Contractor for the purposes of discharging obligation under the Contract without approval of the Engineer.

 For the purpose of this paragraph: “corrupt practice” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. “Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish contract prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition.”

59.3 When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 59.2 above, the Engineer shall decide whether the breach is fundamental or not.

59.4 Notwithstanding the above, the Engineer on behalf of the Employer may terminate the Contract for convenience.

59.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

**60. Payment upon Termination**

60.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Engineer or Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Engineer on behalf of the Employer.

60.2 If the Contract is terminated at the Employer’s convenience or because of a fundamental breach of Contract by the Employer, the Engineer shall issue a certificate for the value of the work done, the cost of balance material brought by the contractor and available at site, the reasonable cost of removal of Equipment, repatriation of the Contractor’s personnel employed solely on the Works, and the Contractor’s costs of protecting and securing the works and less advance payment received upto to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

**61. Property**

61.1 All materials on the Site, Plant, Equipment, Temporary works and Works are deemed to be the property of the Employer, if the contract is terminated because of a Contractor’s default.

**62. Release for Performance**

62.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

**63. LABOUR:**

63.1 The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

63.2 The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the number of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

64. **COMPLIANCE WITH LABOUR REGULATIONS:**

 During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

**SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK.**

a) Workmen Compensation Act 1923:- The Act provides for compensation in case of injury by accident arising out of and the course of employment.

b) Payment of Gratuity Act 1972:- Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more, on death, the rate of 15 days wages for every completed year of service. The Act is applicable to establishments employing 10 or more employees.

c) Employees P.F. and Miscellaneous Provision Act 1952:- The Act provides for monthly contributions by the employer plus workers @ 10% or 8.33%. The benefits payable under the Act are:

(i) Pension or family pension on retirement or death, as the case may be.

(ii) Deposit linked insurance on the death in harness of the worker.

(iii) Payment of P.F. accumulation on retirement/death etc.

d) Maternity Benefit Act 1951:- The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

e) Contract Labour (Regulation & Abolition) Act 1970:- The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the principal employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer, if they employ 20 or more contract labour. (In the present Contract, the Contractor alone shall be the employer or the principal employer for all intents and purposes and under no circumstances shall the Employer or the Engineer be reckoned or treated as the principal employer.)

f) Minimum Wages Act 1948:- The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act, if the employment is a scheduled employment. Construction of Buildings, Roads, and Runways are scheduled employments.

g) Payment of Wages Act 1936:- It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

h) Equal Remuneration Act 1979:- The Act provided for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.

i) Payment of Bonus Act 1965:- The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3500/- per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above upto Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

j) Industrial Dispute Act 1947:- The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

k) Industrial Employment (Standing Orders) Act 1946:- It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the State and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and gets the same certified by the designated Authority.

l) Trade Unions Act 1926:- The Act lays down the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

m) Child Labour (Prohibition & Regulation) Act 1986:- The act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child is prohibited in Building and Construction Industry.

n) Inter State Migrant Workmen’s (Regulation of Employment & Conditions of Service) Act 1979:- The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home upto the establishment and back, etc.

o) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996. All the Bidders or any sub-contractor hired by the main Bidders get registration under Section 7 of this said Act. Similarly, all the construction workers shall get registration under section 12 of the Act. The registration under section 7 and 12 shall be submitted with the bill. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

* + - 1. Factories Act 1948:- The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

**F. SPECIAL CONDITIONS OF CONTRACT**

1. No extra claim what so ever for any RCC work over & above than provided in B.O.Q/drawing would be entertained for any size or slope of the member including slabs columns etc. No extra claim what so ever would be entertained for sloping RCC, folded roofing, etc. horizontal & vertical profile of any member/structure.
2. The description of all the above items is subject to all notes and clarification included in the Common Schedule of Rates 2010amended up to date and of Pb. PWD specification & DSR latest edition corrected up to date and DSR 2014amended up to date.
3. The Joinery-work will be got executed as per detailed drawings supplied by the Architect Consultant and instructions issued by the Engineer-In-charge, Nothing extra on this account will be entertained.
4. Cost of binding wire, hooks, joints wastage and support for reinforcement in the item of reinforced cement concrete is included in the rate and shall not be paid separately as it shall be deemed to be for the convenience of the contractor.
5. If any item which is not provided in the DNIT is to be got done/executed will be paid at CSR/DSR plus premium prevailing at the time of tendering.
6. Amount/Quantity of any item can be increased or any item can be omitted or Substituted as per actual requirement at site of work as per approval of the Engineer-In – Charge. No claim in this regard will be entertained.
7. Nothing extra will be paid due to loss/damages caused by rains, floods, war, epidemic strike of the department officials or any other Act of God or any other cause what so ever.
8. That quantity given against respective item is arbitrary subject to actual as per approved designs/Drawings and site requirements.
9. Nothing extra shall be paid for making slope of any size/shape or any other mounding, thickness of RCC slab will be measured/ paid, as per structural design or actual work done whichever is less subject to the approval of the Engineer-In-Charge.
10. Nothing extra shall be paid for unforeseen delay on account of non availability of any kind of Material, drawings or designs.
11. Only kiln seasoned and chemically treated Wood will be used in joinery works.
12. The work will be carried out strictly in compliance to the Pb. PWD specifications/I.S.Codes latest edition and to the satisfaction of the Engineer-In-Charge.
13. No claim on account of paucity of funds change in Priority or any other causes what so ever will be entertained and the Contractor/firm will have no right to go on for Arbitration on this account.
14. Agenda & Corrigendum issued by the Chief Engineer Pb. PWD B&R from time to time upto date will be applicable for the purpose of measurement.
15. Nothing extra shall be paid what so ever for any temporary work, hutment any allied works required to be done for completion of above the building construction as per design/drawing.
16. The prime Civil contractor will engage/identify his sub-contractor for execution of Public Health works/ Electrical works having valid license for executing the water supply/sanitary engineering works and valid license for executing the building electrification works and should have satisfactorily executed similar works as prescribed in the conditions for qualification of bidders.
17. The work is required to be completed strictly as per the scope of approved drawing irrespective of Qty, and amount of agreement as desired by the Engineer-In-charge.
18. For RCC work steel shuttering or any plate Shuttering should be used and nothing extra shall be paid.
19. In case any dispute/ambiguity the decision of the Vice Chancellor, RGNUL, Patiala shall be final and binding.
20. Any surplus material left at site one month after the completion of the work shall become the property of the RGNUL and no payment shall be made to the contractor for that material.
21. The contractor shall at all-time keep his authorized Engineer/Agent stationed at the work who shall be available during working hours of the day. He shall be competent to carry out instructions conveyed to him by the Engineer-In-Charge or his representative at site without loss of time.
22. The contractor shall not be entitled to any payment on account of work done till he signs his contract Agreement and the same is accepted by the competent authority.
23. If any item, other than B.O.Q,which is also not available either in CSR or DSR, is required to be got done, the contractor/agency shall have to do the same as per direction of the Engineer-In-Charge. The contractor/agency will quote his rates for such item with support of proper analysis. The rate will be decided by mutual negotiation by the competent authority. However, in case of disagreement, the rates fixed by the Engineer-In-Charge shall prevail.
24. The contractor shall carryout the mixed design for the relevant item of concrete from reputed institution/laboratories as approved by the Engineer at his own expenses. Prior approval of Engineer is to be taken before the samples (Cement, Coarse & Fine Aggregates) sent to the institution/laboratories for mix design. The design mix required may be with or without admixtures. The payment will be made for the relevant item after adjusting cement contents as per mix design approved by the Engineer-In-Charge. The decision of Engineer-In-Charge final and binding above.
25. Running payment for all items up to 2ndstorey will be made provisionally with a deduction @ 0.25% from allotted rates. However incase the work is not executed at any stage the final payment will be made after deducting extra rates for additional storey as per CSR plus quoted rates.
26. The rubbing and polishing of marble, kota stone and terrazzo flooring shall be done to granolithic granite finish, for which nothing extra will be paid.
27. All amendments issued on Common Schedule of rates edition 2010 upto the date of opening of tenders will be applicable on this contract schedule of terms.
28. All classes of work not otherwise described shall be executed in accordance with principles laid down in the book of specifications.
29. All classes of work not otherwise described shall be executed in accordance with principles laid down in the book of specifications.
30. No claim will be entertained from the contractor in case of any mistake in description of rates of unit occurs in any item taken in this schedule while preparing this DNIT or in account of typing, comparison or over writing the same will be rectified at any stage as per common schedule of rates admission 2010 and DSR 2014 along with amendments / correction up to date
31. Only the antique (thick letters) are given in the description of items of the contractor schedule of rates. It will deem to cover the entire as fully described in the Common Schedule of Rates 1987 Edition.
32. All the material will be arranged by the contractor at the site of work at his own level and cost.
33. Contractor shall clearly quote **percentagebelow or above** the B.O.Q. amount.
34. Execution of work shall be strictly in accordance with specifications as mentioned in the “Technical Specification of contract”. Any other item which is not covered under the “Technical Specification of contract” will be executed as per PWD Specifications/ ISI specifications for the items.
35. **All materials including cement, steel & bitumen etc. will be arranged by the contractor and nothing extra over and above of the allotted rates.**
36. The rates quoted by the Contractor shall be deemed to be inclusive of VAT / Service Tax / GST, labour welfare cess and other taxes, **carriages, Loading, Unloading etc.**

 **NOTE: -**

* + - 1. Wherever there is a conflict or inconsistency between the “Special Conditions of Contract” and the other Conditions of Contract, the provisions stipulated in the “Special Conditions of Contract” shall prevail over and supersede those appearing in the other Conditions of the Contract.
			2. All the nomenclature, unit & rates as depicted in bill of quantities (Volume - 02) are subject to corrections as per CSR 2010 & DSR 2014 corrected up to date

**SECTION - IV**

**CONTRACT DATA**

**CONTRACT DATA**

**Clause Referencewith respectto Section 3**

Item marked “N/A” do not apply in this Contract.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Name of the Employer is  | Registrar, Rajiv Gandhi national University of LawPb,Sidhuwal ,Patiala. | [Cl.1.1] |
|  |  | . |  |
|  |  |  |  |
| 2. | The Engineer is  | University Engineer,Rajiv Gandhi national University of LawPb,Sidhuwal ,Patiala. |  |
|  | Name of Authorized Representative | (WILL BE INTIMATED LATER) |  |
| 3. | The Dispute Review Expert: Deleted | [C1.1.1] |
|  | Name:\*Address | (Will be intimated later) |  |
| 4. | The Defects Liability Period is **365 days** from the date of completion | [C1.1&35] |
| 5. | The Start Date shall be 21 days from the date of issue of facsimile intimation sent to the successful bidder. | [C1.1.1] |
| 6. | The Intended Completion Date for the whole works is **09 months** after start of work with the following milestones: | [Cl 1.1,17 & 28] |
| 7. | Milestone dates: |  |  |
|  |  |  |  |
|  | **Physical works to be completed** | **Period from the start date** |  |
|  | 70% structural work and brick work etc. 40% plastering, 20% flooring etc. |  3 Months |  |
| - | Completion of structural and brick work, plastering, and flooring, wood work etc. | 6 Months |  |
| - | Works complete in all respect. | 9 Months |  |
|  |  |  |  |
|  | The Site is located at village Sidhuwal on Patiala-Bhadson road, Tehsil &Distt. Patiala Punjab. | [C1.1.1] |
| 8. | The name and identification number of the Contract is:- | Construction of Mess First Floor for Boys & Girls including internal & external Public Health & Electrical Services. |  |

|  |  |  |
| --- | --- | --- |
| 9 a) |  **Public Health Services:** Internal water supply and sanitary installation in the buildings complete as per drawings, layout and PWD Specifications duly supplemented with relevant Indian Standards to the entire satisfaction of the Engineer. |  |
| b) |  **Electrical Services:**  Providing, laying and installation of internal electrical services in buildings as per drawings, bill of quantities, layout and PWD Specifications duly supplemented with relevant Indian Standards to the entire satisfaction of Engineer. Providing, fixing and laying in position external services including wiring and fixtures complete as per layouts, bill of quantities, drawings and PWD Specifications duly supplemented with relevant Indian Standards to the entire satisfaction of Engineer. |  |
|  |  |  |
| 10. | The documents that shall form part of the Contract as per Clause 2.3 | [Cl.2.3(9)] |
| 11. | The law which applies to the Contract is the Law of Union of India. | [C3.1] |
| 12. | The language of the Contract documents is English. | [Cl.3.1] |
| 13. | Limit of sub contracting: 10% of Initial Contract Price subject to approval of Engineer. | [Cl.7.1] |
| 14. | The Schedule of Other Contractors (will be supplied later on). | [Cl.8] |
| 15. |  The Schedule of Key Personnel As per Annex-II to Section I. | [Cl.9] |
| 16. | The minimum insurance cover for physical property, injury and death is Rs. 2.5 lacs per occurrence with the number of occurrences limited to four. After each occurrence, contractor will pay additional premium necessary to make insurance valid for four occurrences always. | [Cl.13] |
| 17. | Deleted | [Cl.14] |
| 18. | The Site Possession Dates shall be Date of award of contract | [Cl.21] |
| 19. | Fees and types of reimbursable expenses to be paid to the Dispute Review Expert.(To be inserted later) | [Cl.25] |
| 20. | Appointing Authority for the Dispute - Review Expert-Vice Chancellor, RGNUL, Patiala. | [Cl.26] |
| 21. | The period for submission of the programme for approval of Engineer shall be 21 days from the issue of Letter of Acceptance. | [Cl.27] |
| 22. | The period between programme updates shall be 30 days. | [Cl.27.3] |
| 23. | The amount to be withheld for late submission of an updated programme shall be Rs. 2 lacs. | [Cl.27.3] |
| 24. | Deleted. | [Cl.44] |
| 25. | The currency of the Contract is Indian Rupees. | [Cl.46] |
| 26. | Deleted. |  |
| 27. | The proportion of payment retained (retention money) shall be 5% from each bill subject to a maximum of 5% of final contract price. | [Cl.48] |
| 28. | Amount of liquidated damages for the whole work of the works are. Rs 20900/- ( amount per day) and that for the mile stones are as under:- a) First mile stone b) Second mile stonec)Third mile stone  | .Rs. 9500/- per day.Rs. 6200/- per day.Rs. 5200/- per day. | [Cl.49] |
| 29. | Maximum limit of liquidated damages for delay in completion of work | 10% of the Initial Contract Price rounded off to the nearest thousand. | [Cl.49] |
| 30. | Deleted |  | [Cl.50] |
| 31. | Deleted |  | [Cl.50] |
| 32. | The amount of the advance payment are: |  |
|  | **Nature of Advance** | **Amount (Rs.) Conditions to** **Be fulfilled.** | [Cl.51&52] |
| i. | Mobilization Advance  | a) | On application by the Contractor, mobilization advance against bank Guarantee to the extent of 5% of the contract price may be paid to the contractor at an interest rate of 12% per annum after the fulfillment of the following condition before payment. The contractor shall have collected at site usual machinery and material valuing at least equal to 5% of the initial contract amount. |  |
|  |  | b) | The contractor shall be entitled to, on request, additional mobilization advance upto a maximum of 5% of the initial contract amount against bank guarantee. This mobilization advance shall be paid in stages subject to the condition that the contractor shall have physically completed work equivalent to the percentage of the mobilization advance applied. The 12% rate of interest per annum will be charged on mobilization advance. |  |
| Ii | Deleted. |  |  |  |
| iii | Secured Advance for non-perishable materials brought at site. |  | The contractor on singing an indenture in the form to be specified by the Engineer-in-Charge, shall be entitled to be paid, during the execution of work 75% of the estimated value of any materials, which in the opinion of Engineer-in-charge is non-perishable under Para 2.105 of P.W.D. code coupled in Accordance with rule 7.37 of D.F.R. (Financial Hand Book No. 3) of the contract and which have been procured and adequately stored against damage, but which have not been incorporated in work as the time of making advance. |  |
|  |  |  | a) The materials are in-accordance with the specification for works.b) Such materials have been delivered to site and are properly stored and protected against damage or deterioration to the satisfaction of the Engineer. The contractor shall store the extra material in measurable Stacks.c) The Contractor’s record of the requirements, orders, receipt and use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer.d) The Contractor has submitted with his monthly statement the estimated value of the materials on site together with such documents as may be required by the Engineer for the purpose of valuation of the materials and providing evidence of ownership and payment thereof.e) Ownership of such materials shall be deemed to vest in the Employer for which the Contractor has submitted and Indemnity Bond in an acceptable format andf) The quantities of materials are not excessive and shall be used within a reasonable time as determined by the Engineer. | (Cl: 51.4) |

 (The advance payment will be paid to the Contactor no later than 28 days after fulfillment of the above conditions.)

(The additional advance payment will be paid to the Contractor no later than 28 days after fulfillment of the above conditions).

|  |  |  |
| --- | --- | --- |
| 33. | Repayment of advance payment for mobilization. The recovery of mobilization advance and interest thereof shall stand start when 20% of the work is completed and shall be fully made when 80% of the work stands completed provided that the loan shall be completely repaid prior to the expiry of the original time for completion pursuant to Clause 17 and 28.  | [Cl.51.3] |

**Clause ReferenceWith respectTo Section 3**

|  |  |  |
| --- | --- | --- |
| 34. | Deleted. | [Cl.51.4] |
| 35. | The Securities shall be for the following minimum amounts equivalent as a percentage of the Contract Price: |  [Cl.52] |
|  | Performance Security for 5 per cent of contract price. |  |
|  | The standard form of Performance Security acceptable to the Employer shall be an unconditional Bank Guarantee of the type as presented in Section 8 of the Bidding Documents. |  |
| 36. | The Schedule of Operating and Maintenance Manuals: 15 days after completion. | [Cl.58] |
| 37. | The date by which **“As-built” drawings** (in scale as directed) in 2 sets are required is within 28 days of issue of certificate of completion of whole or section of the work, as; the case may be. | [Cl.58] |
| 38. | The amount to be withheld for failing to supply “as built” drawings by the date required is Rs. 1.00 lac.  | [Cl.58] |
| 39. | The following events shall also be fundamental breach of contract: “The Contractor has contravened Sub-clause 7.1 and Clause 9 of GCC.”  | [Cl.59.2] |
| 40. | The percentage to apply to the value of the work not completed representing the Employer’s additional cost for completing the Works shall be 20 per cent.  | [Cl.60] |

**SECTION –V**

**TECHNICAL SPECIFICATIONS**

**OF**

**CONTRACT**

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###### **SECTION - 1**

*1.0* EXCAVATION, FILLING AND METALLING

**1.1** **General:**

This item refers to the clearing of site for construction of start, setting out of works, profiles, etc., excavation and filling of all open foundations, wet or dry, for the column and wall footings, trenches, pavements, inspection pits and basements, plinths, areas for leveling, drainage lines, water supply lines etc.

Installing refers to the aggregate, layer below floors, pavements, plinth protection etc.

**1.2 Clearing the site and setting out of works**

The site on which the structure is to be built, as shown on the plan and the area required for setting out and other operations, shall be cleared of all obstructions, loose stones, materials and rubbish of all kinds, stumps, brush wood, shrubs and other growth, roots being entirely grubbed up without extra cost. The materials obtained will be the property of the owner and the materials pronounced useful by the Engineer-in-charge shall be conveyed and properly stacked as directed by the Engineer-in-charge. All holes or hallow, whether originally existing or produced by the removal of loose stones or brushwood, shall be carefully filled up with earth, well rammed and leveled off up to the level of already filled or existing ground as directed.

Trees on the site shall not be cut unless authorized by the Engineer-in-charge, shall not be damaged during construction. The above work of cleaning the site shall be reckoned to be included in the rate paid for various items and no extra shall be paid.

*The****contractor shall be responsible for the true and proper setting out of the works. He shall be responsible for proper maintenance of all reference pillars, bench marks, stakes and other evidences existing in the field required in connection with the setting out of works, at his own cost, till physical completion of all the items of the work or prior to that if agreed to by the Engineer-in-charge***

All such bench marks, reference pillars etc., established by the contractor shall be subject to check and approval of the Engineer-in-charge or his authorized representative at all times. Any variations noticed in the work as a result of improper establishment or maintenance of these shall be at the risk and expenses of the contractor.

**1.3 Classification of soil for excavation purposes**:

All materials encountered in the excavation shall be classified as under:

1. Soils shall include sand, gravel, clay, silt and other similar soft or loose materials and all materials of earthy or sandy nature, small size stone or gravel, soft and hard morrum stiff clay etc., which can be ploughed or excavated by ordinary spade, pick, shovel etc., without restoring to barring, wedging and or blasting.
2. Soft laterite: shall include all rocks such as slate shale, laterite, conglomerates, all decomposed and weathered rock, highly fissured rock, old masonry, concrete foundation and pavements, which can be removed by barring, wedges, etc., but not by ordinary spade, pick, shovel etc.
3. Hard laterite rock shall include all rock occurring in masses and boulders larger than 0.3 cum in volume which in the opinion of the Engineer-in-charge can be best be removed by blasting but on account of restriction to blasting at this site will have to be removed by cold chisels or wedges, line drilling or jack hammer

The decision of the Engineer-in-charge regarding the classification of soil and rock shall be final and binding.

* 1. **Excavation:**

1.4.1 Excavation shall include careful removal of all materials or whatever nature and whether dry or wet, necessary for the construction of work, exactly in accordance with lines, levels, grades and curves shown on the plans or as directed by the Engineer-in-charge. It shall be taken to exact widths and levels of the lowest step of foundation/footing and the sides shall be left to plumb where the nature of the soil permits it. Any shoring, strutting and timbering or cutting of extra widths of trenches required for providing working space shall be done by the contractor, the same shall be deemed to have been included in the quoted rate. The contractor shall notify the Engineer-in-charge before starting excavation and take cross section levels (for purposes of measurements) jointly with the Engineer-in-charge before the ground is disturbed.

1.4.2 The bottom of the foundation shall be leveled both longitudinally and transversally or stepped as directed. Should any of the excavation be carried down to a level below the specified level, the contractor shall fill in such extra excavation at his own cost with M10 concrete, well rammed into position until it is brought up to the proper level, filling with excavation material not being permitted for this purpose.

1.4.3 Where such extra excavation is necessary due to removal of loose boulders, the extra excavation and concrete for filling shall be paid under relevant items of Bill of Quantities. The corners of the excavated pits shall be made true and square and all loose debris shall be removed to the satisfaction of the Engineer-in-charge. Before any foundation concrete is placed, the Engineer-in-charge shall inspect the foundation trenches. If any loose patches of or pockets come to light on inspection, these shall be dug out as directed and filled and rammed with M10 concrete. Just before laying the foundation concrete all bottom of trenches shall be lightly watered and thoroughly rammed.

1.4.5 The contractor shall provide suitable drainage arrangements, to prevent surface water from any source entering the foundation pits, at his own cost.

1.4.6 Any obstacle encountered during excavation shall be reported immediately to the Engineer-in-charge and shall be dealt with as instructed by him. Removal of buried piping or cables shall not be done without prior permission of the Engineer-in-charge and the contractor shall take all measures to protect such lines. Cost of such protective measures and deemed to be included in the rates for various items of excavation. No blasting shall be permitted for excavation of foundation even in rocky formation without the prior permission of the Engineer-in-charge

1.4.7 The contractor shall not undertake any concreting in foundation until the excavation pits is approved by the Engineer-in-charge.

**1.5 Shoring:**

1.5.1 Any shoring, strutting and timbering required for protecting the sides of excavation and for ensuring the safety of workmen and equipment, shall not be paid for separately. The contractor shall be responsible for the design of the shoring which shall however be strong enough to resist side thrust and prevent slips, slow and damage to adjacent works and property. It shall be removed as directed after all the items of work, which it is required are completed.

1.5.2 Shoring shall include all labour, materials, erection of the poling boards, wales, ballies etc., keeping in position as required and dismantling and receiving the same after the work is over, as directed.

1**.6 Dewatering**:

The rate quoted for excavation shall include bailing or pumping out all water which may accumulate in the excavation during the progress of the work either from seepage, rain or any other cause and diverting surface if any, by bund or other means. The bunds shall be removed after their purpose is served. Pumping out water from any foundation enclosure, basements or trenches shall be done generally in such a manner as to preclude the possibility of any damage to the foundation trenches, concrete or masonry or any adjacent structure. The excavation shall be kept free from water:

1. During inspection and measurement
2. When placing of concrete or masonry is in progress and until they have come above the natural water level
3. Till the Engineer-in-charge considers that the concrete or mortar have set and hardened sufficiently and
4. During back filling and consolidating

**1.7 Protection and Safety:**

Foundation pits and similar excavation, road blockades, obstruction etc. shall be adequately fenced and marked at night with red lights and a watchman keep in charge to avoid accidents. Adequate protective measures shall be taken to see that the foundation excavation does not affect or damage adjoining structures. All required measures shall be taken by the contractor, at his own cost to ensure safety of the excavation, the people working in or near the excavation and people and property in the vicinity. He shall be entirely responsible for any injury to life and a damage to property caused by his negligence or accident due to his constructional operations.

**1.8 Stacking of excavated materials:**

***All materials excavated from the foundation, of whatever kind they may be, shall be placed at a distance of more than 1.5m from the edge of the foundation or as directed by the Engineer-in-charge. All excavated material will remain the property of the owner. Rate for excavation shall include the cost of sorting out of useful materials and stacking them separately or transporting them as directed. Material suitable for filling or other use shall be stacked in convenient places. Materials not useful in any way shall be disposed off. The Engineer-in-charge shall be the final authority as to what is useful material. The site shall be left clean of all debris at the completion of the work. Not withstanding the above, it may be noted that in this particular work, as there is no space to stack the excavated earth at site, the contractor has to convey the earth excavated to a place selected by him and arrange to stack there temporarily. The useful earth (which would be decided by the Engineer-in-Charge) shall be brought back for refilling and the balance if any shall be disposed of by the contractor. All the expenses incurred in theabove operation of transportation of earth to and fro will be borne by the contractor and the rates built in to the item No. (1) Will be inclusive of all the above operations.***

**1.9 Back filling around foundations in trenches and plinth**

1.9.1 Back filling material

Back filling material shall be as approved by the Engineer-in-charge or as specified in drawing.

1.9.2 Back filling or excavations in trenches around foundation and elsewhere shall consist of one of the following materials as the Engineer-in-charge may direct in each location.

1. Selected earth from excavated soil heap
2. Selected earth brought from borrow area
3. Sand filling
4. Lean concrete filling

1.9.3 **Back Filling:**

Filling shall be done after the concrete or masonry in the foundation has fully set and its curing completed. It shall be done in such a manner as not to cause undue thrust on any part of the structure.

Back filling around completed foundations shall be done to the lines and levels shown on the drawings, including any trimming of the surfaces, as may be necessary. This will be done with selected and approved earth from excavation or otherwise with borrowed materials as directed by the Engineer-in-charge. Where sufficient suitable material is not available from the excavation, The Engineer-in-charge may direct to import suitable earth from different sources. The refilling shall be done in horizontal layers of thickness not exceeding 15cms from pocket with careful watering, ramming and rolling etc., to obtain necessary level of compaction.

1.9.4 The contractor shall not fill in and around any work, until it has been approved by the Engineer-in-charge

1.9.5 Back filling around liquid retaining structures and piping shall be done only after testing of structures against leakage is done and approval of Engineer-in-charge is taken

**1.10 Metalling:**

501.10.1 Graded coarse aggregate layer below floor, pavements and plinth protection

1. Graded coarse aggregate layer of thickness specified in the Bill of quantities as shown on the drawing shall be provided after the structural foundations and plinth constructions have been built and the filling in the plinth has been watered and thoroughly consolidated. Excavation for cable ducts, pits, trenches and pockets other than those for structural foundations and plinth shall be made only after the graded coarse aggregate layer is laid and consolidated
2. Materials: The aggregate to be of the quality as specified for concrete elsewhere. The sizes to be used are 50mm to 40mm, 40mm to 25mm and 25mm to 20mm.
3. Construction Procedure: The bed on which the graded course aggregate layer is to be laid shall be cleared of all loose materials leveled, watered and compacted and got approved by the Engineer-in-charge before laying the aggregate layer.

1.10.2 The metal shall be mixed thoroughly in a proportion of 2 parts of 50mm metals, to 1 part each of 40mm and 25mm. The mixing shall be done before laying the same at site. It shall be laid in 2 layers of 10cm thickness and each layer shall be consolidated to a thickness of 7.5cm by an 8T to 10T capacity roller. At places which have no access for mechanical rollers, hand rollers after obtaining permission from Engineer-in-charge. While laying, rolling and consolidating, precautions shall be taken to ensure that no damage occurs to the masonry or any other portion of the structure. But special care shall be taken for compaction near masonry and concrete structures. Proper manual and vibratory tamping equipment shall be employed for satisfactory compaction in such area. Weak spots if any shall be rectified at contractors own cost. After the graded course aggregate has been thoroughly consolidated, morrum to completely fill the interstices shall be sprayed gradually over the surface and dry rolling shall be done with morrum for each layer. Finally, the surface shall be finished with a layer of morrum moistened and rolled over so as to provide an even surface. The maximum thickness of the finished morrum layer shall not exceed 12mm. The quoted rate shall include the cost of morrum layer also.

**1.11 Disposal of excavated earth**

Surplus earth and soil, which are rejected for back filling shall be removed from construction area to the area demarcated by the Engineer-in-charge. The materials shall be conveyed by suitable means including trucks, if necessary and disposed off as directed by the Engineer-in-charge, loading and unloading incidental to this transportation shall be included in the quoted rate.

**1.12 Measurement and Payment**

1.12.1 Payment for earth work in excavation shall be made on cubic meter (m3) basis on the measurement of volume of pits /trench of excavated as per the approved for construction drawing. Quoted rate shall cover the following items also:

1. Forming (or leaving) “deadmen” or “Tel1 tales” in borrow pits and their removal after measurement
2. Forming (or leaving) steps in sides of deep excavation and their removal after measurement
3. Unless otherwise specified, removing slips and falls in excavation
4. Excavation for insertion of planking and strutting
5. Slinging or supporting pipes, electric cables etc., met during excavation

1.12.2 The rate shall include pumping and bailing out rainwater surface water accumulated in the excavated pit or trench, removal and disposal of surplus excavated soil from construction area. The rate shall also include cleaning of site, setting out and line out work required for the excavation. No separate payment will be made for watering and consolidating the bottom of excavations, stacking of excavated soils, shoring etc. The rate shall include the clearing of site of all the debris at the end of work and leveling the ground as directed for a distance of 5m around the works.

1.12.3 Dimensions of excavation shall be measured correct to 1 cm and individual quantities shall be calculated to a whole cubic metre.

1.12.4 The payment for respective classes of excavation shall be based on quoted unit rate per cum. of accepted excavation, limited to dimensions shown in plans or as directed by the Engineer. Excavation to dimensions in excess of the above shall not be paid for.

1.12.5 When excavation is to be done below ground level for foundations or plinth beams or other work, the area of plan in Sq. mtr. shall be evaluated for the maximum size of member or component as shown on drawings. This area shall be multiplied by the average depth to get the effective quantity in cubic metre that would be considered for payment for excavation in the case under consideration.

1.12.6 Contractor shall intimate the Engineer-in-Charge as soon as different classifications of soils are met with. Joint levels shall be taken as to the levels of different soil classification and volumes shall work out on the basis of levels only. Where walls of different strata cannot be clearly marked and defined, the contractor shall stack different soils of various classifications separately for measurement purpose and then dispose it off as directed.

1.12.7 If soil of any classifications other than that specified is met with during excavation, the decision of the Engineer-in-Charge as to the classification of soil, levels of the strata of different classifications and their locations shall be binding.

1.12.8 Driving of sounding bars or jumping small drill holes to expose the nature of substratum upto total length of 1.0 M (approximately) below the bed of excavation, distributed in 2 or 3 places in each foundation, if necessary, will be considered incidental work and will be paid for separately.

**1.13 Back Filling:**

Payment for back filling with excavated earth shall be based on volume of consolidated fill. This volume shall be derived from the difference between the volume of excavation and the structure of trenches as the case may be. The rate shall include cost of extracting suitable approved earth from excavated soil, carriage upto directed locations, placing watering, compacting in layers, trimming and dressing, finished surface and disposal of surplus material.

However, back filling done with other borrowed materials shall be paid separately. The cost shall include the cost of material, required labour for loading, unloading the material transporting it to the site and back filling etc., as per specifications above. Measurements shall be based on volume of consolidated fill.

**1.14 Metalling:**

The payment for various thickness of graded coarse aggregate layer shall be made on the basis of unit rate per sq.meter in plan of the layer in position limited however to the dimensions indicated in plan or as directed by the Engineer. Quoted rate for graded coarse aggregate layer shall include for consolidating the layers and surface finishing with moorum layer not more than 12 mm thick and all other incidental work required to complete the item as per these specifications.

**1.15 Disposal:**

Payment shall be made on Cubic Meter basis on the difference of measurements of the volumes of the excavated pits and the measurements of the back filling. Quantity generated due to voids in back filled volume of earth shall also be removed by the contractor at no extra cost and this disposal of earth shall not be measured and paid under any item.

In exceptional circumstances the Engineer-in-Charge may direct the contractor to remove surplus earth, concrete debris or any other waste material from site to the areas of disposal on the basis of truck measurement. In such cases volume of material shall be calculated on the basis of truck volume reduced by 30% for voids for earth and 20% for morrum. All other provisions of disposal such as spreading, leveling grading shall apply in this case also.

The lead shall be measured along with shortest permissible route of movement. No positive or negative lift will be measured and paid for.

###### **SECTION - 2**

1. **CONCRETE WORKS**

**2.1 GENERAL**

SCOPE: This specification covers the general requirements for concrete to be used on jobs using on-site production facilities including requirements in regard to the quality handling, storage of ingredients, proportioning, batching, mixing and testing of concrete and also requirements in regard to the quality, storage, bending and fixing of reinforcement. This also covers the transportation of concrete from the mixer to the place of final deposit and the placing, curing, protecting, repairing and finishing of concrete.

**2.2 RELEVANT CODES AND SPECIFICATIONS**:

The following specifications, standards and codes are made a part of these specifications. All standards, specifications, codes of practice referred herein shall be the latest editions including all applicable official amendments and revisions.

In case of discrepancy between this specification and those referred to herein, this specification shall govern.

### 2.3 MATERIALS

**I.S. CODE:**

1. IS-269 – Specification for ordinary, rapid hardening and low heat and

Portland cement.

1. IS-455 – Specification for Portland blast furnace slag cement.
2. IS-1489 – Specification for Portland pozzolana cement.
3. IS-4031 – Method of Physical tests for Portland cement.
4. IS-650 – Specification for standard sand for testing of cement.
5. IS-383 – Specification for coarse and fine aggregates from natural sources

For concrete.

1. IS-516 – Method of test for strength of concrete.
2. IS-1199 – Method of sampling and analysis of concrete.
3. IS-432 – Specification for mild steel and medium (Part I & II) tensile steel

Bars and hard drawn steel wire for concrete reinforcement.

1. IS-1139 – Specification for hot rolled mild steel and medium tensile steel

 Deformed bars for concrete reinforcement.

1. IS-1566 – Specification for plain hard drawn steel wire fabric for concrete

Reinforcement.

1. IS-1786 – Specification for high tensile steel bars for concrete

Reinforcement.

1. IS-2090 – Specification for high tensile steel bars used in pre stressed

 Concrete.

1. IS-4990 – Specification for plywood for concrete shuttering work.
2. IS-2645 – Specification for integral cement water proofing compound.
3. IS-6925 & IS 903 – Specifications for admixtures.
4. IS-8112 – Specification for 43 grade cement.

**2.4 EQUIPMENT:**

**I.S. CODE:**

1. IS-1791 – Specification for batch type concrete mixer.
2. IS-2438 – Specification for Roller Pan mixer.
3. IS-2505 – Specification for concrete vibrators immersion type.
4. IS-2506 – Specification for screed board concrete vibrator.
5. IS-2514 – Specification for concrete vibrating tables.
6. IS-3366 – Specification for pan vibrators.
7. IS-4656 – Specification for form vibrators for concrete.
8. IS-2722 – Specification for portable swing weigh batchers for concrete

 (single and double buckets types).

1. IS-2750 – Specification for steel scaffolding.

**2.5 CODE OF PRACTICE**:

1. IS-456 – Code of practice for plain and reinforced concrete.
2. IS-1343 – Code of practice for pre stressed concrete.
3. IS-3370 – Code of practice for concrete structures (Parts I to IV) for

Storage of liquids.

1. IS-3935 – Code of practice for composite construction.
2. IS-3201 – Criteria for design and construction of precast concrete trusses.
3. IS-2204 – Code of practice for construction of reinforced concrete shell

Roof.

1. IS-2210 – Criteria for the design of RC shell structures and folded plates.
2. IS-2751 – Code of practice for welding of mild steel bars used for

 Reinforced concrete construction.

1. IS-2502 – Code of practice for bending and fixing of bars for concrete

Reinforcement.

1. IS-3414 – Code of practice for design and installation of joints in buildings.
2. IS-3558 – Code of practice for use of immersion vibrators for

Consolidating concrete.

1. IS-4014 – Code of practice for steel tubular scaffolding (Part I & II)
2. IS-2571 – Code of practice for laying in situ cement concrete flooring.
3. IS-10262 – Code of practice for mix design.
4. SP-23 – Hand book for concrete mix design.

**2.6 MEASUREMENT:**

**I.S. CODE:**

1. IS-1200 – Method of measurement of building works.
2. IS-3385 – Code of practice for measurement of civil engineering Works.

**2.7 CONSTRUCTION SAFETY:**

**I.S. CODE:**

1. IS-3696 – Safety code for scaffolding and ladders (Part I & II).

**2.8 MATERIALS:**

All materials shall be obtained from sources approved by the Engineer-in-charge. The agreed source or quality of any material shall not be changed during the course of the contract except with the approval of the Engineer-in-charge.

When requested by the Engineer-in-charge, the Contractor shall provide a certificate from the manufacturer, for each and every delivery of material, showing the source, quantity delivered and confirming that the material has been tested and conforms to the required Indian Standard.

**2.9 TESTING OF CONCRETE MATERIALS**

Prior to the commencement of concrete work, the Contractor shall get all cement, aggregates and water tested in the laboratories approved by the Engineer-in-charge and shall keep approved samples in the site office for inspection of the Engineer-in-charge at any time of the concreting operation.

During construction also, the materials shall be sampled and tested as often as deemed necessary by the Engineer-in-charge. Samples shall be taken and tested in accordance with the latest revisions of relevant Indian Standard Specifications and the cost thereto shall be borne by the Contractor.

**2.9.1 CEMENT**

The cement used throughout the work shall be to the approval of the Engineer-in-charge. A certificate shall be obtained from the manufacturers and produced to the Engineer-in-charge for each delivery of cement and in case of Ordinary Portland Cement. It shall comply with the requirements of IS: 269 and IS: 8112. The Contractor shall store the cement in sheds to be provided by him for this purpose at site. The Cement shall be delivered to the site in bags sealed with the manufacturer’s seal and different types of cement shall be stored separately. The storage sheds with water tight walls and roof, shall be maintained in a perfectly dry and well ventilated condition, 30 cm above ground level and the cement shall be stored as per instructions issued in the booklet of the Associated Cement Company. It shall be turned over from the bottom as and when required by the Engineer-in-charge. Any cement which has been deteriorated caked or which has been damaged due to any reason whatsoever shall not be used. No cement shall be used for the works that has been stored at site for more than three months unless it is retested. Test samples of cement may be drawn from each consignment as delivered and tested by the Contractor. Should the result of such test show that any sample does not comply with the specified requirement, the whole consignment from which the sample was taken, shall be rejected and forthwith removed entirely from the site and replaced with cement of satisfactory quality. The cement obtained from either L&T/ ACC/ Birla/ Ambuja/ JK / Shree ULTRA / CCI. Shall be used on work.

# 2.9.2 SAND

Sand to be used for concrete shall be washed and well graded mixture from coarse to fine grains, comply with the requirements of IS 383 and 515. It shall be washed, clean, hard and free from salt, earth, clay and other impurities. Fine sand of uniform size or silt shall not be used. It will comply with sieve analysis in accordance with IS: 2386 Part I and II. Unless initially clean, all sand shall be thoroughly and carefully cleaned by screening and washing in fresh and clean water. The **screened and washed sand** shall not contain more than 4% by volume of clay, dust and silt immediately after allowing it to settle for 3 hours in water.

FM of sand shall neither be less than 2.2 nor more than 3.2.

Field tests shall be carried out regularly to ensure the suitability of sand.

Sample loads shall be available at site for the inspection of the Engineer-in-charge and if approved by him all sand in the work shall be of similar quality.

In case of sand containing moisture the proportions of concrete materials shall be adjusted to give the correct mixture.

**2.9.3 COARSE AGGREGATE**

The coarse aggregate for the reinforced concrete work shall consist of crushed gravel, black trap, granite or other stone to the approval of the Engineer-in-charge and shall be free from dust. If considered necessary by the Engineer-in-charge the aggregate shall be washed especially until an approved cleanliness is obtained. The use of laminated stone, flat or flaky material will not be permitted. The combined coarse aggregate shall in all respects be so graded as to allow 95% to 100% by weight to pass a 20mm IS sieve; 25% to 55% by weight to pass a 10mm IS sieve and 0% to 10% by weight to pass a 5mm IS sieve. The aggregates of different sizes shall be stored in separate stacks in clean state and free from all dirt.

The coarse aggregate where absorption of water after 24 hours immersion is more than 5% by weight shall not be used.

When required by the Engineer-in-charge tests indicated in IS 383 shall be carried out by Contractor at his cost to show the acceptability of the materials. Strong piles of aggregate shall have good drainage, preclude inclusion of foreign matter and preserve the gradation.

**2.9.4 WATER**

Water used for all purposes in this contract shall be free from oil, acid, vegetable matter, salts or dirt of any kind which will have adverse effect on cement or steel in the case of reinforced concrete. Whenever called for the Contractor shall produce test results for water being used on work.

Average 28 days compressive strength of at least three 15 cm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water. Sea water shall not be used.

**2.9.5 ADMIXTURES**

Plasticisers may be used in the concrete work to achieve better workability admixtures or cements containing additives (such as accelerators, retarders, water proofing agents etc.) shall not be used unless specified or otherwise directed or approved by the Engineer-in-charge.

**2.9.6 STEEL REINFORCEMENT**

The following types of reinforcement shall be used.

1) Mild steel round bars conforming to IS : 432 (Part-I)

2) Hot-rolled deformed bars conforming to IS: 1139

3) Cold-twisted bars conforming to IS: 1786

The Steel reinforcement shall be procured from KAMDHENU, RILN, RATHI, confirming to ISI codes with the prior approval of Engineer-in-charge as above and in any case steel should be none converted. Written permission from the Engineer-in-charge shall be taken before procurement. The contractor shall produce a test certificate of the manufacturer for each consignment.

Bars upto 25 mm diameter shall stand bending cold to an angle 180 Deg. round a diameter equal to that of the test piece without fracture of the outside skin of the bent portion. If independent tests are considered necessary they shall be carried out to IS: 223. No bar shall be more than 2 1/2% over or under the areas specified. Immediately before deposition of the concrete, reinforcement shall be well cleaned and made perfectly free from dirt, loose, rust, scales, paint, oil wash, grease or any other coatings which may destroy or reduce bond.

# 2.10 FABRICATION AND PLACEMENT OF REINFORCEMENT

All steel reinforcement shall be fabricated and fixed in accordance with IS 2502. Bars shall be firmly bound together with annealed steel wire not thinner than 16 SWG at sufficient intersections to ensure that the network of rods will retain its original form and the mesh will be so temporarily supported as to retain its correct position in the formwork during the process of depositing the concrete. An adequate number of MS chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. All splices and lengths of overlaps in reinforcement shall be strictly in accordance with the drawings. The overlaps shall be staggered and their positions shall be approved by the Engineer-in-charge. No welding of reinforcement is permitted unless approved by the Engineer-in-charge in writing. The ends of wire ties must not project towards the face of the concrete, and all ends shall be cut off or bent inwards so that there is no risk of rust staining the surface of concrete. Off cuts of binding wire must be removed from the inside of forms after the steel fixing operations are over.

Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original positions, care shall be taken to ensure that at no time is the radius of the bend less than 4 bar diameters for deformed bars. Care shall also be taken when bending back bars, to ensure that the concrete around the bar is not damaged.

Where reinforcing bars are lapped with dowels provided in concrete work:

If the lap length to provide in concrete work is less than the minimum lap length specified on the drawings for development of full strength of the connection, bars shall be spliced by welding. Such welding shall conform in all respects to the provisions given in Appendix ‘A’ of SP: 34 (S&T) - 1987, Hand book on concrete reinforcement and detailing, Bureau of Indian Standards. Such splices shall be payable under relevant item of the Bill of Quantities. However if the contractor has failed to provide sufficient lap length as shown on the drawings through his own fault, the bars shall be spliced by welding and such welded splice shall not be payable.

**2.11 SPACER BLOCKS**

To maintain the specified amount of concrete cover to the reinforcement small pre cast concrete blocks of grade similar to that of concrete to be placed shall be used.

a) At each end of reinforcing bar, not less than 25mm, nor less than twice the diameter of bar.

b) For a longitudinal reinforcing bar in a beam, not less than 25mm, nor less than the diameter of the bar.

c) For a longitudinal reinforcing bar in a column, not less then 40mm nor less than the diameter of the bar.

d) For tensile, compressive, shear or other reinforcement in a slab, not less than 15mm, nor less than the diameter of the bar.

e) For vertical or horizontal reinforcement in concrete walls not less 15mm nor less than the diameter of the bar.

f) For reinforcement in footings, pile caps and raft foundations not less than 50mm.

**2.12 PREVENTION OF RUST STAINING**

Reinforcement left projecting above a concrete surface shall be cement washed if exposed in such a way that rust staining of concrete surfaces is likely. Any rust staining of exposed surfaces shall be cleaned immediately.

**2.13 STORAGE AND HANDLING OF REINFORCEMENT**

Reinforcement shall be stacked off the ground in clean conditions and protected from contamination and excessive rusting. The reinforcement shall be clean and free from oil, grease, and loose rust, loose mill scale, salt and chemical contaminants at the time of fixing in position and concreting.

**2.14 PROPORTION FOR CONCRETE**

The Contractor shall design concrete mixes to produce concrete of the required strengths. The contractor must submit full designs of the mixes for approval of the Engineer-in-charge and trial mixes will be prepared by the contractor in the presence of the Engineer-in-charge, having workability, strength, minimum cement content and finish as criteria.

Concrete surfaces, which are to be finished with cement rendering shall be thoroughly hacked with approved hand tools immediately after removal of formwork so as to bring about adequate bond between the concrete and cement rendering.

Notwithstanding the acceptance by the Engineer-in-charge of any mix design and series of trail mixes, variations may be made to the proportions when considered necessary by the Engineer-in-charge. Such variations may be made to Nominal mixes if used, but variations of this nature will not be allowed to affect the unit price of concrete.

For both Nominal as well as Design Mix concrete, the quantity of cement shall be determined by weight. Where standard bags of cement are used, their weight shall be checked at frequent intervals and any loss in weight due to leakage etc. shall be made good.

In the case of Nominal Mix Concrete, aggregates shall be measured by volume, cement by weight and mixing water in graduated liter cans. In the case of controlled concrete all aggregates and cement shall be measured by weight in approved weigh batching equipment. Mixing water shall be measured in graduated liter Cans.

While calculating the amount of mixing water, the moisture content of the aggregate shall be taken into account. The grades of concrete shall be in accordance with Table below. The cement content of the mixes specified shall not exceed the minimum content specified in Para 2.20 by more than 5%.

|  |  |
| --- | --- |
| **Grade of****Concrete** | **Minimum Compressive strength N/mm2** |
|  |  **At 7 days** | **At 28 days** | **Remarks** |
| M 15M 20M 25M30 | 1013.51720 | 15202530 | -------- |

The above specified compressive strengths shall be for the use of ordinary Portland cement in concrete. When rapid hardening Portland cement is used, the 28 days compressive strength requirements specified in Table shall be met at 7 days. Where other cements are used, the Engineer-in-charge shall specify the corresponding requirements preferably on the basis of preliminary tests.

In order to get a relatively quicker idea of the quality of concrete compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength tests and it shall not be less than 67% of the 28 days Cube Strength. In all cases 28 days compressive strength shall alone be the criterion for acceptance or rejection of the concrete.

Design Mix Concrete is preferred to Nominal mix. If Design mix concrete cannot be used for any reason on the work for grades of M20 or lower, nominal mixes may be used with the permission of the Engineer-in-charge.

If Nominal Mix concrete does not yield the specified strength, such concrete shall be classified as belonging to the appropriate lower grade. Nominal Mix concrete proportion for a given grade shall not, nowhere, be placed in higher grade on the ground that the test strengths are higher than the minimum specified. As long as the quality of the materials does not change, a mix design earlier in use may be considered for later work.

The proportion of fine aggregate to coarse aggregate in Nominal Mix is generally 1:2 but subject to an upper limit of 1:1 1/2 and lower limit 1:2 1/2 depending upon the nature of aggregates. The cement content of the mix for any Nominal Mix shall be proportionately increased if the quantity of water in a mix has to be increased to overcome the difficulties of placement and compaction so that water cement ratio is not exceeded.

To improve workability of concrete and cement, grout admixtures conforming to IS 6925 and IS 9103 could be permitted subject to the approval of Engineer-in-charge . Mixtures generating hydrogen, nitrogen etc., should not be used. Nothing extra will however be paid for the same.

**2.15 MIXING OF CONCRETE**

Mixing of concrete shall continue until there is a uniform distribution of material and the concrete is uniform in colour and consistency and shall be for at least two minutes.

Mixers and weigh batches shall be maintained in first class condition throughout the contract and any mixer or plant which is faulty shall not be used. The drums on all mixers shall revolve at the speed recommended by the manufacturer. A mixer of any type which has been out of use for more than 20 minutes shall be thoroughly cleaned out before any fresh concrete is mixed. The subsequent 1st batch shall have additional cement to allow for sticking in the drum. All equipment’s shall be maintained in a clean, serviceable condition and their accuracy periodically checked. All controlled mix of concrete shall be from RMC plants, which are duly approved.

**2.16 COMPRESSIVE STRENGTH**

The Contractor shall keep on site minimum six standard 15 cm test cube moulds and ancillary equipment for preparing test cubes. Before the Contractor commences any concrete construction he shall make six cubes of mix concrete with the cement, sand, aggregate and water which he proposes using on the contract and shall have them tested at a Laboratory approved by the Engineer-in-charge. Three cubes shall be tested at 7 days and three cubes at 28 days after casting and curing. In all cases the cubes shall give the minimum compressive strength for Preliminary Tests specified above. No concrete construction shall be commenced until Preliminary Tests on the six cubes referred above have been completed and result show the concrete to have the minimum compressive strength.

As construction proceeds samples from fresh concrete shall be taken as per IS: 1199 and cubes shall be made, cured and tested in accordance with IS: 516. Three test specimen shall be made for each samples for testing at 28 days. Additional cubes may be required for various purposes as to determine the strength of concrete at 7 days or at the time of striking formwork, or to determine the duration of curing, or to check the testing error. The test strength of the sample shall be the average of the strength of three specimens. The individual variation should not be more than +15 percent of the average. Any part of the work from which the cubes fail to give the required minimum compressive strength shall be dealt with the Contractor as directed by the Engineer-in-charge and at the expenses of the contractor.

**2.17 Design mix concrete**

All designs mix concrete shall be designed on the basis of preliminary tests. The contractor shall make trial mixes using samples of aggregates and cement typical of those to be used in the works. If possible, the concreting plant and the methods of transporting and depositing the concrete to be employed in the work shall be used to working conditions with the trial mixes.

All these preliminary tests approvals etc., shall be got done well in advance by the contractor before any concreting is contemplated. Failure on the part of the contractor to do so and the consequent delay in the completion of the works will not entitle him for any compensation whatsoever, either financially, or by way of extension of time.

Based upon the successful preliminary crushing and workability tests, the contractor shall submit mix proposals to the engineer-in-charge who will have the right to reject any trial mix not deemed satisfactory.

It shall be the ultimate responsibility of the contractor for selection of the trial mix to the complete satisfaction of the engineer-in-charge.

**2.18 Cement content, water cement ratio and workability**

From durability consideration, strict control on the cement content and water ratio and in the process of concrete making, laying, compaction and curing must be exercised, the aim being to achieve a dense and impermeable concrete.

The following limit in respect of cement content and water cement ratios shall be maintained:

Structural Min.cement content maximum water

Member in kg/m3 (for 20mm nominal cement ratio

size of aggregate)

a) PCC members 0.45

b) RCC members (As per IS 456) 0.40

c) PSC members 0.40

The cement content shall be as low as possible but not less than the quantities as specified as above.

The concrete is also liable to be rejected or repaired as per the instructions of the Engineer-in-charge if it is porous or honeycombed, its placing has been interrupted without providing a construction joint or the reinforcement has been disproportionately displaced.

The Contractor shall keep a daily record showing the date when each portion of concrete is poured in slab, beam, column, etc., curing period, removal of formwork and test cube results at 7 days and 28 days period. They shall be sent immediately to the Engineer-in-charge.

**2.19 Tests & standards of acceptance**

**Slump Test**

The Contractor shall keep at the site of the works for the constant use of the Engineer-in-charge’s representative a standard slump test mould and shall provide facilities throughout the construction for tests to be made as and when the Engineer-in-charge may require. The slump cannot be definitely stated until tests have been made using the materials adopted for the work, but it is anticipated, that the slump of between 25mm to 50mm will be required.

The Contractor at his own expense shall establish a field laboratory to carryout all preliminary tests, work tests and also to work out grading and proportioning of aggregates in order to obtain and maintain uniform quality of work. A 150 mm cube testing machine shall be installed by the contractor at his own expense to ascertain the strength of concrete from time to time. The contractor shall supply all materials, labour and testing machines for preparing and testing sample as required by the Engineer. The concrete shall also be got tested in an independent laboratory approved by the Engineer at the discretion of the Engineer or his authorized representative at no extra cost.

**2.19.1 Defective concrete**

Any concrete which gives results below the results specified in relevant paras or becomes severely damaged due to cracking or shows excessive honey-combing and exposure of reinforcement or exhibits any fault which in the opinion of the engineer-in-charge, seriously impairs its function, may be declared defective concrete. Such concrete shall be cut-out, removed from the site and contractors own expenses to the satisfaction of the engineer-in-charge. Alternatively the contractor shall carry out at his own expenses whatever other remedy the engineer-in-charge may reasonably require having regard to all the circumstances.

**2.19.2 Tests**

In case of doubt regarding grade of concrete used, either due to poor workmanship or bases on results of cube crushing strength, test of concrete on the basis of any or all of the following shall be carried out. The engineer-in-charge shall be the final authority for interpreting the results of all these tests and the contractor shall carry out these tests at his own expenses without any additional cost to the Employer.

1. **Core test**

The points from which cores are to be taken and the number and size of cores required shall be the discretion of the engineer-in-charge. Core shall be prepared and tested as described in relevant code. Concrete in the member represented by a core test shall be considered acceptable if the average equivalent strength of 85% of the cube strength of the grade of concrete specified for the corresponding age and no individual core has strength less than 75%.

In case the strength of individual core is found unsatisfactory and below the specified stipulation, approval is to be obtained from the engineer-in-charge after submitting necessary proofs in writing on safety and stability of the structure. Decision on acceptance/rejection to this effect given by the engineer-in-charge shall be final binding on the contractor.

1. Other non-destructive test e.g. rebound hammer test ultrasonic test- as directed by the engineer-in-charge.

**2.20 TRANSPORTING PLACING AND COMPACTION OF CONCRETE**

The concrete shall be transported maintaining required workability in a manner such as to avoid the segregation of the constituent materials, and loss of any of the ingredients. It shall be deposited as nearly as practicable in its final position to avoid rehandling. It shall be placed and compacted before setting commences and should not be subsequently disturbed. Methods of pouring should be such as to preclude segregation, and to avoid displacement of reinforcement and movement of formwork.

The concrete should be thoroughly compacted and fully worked around the reinforcement, around embedded fixtures and into the corner of the formwork without formation of honey combing, pinholes or surface irregularities and any other defects whatsoever. The use of mechanical vibrators having capacity of producing vibrations at a rate not less than 5000 cycles per minute is recommended. Over vibration or vibration of very wet concrete is harmful and should be avoided; under vibration is also harmful. In addition to mechanical vibration, sufficient hand tools must be used to ensure full consolidation around reinforcement and at edges and corners.

The deposition of concrete shall be carried out as continuously as possible to reduce to minimum joints between new concrete which has set. Where construction joints are necessary they shall be formed at right angles to the axis of the member concerned by the insertion of rigid stopping off form, against which concrete can be properly rammed. Concrete shall not be dropped from a height of more than 1.0 M. No unset concrete shall be brought into contact with unset concrete containing cement of different type. Special permission and instructions shall be obtained when concrete has to be deposited under water. Under water concreting shall be done with the help of tremi pipe line only. Concrete shall contain 10% more cement than that required for the specific mix placed in dry condition.

Accumulation of set concrete on the reinforcement shall be avoided. Before fresh concrete is deposited upon or against any concrete which has already hardened, the surface of hardened concrete shall be well roughened if necessary by chipping and all Latinate removed. The surface shall then be swept clean with wire brushes, thoroughly wetted and covered with a thin layer of cement mortar.

**2.21 PROTECTION OF CONCRETE**

Newly placed concrete shall be protected by approved means from rain, sun and drying winds. Concrete placed below the ground shall be protected from falling earth during and after placing. Approved means shall be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion, deleterious ground water, mixing with earth or other materials that may impair the strength and durability of concrete.

**2.22 WORKING IN EXTREME WEATHER**

During windy weather efficient protection is to be provided to prevent the cement from being blown away during the process of apportioning and mixing. During wet weather the concrete shall be adequately protected as soon it is in position. No concreting shall be carried out during period of continuous heavy rain unless it is completely covered during mixing, transporting and placing. In extreme hot weather, concreting shall be restricted to mornings and evenings. Time between mixing and placing of concrete shall be kept to the minimum and formwork shall be cooled by sprinkling with water before it starts drying out.

**2.23** C**ONSTRUCTION JOINTS**

The minimum number of joints should be used and their constructions should be simple. They should be either horizontal or vertical because concreting sloping surfaces are usually unsatisfactory.

Where concrete is placed in vertical members e.g. walls columns and the like, the lifts of concrete shall finish or in sloping members at right angles to the axis of the members, the joint line matching the features of the finished work. Concreting shall be carried out continuously upto the construction joints.

Laitance, both on the horizontal and vertical surfaces of the concrete, should be removed before fresh concrete is adhesion and sand wet blasted. Various methods for removal can be used. But they should not dislodge the coarse aggregate particles. Concrete may be brushed with a stiff brush soon after casting while the concrete is still fresh, and while it has only slightly stiffened.

If the concrete has partially hardened, it may be treated by wire brushing or with a high pressure water jet, followed by drying with an air jet, immediately before the new concrete is placed.

Fully hardened concrete should be treated with mechanical hand tools or grit blasting, taking care not to split or crack aggregate particles.

The best time for treating the joints is a matter of judgment because it depends on the rate of setting and hardening (which is itself dependent on the temperature of the concrete) before further concrete is cast the surface should be thoroughly cleaned to remove debris and accumulated rubbish, one effective method being by air jet.

Where there is likely to be a delay before placing the next concrete lift protruding reinforcement should be protected before the next lift is placed, rust, loose mortar, or other contamination should be removed from the bars and where conditions are particularly aggressive and there has been a substantial delay between lifts, the concrete should be cut back to expose the bars for a length of about 50 mm to ensure that contaminated concrete is removed.

In all cases, when construction joints are made, it is essential to ensure that the joint surface is not contaminated with release agents, dust, or curing membrane and that the reinforcement is fixed firmly in position at the correct cover.

2**.24 CONCRETING AT CONSTRUCTION JOINTS**

When the form work is fixed for the concreting work it should be inspected to ensure that no leakage is seen from the fresh concrete.

The practice of first placing a layer of mortar or grout when concreting joints is not recommended. The old surface should be soaked with water, without leaking puddles immediately before starting concreting then the wet concrete should be thoroughly compacted against it.

When fresh concrete is cast against existing mature concrete or masonry, the older surface should be thoroughly cleaned and soaked to prevent the absorption of water from the new concrete. Standing water should be removed shortly before the new concrete is placed and the new concrete should be thoroughly vibrated in the region of the joint. Chemical bonding agents shall be used with the approval of the Engineer-in-charge at no extra cost.

**2.25 STRUCTURAL JOINTS**

Expansion joints or other permanent structural joints shall be provided in position and of the form described in the drawings or elsewhere.

In no case shall the reinforcement, corner protecting angles or other fixed metal items, embedded or bonded into concrete, run continuously through an expansion joint. The placing of concrete on either side of the expansion joint shall be done separately after an interval of at least seven days.

**2.26 CUTTING INTO CONCRETE**

No concrete shall be cut into, nor shall it be interfered with in any way, without the prior approval in writing of the Architect. Necessary holes shall be provided as required for plumbing work and for electrical pipes at the time of execution.

**2.27 CURING OF CONCRETE**

Exposed surfaces of concrete shall be kept continuously in a damp or wet condition for at least fourteen days from the date of placing of concrete.

Approved curing compounds may be used in lieu of moist curing with the permission of the Architect. Such compounds shall be applied to all exposes surfaces of the concrete as soon as possible after the concrete has set and care shall be taken so as the compound shall not affect the concrete. The surface shall be cleaned by using wire brushes before plastering without additional cost.

**2.28 INSERTS**

The contractor shall fix all necessary steel plates, pipe holes, pockets, dowels etc. in the shuttering of concrete work, to enable subsequent fixing of supports, brackets, ceilings, precast members etc., as indicated in the drawings or as required by the Consultants.

**2.29 FINISHING**

Immediately on removal of forms, the RCC work shall be examined by the engineer-in-charge before any defects are made good.

1. The work that has sagged or contains honey-combing to an extent detrimental to structural safety or architectural concept shall be rejected.
2. Surface defect of a minor nature be accepted to acceptance of such work by the engineer-in-charge and the same shall be rectified in an approved manner.
3. Surface defects which require repair when form are removed usually consist of bulges due to the movement of forms, ridges at form joints, honey combed areas, damage resulting from the stripping of forms and bolt hole. Bulges and ridges are to be removed by careful chipping or tooling and the surface is then rubbed with a grinding stone, honey combed and other defective areas must be chipped out, the edges being cut as straight as possible and perpendicularly to the surface or preferably slightly undercut to provide a key at the edge of the patch . bolt holes shall be closed by cement mortar to ensure through filling.
4. Shallow patches are first treated with a coat of thin grout composed of one part of cement and one part of sand and then filled with mortar similar to that used in the concrete. The mortar is placed in layers is given a scratch finish to secure bond with the succeeding layer. The last layer is finished to match the surroundings concrete by floating, rubbing or tolling on formed surfaces by pressing the form material against the patch while the mortar is still plastic. Bonding compound shall be used without any extra cost.
5. Large and deep patches require filling up with concrete held in place by forms. Such patches are to be reinforced and carefully dwelled to the hardened concrete.
6. The same amount of care to cure the material in the patches should be taken as with the whole structure. Curing must be started as soon as possible, after the patch is finished to prevent early drying. Damp Hessian may be used but in some location, it may be difficult to hold it in place. A membrane curing in these cases will be most convenient.
7. On receiving approval of the engineer-in-charge the exposed concrete surfaces of substructure and superstructure above well cap shall be finished with two coats of cement based paint of approved shade and quality.

**2.30 PRE-CAST CONCRETE**

All aforesaid specifications for concrete shall apply to precast concrete in addition to the following variations.

The concrete in one precast piece shall be placed in one operation. No piece shall be removed from the mould or erected until sufficiently matured to ensure that no damage shall be done to the piece.

All details of jointing, inserts, anchors and bearing widths shall be as shown on the drawings.

All precast concrete members shall be clearly marked to indicate the top of the member and its location.

Units shall be stored, transported and placed with due care so that they will not be overstressed or damaged.

Precast units shall be adequately braced and supported during erection to ensure proper alignment and safety, and such bracings and supports shall be maintained until there are adequate permanent connections.

**2.31 PLUM CONCRETE COURSE**

The unevenness in the founding strata shall be leveled using plum concrete. The pockets in the founding strata shall be filled with plain cement concrete of lean mix. Plums above 160mm and upto any reasonable size shall be embedded in the plain cement concrete layer upto a maximum limit of 20 percent by volume of plain concrete when specifically permitted by the Engineer-in-charge. The plums shall be distributed evenly and shall be not closer than 150mm from the surface.

**2.32 LEVELING COURSE**

It shall be plain cement concrete of leaner mix which shall be proportional as stipulated and placed in position conforming to line and level shown on the drawing and compacted by approved means and cured.

**2.33 SUPERVISION**

Constant and strict supervision at all items of the construction is necessary during the progress of the work, including the proportioning and mixing of the concrete. Supervision is also of extreme importance to check the reinforcement and its placing before being covered. Before any important operations, such as concreting or striking off the formwork is started, notice shall be given to the Engineer-in-charge.

**2.34** **FORMWORK**

The Form work shall be designed for rigidity and durability, strength, water tightness, easy removal, surface finish required for concrete in contract with shuttering and economy.

Material used in form work shall be 12mm thick film faced shuttering plywood's, steel props, steel plates, or specially designed and manufactured moulds out of plastic or reinforced fiber glass or steel.

Use shall depend upon its location, type of finish specified subject to acceptability by EIC. Form work designed with proposed material in use should be able to retain its shape, lines, and dimensions, shown in the drawings. It should safely carry the full load of concrete self weight, reinforcement weight together with any live and impact load likely to occur during concreting.

Material used shall conform to relevant IS codes. It is the contractor’s responsibility to entirely achieve the standard expected to the satisfaction of the EIC.

**2.34.1 Workmanship**

Erection of form work may be from pre-molded, pre-fabricated, pre-assembled plates or forms reasonable enough to transport and erect at site to correct line and level as set out at site. Supports shall be firm and maintained in position by nails, cross bracings, tie rods, locking bolts and nuts. It shall be rigid and stiff so as to retain its shape during and after concreting.

Joints shall be water tight and no cement slurry shall be allowed to slip through.

Pre-fabricated or site fabricated forms shall be assembled, so as to deshutter without any jerk to the green concrete. For this double wedges shall be used. Wedges shall be nailed, the heads reasonably left out, allowing easy removal while deshuttering.

Pre-fabricated or site fabricated forms shall be of sufficient thickness and with the required supporting runners in either direction. Supporting runners shall be standardized in size for easy replacement and universal use at site.

Props shall be of steel only. Size and vertically shall be approved by the EIC. Its spacing shall be as per design. It shall be vertical and plumbed. Base shall be a proper steel plate or timber plank, for equal distribution of load. The concreting of the upper floor shall be done only after 14 days of concreting of lower floor.

Beams and slabs shall have camber of 4mm per meter or as directed by the EIC.

All angles and corners shall be sharp and well defined in places where concrete edges are permanently exposed and require no further treatment; they shall be chamfered in a triangle of 25 x 25mm. Props of steel or timber shall be provided with adequate horizontal and cross-bracing. Steel props shall use steel pipes and steel couplers. If use of timber is permitted, planks of 100 x 25 mm shall be used and shall be secured by nailing them to timber props. No other material shall be permitted.

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

a) Openings for cleaning prior to start of concreting.

1. Pouring points shall avoid high drops and provide easy access to vibrator Needles. Surfaces shall

be treated with mould releasing oil or emulsion as approved by the EIC prior to reinforcement laying.

The following points shall be observed very carefully:

1. Joints of moulds shall be water-tight. It is easy to check from the bottom

And make sure that no light is visible.

1. Props shall be on solid base, plumbed, in one straight line and braced

Horizontally and cross.

1. Tie bars in beams, walls and columns shall be at the correct place and fully

tight.

1. Wedges shall be fully secured and nailed with heads left out for easy

removal.

1. All saw dust, dirt, shavings and any other unwanted materials shall be

Cleaned and hosed out.

1. Provisions shall be made for watching form work while concreting and any

Other platform needed for movement of workers without any disturbance of reinforcement.

Form work shall be erected in accordance with:

a) IS 3696 safety code of scaffolds and ladders

1. IS 4014 code of practice for steel tubular scaffolding I and II Part - 2

Safety regulation for scaffolding.

c) IS 8989 safety code for erection of concrete framed structures.

**2.34.2 Special Fair Faced Finish**

Where special fair faced finish is specified, the contractor shall be responsible for producing a perfectly smooth surface to the concrete, free from projections or imperfections of any description. Arises must be clean, sharp and perfectly sound. The form work must be designed so that it can be erected and maintained perfectly plumb and all surfaces must be true planes free from winding or other deformities throughout. Tieing wires through the concrete to hold the form work together will not be permitted and either exterior bracing or through bolts are to be employed. If the latter are used the bolts shall subsequently be removed and the holes plugged with cement mortar. The pattern of holes has to be to the approval of the Engineer-in-charge. No part of any metal tie or spacer remaining permanently embedded in the concrete shall be nearer than 50mm to the finished surface of the concrete. Concrete faces must be protected at all times during and after construction against accidental damage or disfiguration and the contractor will be responsible for taking all necessary measures to ensure that the work is perfectly sound and free from blemishes, stains, etc., when finally handed over.

**2.34.3 Removal of Formwork**

Under normal circumstances and where O.P. Cement is used, forms shall be removed after expiry of the following periods. As per IS 456-2000

a) Walls, columns and vertical faces - 24 to 48 hours

b) Slabs (props left under) - 3 days

c) Beams-soffits (props left under) - 7 days

d) Removal of props under slabs

 i) Spanning upto 4.5 M - 7 days

 ii) Spanning over 4.5 M - 14 days

e) Removal of props under beams and arches

 i) Spanning upto 6 M - 14 days

 ii) Spanning over 6 M - 21 days

For other cements, the stripping time shall be suitably modified in consultation with the EIC.

Where the shape of elements is such that the form work has re-entrant angles, the form work shall be removed as soon as possible after the concrete has set, to avoid shrinkage or cracking that might occur due to the restraint imposed. For precast moulds, the stripping time shall be 24 hours. The mould may be lifted and stored in the yard within 24 hours to 48 hours as approved by the EIC.

**2.34.4 Openings/Inserts**

All required openings and pockets shall be provided as detailed in the drawing. They may be enumerated or paid on area basis as detailed in the BOQ. The contractor shall provide for the required material, labour, for fixing and supporting during concreting, in his quoted price. It is imperative that all openings and pockets shall be deshuttered with care and all corners of openings shall be preserved. All openings/pockets shall be in a correct line and level. After concreting, the openings shall be secured against any accident by proper covering and guard-rail and warning notice, if any.

The contractor shall clean and grout the pocket at a later date with a non-shrinking compound added to the grout mix or non-shrinking cement shall be used. It shall be well-cured and protected to correct line and level till handing over.

Inserts are material such as timber, steel, plastic, dowels, bolts, locks, brackets, pipes etc. left in concrete partly or fully embedded to receive connection with foreign member at a later date. These may be fabricated by the contractor or provided by the owner as received from specialist, manufacturer, etc. These shall be protected from weathering and damage in course of the construction. The cleaning required after concerting and any treatment such as oiling, greasing or covering with paint etc., shall be carried out by the contractor at his cost.

It is very important that the providing and fixing as contemplated in the BOQ shall be carried out with the “utmost precision” and to the entire satisfaction of the EIC. Any deviation from that as shown in the drawings or instructions shall be rectified by the contractor at his own cost and responsibility.

**2.35 Preparation of formwork before concreting**

**2.35.1 Special provision**

Wherever the concreting in narrow members is required to be carried out within shutters of considerable depth, temporary openings in the sides of the shutters shall, if so directed by the engineer-in-charge, be provided to facilitate the pouring and consolidation of the concrete. Small temporary openings shall be provided as necessary at the bottom of shutters of walls and deep beams to permit the expulsion of rubbish, etc.

**2.35.2 Discoloration**

Formation of blotches and stains due to detachment of form work panel from the concrete when adjacent portion to the same lift is still adhering, shall not be allowed to occur, and for this purpose, all shutters shall be struck off at the same time.

###### **SECTION - 3**

1. **STONE MASONRY Deleted**

###### **SECTION - 4**

1. **BRICK WORK:**

4.1 The following I.S. apply to this section:

|  |  |
| --- | --- |
| I.S. NO. | SUBJECT |
| 1077-1986 | Specification for common burnt clay building Bricks. |
| 1905-1980 | Code of practice for structural safety of building masonry wall (Second Revision) |
| 2116-1980 | Specification of sand for masonry mortar (First Revision) |
| 5454 - 1978 | Method of sampling of clay building Bricks (First Revision) |
| 2250 | Code of practice for preparation and use of masonry cement. |

**MATERIALS:**

**4.2 CEMENT**:

Cement shall be of ordinary Portland cement, Portland blast furnace slag cement or pozzolona cement as specified.

**4.3 SAND FOR MASONRY MORTAR:**

Unless otherwise indicated sand for masonry mortar shall consists of natural sand, crushed stone sand or crushed gravel sand or the combination of any of these conforming to I.S. 2160 – 1980 specification for sand for masonry mortar. Sand shall be hard, durable, clean and free from adherent coating and shall not contain clay and impurities such as iron, pyrates, salt, coal, mica, Shale or similar laminated or other materials.

The maximum quantity of clay, fine silt and fine dust in sand shall not be more than 5% by mass. Organic impurities shall be below that the obtained by comparison with a standard solution.

**4.4 COMMON BURNT CLAY BUILDING BRICKS**:

Common burnt clay building bricks (hereinafter termed as “Bricks”) shall conform to the requirement laid down in I.S. 1077 – 1986, specification for common burnt clay building Bricks. The class of Bricks, based on minimum compressive strength, 35, 50, 75, 100 or 125 and their sub class A or B shall be indicated. Sub class A bricks shall have smooth rectangle faces with sharp 0corners and shall be uniform in colour.

**(a) Dimensions:**

Size of standard Bricks shall be as under;

|  |  |  |
| --- | --- | --- |
| TYPE OF BRICKS | NOMINAL SIZE | ACTUAL SIZE |
| Modular Bricks | 20x10x10 cms | 19 x 9 x 9 cms |
| Old size Bricks (FPS) | 9x4.5x3 inches OR 21x 11.5 x 7.5 cms | 9x4 3/8 x 2 ¾ inch |

**(b)** **Tolerance:**

The permissible to tolerance on the dimensions of the Bricks unless otherwise indicated, shall be + or – 3% for class A Bricks and + or – 8% sub class B Bricks.

**(c)** **General Quality**:

Bricks may be hand or machine moulded and shall be made from suitable soils. `They shall be free from cracks, flows and nodules of free line. Bricks of 7.5 cms, 10 cms thickness (height) shall be moulded with frog 1 to 2 cms deep on one of its flat surface.

**(d) Compressive Strength**:

The compressive strength of individual Bricks shall not fall below the minimum average compressive strength specified for class of Bricks by more than Twenty percent.

**(e) Water Absorption**:

The average water absorption of Bricks, after immersion in cold water for 24 hours shall not be more than Twenty percent (for Bricks upto Class 125).

**(f) Efflorescence**:

The rating of Efflorescence of the Bricks shall not be more than moderate (for Bricks Class 125).

**4.4.1 Handling and Storage**:

Bricks shall not be dumped at site, they shall be stacked in regular tiers on even ground as they are unloaded to minimize breakage and defacement of Bricks, Bricks stacked for facing and any particular purpose/situation of use shall be stacked separately.

**4.5 MASONRY MORTARS**:

**(a) Proportioning**:

Mortar should be of the mix as indicated, the mix specified by volume in proportion of cement to dry sand.

**(b) Preparation of Cement Mortar**:

Mixing should be done preferably in mechanical mixer. If hand mixing operation shall be carried on a clean water tight platform. Cement and sand shall be mixed dry in the required proportion to be obtained a Uniform colour. The required quantity of water shall then be added and the mortar hoed back and forth for 5 to 10 minutes with addition of water to a workable consistency. In the case of mechanical mixing the mortar shall be mixed for at least three minutes after addition of water. Cement mortar should be freshly mixed for immediate use. Any mortar which has commenced to set shall be discarded and removed from the site.

**4.6 SETTING OUT:**

All Brick work shall be set out and built to the respective dimensions, thickness and height as indicated.

**4.7 SCAFFOLDING**:

Scaffolding shall be strong to withstand all dead, live and impact loads which are likely to come on that. Scaffolding shall provided to allow easy approach to every part of work, overhead work shall not be allowed. For exposed brick facing double scaffolding having two sets of vertical supports shall be provided. For brick work which is to be plastered over, single scaffolding may be provided. In single scaffolding one end of put logs shall rest in the hole provided in the header course of brick masonry. Not more than one header for each put long shall be left out. Such hole shall not be allowed in the case of pillar or narrow masonry portions, between the openings, which are less than 1 M in width or are immediately under or near the structural member supported by the walls. The holes left shall be made good on removal of scaffolding to match with the face work/surrounding area.

**4.8 SOAKING OF BRICKS**:

Bricks shall be soaked in water before use for a period for the water to just penetrate the whole depth of bricks. The alternatively bricks can be soaked in stacks by profusely spraying with clean water on regular intervals for a period not less than six hours.

**4.9 LAYING**:

All loose materials, dirt and set lumps of materials which may be laying over the surface on which brick work is to be freshly started shall be removed with wire brush and surface wetted slightly. Brick shall be laid on a fully bed of mortar. When laying, the Brick shall be properly bedded and slightly pressed with handle of trowel, so that the mortar can get into all pores of the brick surface to ensure proper adhesion. All the joints should be properly flushed and packed with mortar, so that no hollow spaces are left. Care shall be taken to see that the required quantity of water is added to the mortar at the mixing platform to obtain required consistency. Addition of water during laying of course shall not be permitted. In the case of walls two brick thick and over, the joints shall be grouted to every course in addition to bedding and flushing with mortar.

 While using old size bricks, (FPS conventional bricks) top courses of plinth, parapet, steps and top of walls below roof slab or floor slab shall be laid on brick on edge, applicable in case of additional bricks unless directed otherwise. Care shall be taken that Brick forming top courses and ends of wall are properly keyed into position.

 Brick shall be laid frog up however, when the top course is exposed, brick shall be laid with frog down, and care shall be taken to fill the frogs with before embedding the bricks in position.

All quoins shall accurately constructed and the height of course checked with storey rods as the work proceeds. Acute and abuts quoins shall be bonded. Where practicable, in the same way as square quoins, abuts quoins shall be formed with squint showing a three quarter brick on one face and quarter brick on the other.

**4.10 BOND**:

All brick work shall be built in English bond, unless otherwise indicated, half brick wall shall be built in stretcher bond. Header bond shall be used for walls curved on plan for better alignment. Header bond shall also be used in foundation footings, stretcher may be used when the thickness of wall render use of header impracticable. When the thickness of footings is uniform for the number of course, the top course of the footing shall be header. Half or cut bricks shall not be used except where necessary to complete the bond.

Overlap in stretcher bond is usually half brick and is obtained by commencing each alternate course with the half brick. The overlap of the header bond which is usually half the width of the brick is obtained by introducing three quarter brick, in each alternate course at quoins, in general, the cross joints in any course of brick work shall not be nearer than quarter of the brick length, from these in the course below or above it.

**4.11 UNIFORMITY**:

The Brick work shall be built, in uniform layers, corners and other advance work shall be raked back. No part of the wall during its construction shall rise more than one meter above the general construction level, to avoid unequal settlement. Part of wall left at different levels shall be properly raked back. Too-thing may be done where future construction is contemplated, but shall not be used alternative to raking back.

 For half brick partition to be keyed into main walls, indents shall be left in the main walls.

**4.12 ALIGNMENTS AND PERPENDS**:

The wall shall be taken truly plumb, or true to required batter, where specified. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in alternate course directly one over the other. (Quoins, jambs) and other angles shall be properly plumbed as the work proceeds. The maximum permissible tolerance in masonry shall be as under.

1. Deviation from vertical within a storey per 3 M height – 6 mm
2. Deviation from vertical in total height of building – 12.5 mm
3. Deviation of bed joints from horizontal.

i) In any length up to 12 M - 6 mm

ii) In any length over 12 M - 12.5 mm total

**4.13 THICKNESS OF JOINTS**:

Thickness of joints be such that four courses and three joints shall be taken consecutively shall measure as follows unless and otherwise specified.

1. Old size brick – equal to four lines the actual thickness plus 4 cms.
2. Modular brick – equal to 39 cms

**4.14 STRIKING JOINTS**:

Where no pointing, plastering or other finish is indicated, the green mortar shall be neatly struck flush, where pointing, plastering or other finishes indicated, the joint shall be raked out to a depth of not less than 10 mm for plastering and 15 mm for pointing.

**4.15 PROTECTION AGAINST DAMAGE**:

Care shall be taken during the construction the edges of jambs, cills, heads etc., are not damaged. In inclement weather, newly built work shall be covered with gunny bags or tarpaulins, so as to prevent the mortar from being washed away.

**4.16 CURING**:

The Brick work shall be constantly kept wet for at least seven days.

**4.17 FACING**:

In the case of walls of one brick thick and under at least one face shall be kept even and in proper plane, while the other face may be slightly rough. In the case of walls more than one brick thick, both the faces shall be kept even and in proper plane.

**4.18 CLEANING**:

Face of the brick work shall be cleaned on the same day it is laid and all mortar droppings removed.

**4.19 HALF BRICK MASONRY**:

 Half brick masonry walls shall be provided with PCC 1:3:6, 75 mm thick band reinforced with 2 Nos, 8 mm tor steel rods at every 5th course for the full length of wall.

* 1. **MODE OF MEASUREMENT:**

All brick work shall be measured in cubic meters. Architectural coping shall be measured in linear meters. The rate shall include cost of all labour, T&P, scaffolding etc. The rate shall also include full compensation for using specially moulded bricks on the face of walls and provision of weep holes where necessary.

###### **SECTION – 5**

**5.0 CONCRETE WORKS - CONCRETE MASONRY UNITS SOLID LIGHT WEIGHT CONCRETE BLOCKS**

###### **Deleted**

###### **SECTION - 6**

**6.0 PLASTERING**:

**6.1 INDIAN STANDARDS**:

The following I.S. applies to the section:

|  |  |
| --- | --- |
| I.S. NO. | SUBJECT |
| 1542 - 1977 | Specification for sand for plaster (First Revision) |

**MATERIALS:**

**6.2 CEMENT:**

Cement shall be ordinary port land cement or port land blast furnace cement or port land pozolona cement as specified.

**6.3 SAND:**

Sand for plastering shall conform to I.S. 1542 – 1977: Specification for sand for plaster. Sand shall consist of natural sand, except where crushed stone sand or crushed gravel sand or combination of any of these indicated. The sand shall be hard, durable, clean and free from adherent coating and organic matter and shall not contain appreciable amount of clay balls, sand shall be obtained from approved sources.

 Sand shall not contain any harmful impurities, such as iron pyrites, alkalis, salts, coal, mica shale or similar laminated materials, soft fragments, sea shells and organic impurities in such quantities as to affect adversely the hardening, the strength and durability or the appearance of plaster or applied decoration or to cause corrosion of metal lathing, or other metal in contact with plaster. The maximum quantity of clay, fine silt, stone dust shall not be more than 5 percent by weight.

 The particle size, grading of sand for plaster work shall be as under, unless otherwise specified to conform to the sample maintained by the Engineer-in-Charge.

|  |  |
| --- | --- |
| IS SIEVE DESIGNATION  | PERCENTAGE PASSING BY WEIGHT |
| 10 mm | 100 |
| 4.75 mm | 95 – 100 |
| 2.36 mm | 95 – 100 |
| 1.18 mm | 90 – 100 |
| 600 Microns | 80 – 100 |
| 300 Microns | 20 – 65 |
| 150 Microns | 0 – 5 |

**6.4 WATER:**

Water is used for mixing and curing shall be clean, free from deleterious matter and

also from unusual proportion of dissolved salts. Sea water or tidal astuary or brackish water shall not be used. Water fit for drinking is normally suitable.

**WORKMANSHIP**:

**6.5 SCAFFOLDING**:

Where possible independent scaffolding shall be used to obviate the subsequent restoration of masonry in put log and other breaks in the work. Stage scaffolding shall be provided for ceiling plastering.

**6.6 CEMENT MORTAR**:

Mortar should be of the mix as indicated, the mix specified by volume in proportion of dry cement and dry sand.

**6.7 PREPARATION OF CEMENT MORTAR**:

Mixing should be done preferably mechanical mixer. If hand mixing operation shall be carried on a clean water tight platform. Cement and Sand shall be mixed dry in the required proportion to obtain uniform colour. The required quantity of colour shall then be added and the mortar hoed back and forth five to ten minutes with addition of water to a workable consistency. In the case of mechanical mixing the mortar shall be mixed for at least three minutes after addition of water. The cement mortar freshly mixed for immediate use. Any mortar which has commenced to set shall be discarded and removed from the site.

 **6.8 PREPARATION OF BACK GROUND FOR APPLICATION OF MORTAR:**

 All dirt, dust and other foreign matter all masonry and laitance on the concrete surface shall be removed by watering and brushing as required. If the back ground contains soluble salts, particularly sulphates, the application of plaster shall be done one after the efflorescence of the salts is complete and efflorescence is completely remove from the surface. Any trace of Algae or Moss formation shall be removed. Joints in brick work shall be raked out to a depth not less than 10 mm as your proceeds, local projections in brick work beyond the general wall face shall be trimmed off where necessary.

**6.9 ROUGHNESS**:

Smooth surface of in situ concrete walls and ceiling etc., shall be roughened by wire brushing, if it is not hard, and by hacking or bush hammering if it is hard, to provide for proper adhesion. Projecting burrs of mortar because of gaps at joints in shuttering shall be removed. Surface shall be kept clean with wire brushes, in addition concrete surface shall be pock marked with a pointed tool at facing of about 50 mm the pocks made to be not less than 3 mm deep.

**6.10 SUCTION ADJUSTMENTS**:

Adequate drying intervals shall be allowed between the erection and plastering to bring the surface suitable form suction adjustment. High rate of suction makes the plaster, weak, pours and friable. The wall shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry in spots such areas shall be moistened again to restore uniform suction. Excessive water leads to failure of bond between the plaster and back ground.

**6.11 EVENNESS**:

Any local unevenness must be leveled and projections removed to avoid variance in thickness of plaster.

**6.12 IMMOBILITY**:

Differential movements between the back ground and the plaster due to moisture change, temperature change, structural settlement, deflection etc., cause cracks. The major part of such movements shall be allowed to set in before the plaster is applied.

**6.13 PRECAUTION AGAINST DISCONTINUITY IN BACK GROUND**:

All straight cut groove through the plaster at the junction of wall to ceiling may be provided where directed.

Holes left in the wall after removing scaffolding, shall be filled up with respective masonry and the patch plaster up true and in conformity with rest of the wall so that no sign of patch work shows out.

 **6.14 PLASTERING**:

The type and mix of water for plastering, the number of coats to be applied, and surface finished of the plaster and the back ground to which the plaster is to be applied shall be as indicated.

 The mortar for dubbing out and rendering coat shall be of the same type and mix. Dubbing out may be executed as a separate coat or along with the rendering coat.

 Plastering operation shall not be started until all necessary fixtures such as doors and window frames, mantle pieces or completed and all pipes and conduits to be embedded have been installed and surfaces to be plastered have been passed by Engineer-in-Charge.

**6.15 PROTECTION**:

All existing work and fittings that are likely to be damaged in the application of plastering shall be protected. Care shall be taken to avoid, as far as possible, the splashing of mortar on to the finish surfaces such as joinery, paint work and glazing, all such splashes shall be cleaned off immediately.

 Screeds 15x15 cms shall be laid vertically and horizontally not more than 2 M apart to serve as guides in bringing the work to an even surface.

 Plastering shall be done from top to bottom and care shall be taken to avoid joints in continuous surface.

**6.16 MAINTENANCE OF PROPER TIME INTERVALS**:

To avoid breakdown of adhesion between successive course, drying shrinkage of first coat shall be allowed to be materially completed before a subsequent coat is applied.

 All corners, arises angles, junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering of corners, arises and junctions shall be carried out with proper templates to the required size. Plastering of cornices, decorate feature, etc. Shall normally be completed before the finishing coat is applied.

 In suspending the work at the end of the day, the plaster shall be cut clean to the line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scraped clean and wetted with cement slurry before plaster is applied to the adjacent area.

Partially set and dried mortar shall be not be re-tampered for use.

* 1. **CLEANING ON COMPLETION:**

On completion of work affected by plastering shall be left clean, special care shall be taken while removing any set mortar from glass and joinery, etc., to avoid damaging their surface.

* 1. **TRUENESS OF PLASTERING SYSTEM:**

 The finished plaster surface shall not show any deviation more than 4 mm when checked with straight edge of 2 m length placed against the surface.

* 1. **ONE COAT PLASTER WORK:**

Mortar shall be firmly applied to masonry walls and well pressed into the joints and forcing into surface depression to obtain a permanent bond. The plaster shall be laid in a little more than the required thickness and leveled with wooden float. On concrete walls, rendering shall be dashed on to the roughened surface to ensure adequate bond. The dashing of rendering coat shall be done using a strong whipping motion at right angles to the face of walls. The surface shall be finished even and fair, unless indicated to be finished even and smooth.

The surface of the dubbing out, if carried out separately, shall be left rough or scored to provide key for the plaster coat.

* 1. **TWO COAT PLASTER WORK:**

**First Coat:**

 The first coat of specified thickness shall be applied in a manner similar to one coat plaster work. Before the first coat hardens, the surface of cement plaster shall be scored to provide key for second coat. The rendering coat shall be kept damp for at least two days. It shall then be allowed to become thoroughly dry.

**Second Coat:**

Before starting to apply second coat, the surface of the rendering coat shall be damped evenly. The second coat shall be completed to the specified thickness in exactly the same manner as the one coat plaster work.

* 1. **WATER PROOFING PLASTER:**

 Integral water proofing compound shall be mixed with cement in proportion indicated by weight. Care shall be taken to ensure water proofing material gets well and integrally mixed with cement.

* 1. **CURING:**

 Each coat shall be kept damp continuously for at least two days. Moistening shall commence as soon as the plaster has hardened sufficiently and is not susceptible to injury. The water shall be applied preferably by using a fine fog spray. Soaking of wall shall be avoided and only as much water as can be readily absorbed shall be used. Excessive vaporization on the sunny or wind word side of buildings in hot dry weather shall prevented by hanging matting or gunny bags on the outside of the plaster and keeping them wet.

**6.23 NEERU FINISH ( Neat Coat) :**

After applying and finishing the under coats i.e., (under coat + floating coat) as described, and before they set, the finishing coat shall be applied to a thickness of not more than 1.5 mm with specially prepared lime putty i.e., Neeru to which about 5 percent cement has been added.

It shall then be well polished with trowel. While trowelling is going on, soat stone powder contained in thin muslin bags shall be dusted over the surface and worked in.

When the surface of outer walls is to be treated with sunk or grooved line works like squares or rectangles, by drawing vertical and / or horizontal lines at intervals, such lines (which may be V-grooved or U-shaped) shall be marked on the floating coat when it is not yet set and neatly finished off in the finishing coat with a wood lath having an edge of requisite thickness and slope on one of its sides.

NOTE: In each case the finishing done shall be uniform all over the surface and to the entire satisfaction of the Engineer-in-Charge. A sample of considerable area shall be first made in consolation with the Engineer-in-Charge and shall be got approved before starting the work.

* 1. **CURING:**

Moistening shall be commenced as soon as the plaster has hardened sufficiently and is not susceptible to injury. Soaking of wall shall be avoided and only as much water as can be readily

absorbed shall be used.

All plaster work shall be kept damp continuously for a period of 14 days. To prevent excessive evaporation on the sunny or wind ward side of the buildings in hot, dry weather, matting or gunny bags may be hung over on the out side of the plaster in the beginning and kept moist. Should the mortar of the plaster perish through neglect of watering or for any other default and if the work is not done as specified above, the plaster shall be removed and redone at the contractor’s expenses.

**6.25 MODE OF MEASUREMENT AND PAYMENT**:

If the average thickness of plaster provided by the contractor is more than what is specified on any account, no extra payment will be made for the same.

The quoted rate shall be per Sq.m and shall include:

1. Erecting, dismantling and removing the scaffolding.
2. Preparing the surface to receive the plaster.
3. Providing cement plaster with specified finish and specified thickness.
4. All labour, materials, use of tools and equipment to complete the plastering as per specification.
5. Curing for 14 days.
6. Any grooves, bands, etc., if shown on the drawings or as directed by the Engineer-in-Charge.
7. All lifts and leads.
8. All wooden frames, steel frames or other fixtures, which are required to be painted or polished subsequently shall be cleaned after the plastering work is completed.

Measurements shall be based on area of plastered surfaces and the rate shall be per Sq.m. of this area.

For openings, the following principles shall apply:

1. Area of opening less than 0.5 Sq.m. No deductions shall be made for the opening and no additions shall be made for reveals, jambs, soffits, sills etc.
2. Area of opening between 0.5 Sq.mm and 3 Sq.mm: No additions shall be made for reveals, jambs, soffits, sills, etc., and deductions shall be as follows;

i) When only one face is plastered, no deductions shall be made.

ii) When both faces are plastered to the same finish, deductions shall be made for one face only.

iii) When the two faces are plastered with different finishes deductions shall be made for that face on which the width of reveal is less, but no deduction shall be made on the other side.

1. Area of opening greater than 3 Sq.m: Deduction shall be made for the actual opening and reveals, jambs, soffits sills etc., shall be separately measured and paid.

The quoted rate shall include supply of all materials, labour, scaffolding, plant and equipment, tools and tackle and all other work incidental to the completion of this item as per these specifications and all lead and lifts.

###### **SECTION - 7**

1. **FLOOR FINISHES:**

**7.1 INDIAN STANDARDS:**

The following I.S. apply to this section;

|  |  |
| --- | --- |
| I.S. NO. | SUBJECT |
| 777 - 1970 | Specification for glazed earthen ware tiles (First Revision with Amendment No. 1) |
| 1237 - 1980 | Specification for cement concrete flooring tiles (First Revision) |
| 4557 - 1982 | Specification for ceramic unglazed, vitreous acid resistant tiles (First Revision) |
| 8042 - 1978 | Specification for white port land cement  |
| 5491 | Code of Practice for laying in situ granolithic concrete floor topping. |

**7.2** **MATERIALS:**

**7.2.1 Cement:** Cement shall be ordinary port land cement conforming to I.S. 269 – 1976.

 **7.2.2 White Cement:** White cement shall conform to 8042 – 1978 specification for white port land cement.

**7.2.3 Aggregates:**

 Coarse and fine aggregate and cement concrete and granolithic concrete shall conform to I.S. 383 – 1970.

 Aggregate for granolithic concrete shall consist of crushed granite, basalt, trap quartzite. The aggregate crushing value shall not exceed 30 percent. The grading of aggregate shall be as given below.

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 IS sieve Designation Percentage by weight passing IS sieve

 Coarse aggregate Fine aggregate

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 Zone I Zone II

………………………………………………………………………………………………………………..

12.5 90 to 100

10 40 to 85 90 to 100 90 to 100

4.75 0 to 10 60 to 95 75 to 100

2.36 30 to 70 55 to 90

1.18 30 to 70 55 to 90

600 Micron 15 to 34 35 to 39

300 Micron 5 to 20 8 to 30

150 Micron 0 to 10 0 to 10

…………………………………………………………………………………………………………………

Sand for mortar for laying slabs/ tiles shall conform to I.S. 2116 – 1980.

***7.3* CEMENT CONCRETE FLOORING (CAST INSITU) GRANOLITHIC CONCRETE FLOOR***:*

**7.3.1** The proportion of the granolithic concrete floor topping shall be 1:1:2 (cement, fine aggregate, Coarse aggregate) by volume mixing, laying, finishing and curing etc., shall be carried out as specified.

**7.3.2 Size Of Panels**:

The floor topping shall be divided into suitable panels. Size panel is governed by the thickness of floor finish, the type of construction, local condition of temperature, humidity and the season in which flooring is laid. Generally no dimension of panel shall exceed 4 M in case of floor topping laid monolithically with the base concrete, and 2 M in case of floor topping laid separately on a hardened base. In case of ground floor, topping panel may synchronize with that of the base concrete. Length of a panel shall not exceed one and half a time its breadth. The exact dimensions of the panels shall be as directed by the Engineer-in-Charge.

***7.3.3*****Form Work To Sides Of Concrete Flooring:**

 Form shall be provided as specified, where glass or aluminum dividing strips are provided form work may not be provided. The boarding/ battens shall be fixed in position with their top at proper level, giving slope where require. The flooring shall butt against the masonry of the wall. Before being laid in position, the form or screed strips shall preferably coated with thick coat of lime wash.

***7.3.4* Joints**:

Construction joints between base of the floor finish need only be plain, untreated vertical butt joints and shall be placed over any joint in the base.

**7.3.5 Laying the Topping**:

 The surface of base concrete shall be thoroughly cleaned of all dirt, loose particles, caked mortar droppings and laitance, if any, by scrubbing with coir or steel wire brush. Where the concrete has hardened so much that roughening of surface by wire brush is not possible, the entire surface shall be roughened by chipping or hacking. Before laying the topping, the surface shall be soaked with water at least for twelve hours and surplus water shall be removed by mopping immediately before the topping is laid in position.

The form shall be fixed over the base concrete dividing it into suitable panels. Before placing the concrete mix for topping, neat cement slurry at the rate of 3 Kg/Sqm shall be thoroughly brushed into the prepared surface of the base concrete just ahead of the finish. The topping then shall be laid, thoroughly tamped or vibrated, the surface floated with wooden float to a fair and even surface. The surface shall be tested and finished and specified.

**7.3.6 Finishing the Surface Fair Smooth:**

Where an even smooth surface is indicated, the surface, after being floated with a wooden or steel float, shall be finished with a steel trowel. Finishing operations shall start shortly after the compaction of concrete and shall be spread over the period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be trowel three times at intervals so as to produce a uniform, hard and close knit surface. Immediately after laying, only just sufficient trowelling shall be done to give a level surface. Excessive trowelling in the earlier stages shall be avoided as this tends to work a layer rich in cement to the surface. Some times after the first trowelling and after duration depending upon the temperature and atmospheric conditions, the surface shall be retro welled to close in pores in the surface, and to bring to surface and scrap of any excess water in concrete laitance (it shall not be trowel led back into the topping). The final trowelling shall be done well before the concrete has become too hard but at such a time the considerable pressure to make any impression on the surface. Spreading and trowelling of a rich mix of dry cement and fine aggregate on the surface shall not be permitted.

 Where the surface is to be finished with steel trowel using extra cement, it shall be clearly indicated.

***7.4* VACUUM DEWATERING METHOD AND POWER TROWELLING METHOD WITH SKIM FLOTTER FINISH TO CONCRETE FLOORING**:

**7.4.1** Cement concrete shall be laid between steel forms acting as a stop end and also rail to be used for surface vibration. The preparation and laying of concrete all as per Para 3.4.5 &3.4.6 . Thickness and mix of the concrete as indicated.

**7.4.2** The concrete thus laid shall be vibrated with poker vibrator. During poker vibration, proper compaction of coarse aggregate, fine aggregate and cement shall be obtained. The surface will be then finished in level with the help of surface vibrator to give a dense level surface of concrete.

**7.4.3** Vacuum de-watering method will be used to remove excess water from the laid concrete and filter pad and suction mat shall be laid on the freshly laid concrete which will not allow cement paste to flow out, and the suction pump are then started immediately to remove the excess water. The suction time normally is 20 to 30 minutes. This vacuum process will enable to remove 15 to 25 percent of water content and making the surface hard enough to enable to carry the floating operation.

**7.4.4** The top surface of the removal of the mat shall be floated with a mechanical skim floater with trowelling blade to enable the top surface to grind and give a uniform water resistance surface on top. Under no circumstances neat cement be sprinkled directly on concrete surface to absorb bleed water as surface scaling may occur later. Similarly water should not be applied between trowelling operation as it may cause surface weakness. Minimum two passes shall be carried out.

***7.5* CURING**:

* + 1. Immediately after the flooring surface is finished, it shall be protected from rapid drying and strong sun light. As soon as the surface has hardened sufficiently to prevent damage to it, it shall be kept continuously moist for at least 15 days by means of wet gunny bags or 50 mm thick layers of damp sand spread over the surface or pooling water on the surface. During this period the flooring shall not be exposed to any traffic. Regular traffic on the floor shall be allowed only after 28 days.

**7.5.2 Mode of Measurement:**

Flooring shall be measured in square meter basis (m2) length and breadth shall be measured between the finished faces of skirting, dado or wall plaster as the case may be correct to a cm. No deduction shall be made up to 0.050 Sqm. No extra shall be paid for laying the floor at different levels.

Skirting shall be paid on running meter basis and shall be measured not between the finished faces. The rate shall include cost of all materials and labour and shuttering involved in the operations described above.

**7.6 GLAZED EARTHENWARE/TILES/CERAMIC TILE FLOORING, DADO AND SKIRTING***:*

**7.6.1** Glazed earthenware tile shall conform to I.S. 777-1970, specification for glazed earthenware tiles. When fractured they shall appear fine grained in texture, dense and homogeneous. The tile shall be flat true to shape, sound and free from flaws and other manufacturing defects. The top surface of the tiles shall be glazed. The under side of the tiles shall be free from glaze in order that the tiles may adhere properly to the base. The sides of the tiles shall be preferably free from glaze, if unavoidable, glaze shall be permitted provided that number of edges with complete glaze is not more than one and glaze present in remaining three edges not exceed 15 percent of the surface are of the edge. The glaze shall be uniform in quality and shall be free from welts, chips, craze, specks, crawling or other imperfections, detracting from appearance when viewed at a distance of one meter. The glaze shall be glossy or matt, as directed and white in colour except in the case of coloured tiles when the tint, shade and finish shall be as indicated. Tiles shall be of sizes and thicknesses as indicated.

 IS – 1443: Laying and finishing of C.C. flooring tiles.

**7.6.2 Tolerances***:*

 **Facial dimensions**: The length of all the four sides of tiles shall be measured to the nearest 0.1 mm. The average value shall not vary more than + or – 0.8 mm from the dimension of the nominal size. The variation of the individual dimension from the average value shall not exceed + or – 0.5 mm.

 Tolerance on thickness + or – 0.5 mm.

**7.6.3 Trueness of Shape***:*

**Square ness**: Any variation from right angle in angle contained by any two and joining sides shall be limited, so that if a builder steel square is placed against the angle, the distance between the inner edge of the square and the adjacent side of the tile shall not be more than 0.5 mm per 100 mm.

**7.6.4 War page***:*

The tiles when tested for warp age on the diagonal shall not have warp age exceeding the value specified below.

Size of tile Warp age

 99 x 99 mm + or – 0.5 mm

* 0.3 mm

149 x 149 mm + 0.7 mm

- 0.4 mm

**7.7 PERFORMANCE REQUIREMENT**:

**7.7.1 Water absorption**: The average water absorption of the tile when tested and evaluated shall exceed 18 percent.

**7.7.2 Crazing**: Tiles when tested for crazing shall satisfy the requirement.

**7.7.3 Impact strength**: Tiles when tested for impact strength shall not have a value less than 0.020 Kg fm/cm.

**7.7.4 Chemical Resistance**: When tested the glazed surface of tiles having a white/Cream coloured glossy glaze shall show no deterioration.

**7.8 BEDDING**:

 Bedding over which the glaze tiles shall be laid as indicated and shall not be less than 10 mm at any place. Mix of bedding layer should be as specified. Tiles shall be soaked in **water before laying.**

**7.9 LAYING***:*

Base shall be cleaned and wetted. The bedding shall then be laid evenly over the surface, tamped and corrected to desired levels and allow to harden enough to offer a rigid cushion to tiles. Before laying the tiles, cement slurry of honey like consistency 3 Kg /Sqm shall be applied over the bedding. At a time area to accommodate about 20 tiles shall be applied with cement slurry. Tiles shall then the washed clean and fixed in the grout one after the other. Each tile being gently tapped in its position till it is properly bedded and in level and line with adjoining tiles. The joint shall be as thin as possible but not exceeding 1.5 mm wide.

In the case of skirting and dado, the wall surface shall be covered with about 10 mm thick plaster of cement and sand mortar 1:3 and allow to harden. The plaster shall be roughened with wire brushes or by scratching diagonal lines. The back of the tiles shall be buttered with cement paste and set on bedding mortar. The tiles shall be gently tapped in position one after the other. Top of skirting or dado shall be truly horizontal and the joints vertical or as per required pattern.

**7.10 JOINTING AND FINISHING**:

The joints shall be racked to a depth of 5 mm and all dust and loose mortar removed. Joints shall then be flush pointed in White cement or in coloured cement in the case of coloured tiles. The surface shall be cured for seven days and then wash clean.

7.10.1 **Mode of Measurement**:

Payment will be on Sq.mm. basis. Rate shall include cost of all materials labour and shuttering involved in all the operations.

**7.11 KOTA STONE FLOORING**:

**7.11.1 Stone Slabs***:*

 The slab shall be of selected quality, hard, sound, dense and homogeneous in texture, free from cracks, decay, weathering and flaws. They shall be machine diamond cut to the requisite thickness as indicated and they shall be of uniform colour.

 The slab shall have on top (exposed) face polished before being brought to site. Before starting the work, contractor shall get the samples of slabs approved by Engineer-in-Charge.

**7.11.2 Dressing Of Slabs**:

 Every slab shall be cut to the required size and shape and fine chisel dressed on the sites to the full depth so that a straight edge laid along the side of the stone shall be in full contact with it. The sides (edges) shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges of the slabs shall be true, square and free from chippings and the surface shall be true and plain. **For staircase treads, single piece slab to full length and width of treads shall be provided**. The nosing shall be rounded off and two parallel grooves of ten by ten (10 mm x 10 mm) immediately behind the **nosing edge** shall be provided as per drawing to avoid skidding.

**7.11.3 Preparation of Surface and Laying**:

 Sub grade concrete or the R.C.C. slab on which the slabs are to be laid shall be cleaned, wetted and mopped. The bedding for the slab shall be with cement mortar 1:4 (one cement: four coarse sand). The thickness of the screed shall be as indicated.

 The slabs shall be laid in the following manner;

 Mortar of the specified mix shall be spread under the area of each slab, roughly to the average thickness as indicated. The slab shall be washed and cleaned before laying. It should be laid on top, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid aside. The top surface of the mortar shall then the corrected by adding fresh mortar at hallows. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same at the rate of 4 Kgs of cement per Sqm. The slab to be paved shall be lowered gently back in position bedded in level. Subsequent slab shall be laid in the same manner and joints between adjacent slab shall be thin as possible and run in straight line. After each slab has been laid, surplus cement grout coming out of the joints of slabs shall be cleaned off. The surface of the flooring as laid shall be true to levels, lines and shapes as instructed by Engineer-in-Charge. The slabs shall be matched as shown in drawings or as instructed by the Engineer-in-Charge.

Slabs, which are fixed in the floor adjoining the wall shall enter not less than twelve (12) mm under the plaster, skirting or dado. The junction between wall plaster and the floor

Shall be finished neatly and without waviness.

**7.12 CURING, POLISHING AND FINISHING**

 The floor shall be kept wet for a minimum period of seven (7) days. The kota/ marble flooring surface should be Granite Finish.

 If any slab is disturbed or damaged, it shall be refitted or replaced, properly jointed and polished. The finished floor shall not sound hallow when tapped with wooden mallet.

**7.13 POLISHED SLAB GRANITE FLOORING:**

**7.13.1 Materials**:

 Polished granite slab shall be machine cut. Machine cut slabs shall have fine tooled dressing on all sides to full depth.

**7.13.2 Laying Stone Slabs**:

 Slabs shall be washed clean before laying. The bedding mortar of the specified mix shall be spread under each slab, slab shall be then laid on top, pressed so that the hollows underneath get filled and surplus mortar works up through the joints. The slabs should be tapped with wooden mallet and brought to level and close to adjoining slabs with thickness of joints not exceeding 1.5 mm. After laying each slab surplus mortar on the surface of the slabs shall be cleaned off and joint finished flush. Subsequent slabs shall be laid in the same manner. The joint shall be left raked out uniformly to a depth not less than 10 mm, when the mortar is still green. The surface of the flooring laid, shall be true to levels as directed by the Engineer-in-Charge. Slabs, which are fixed in the floor and joints the wall not less than 12 mm under the plaster, and floor shall be finished neatly and without waviness.

 The flooring shall be cured for Fourteen days. The finished floor shall not sound hollow when tapped with wooden mallet.

**7.13.3** **Mode of Measurement**:

Measurement shall be on Sq.mm. basis. The rate shall include cost of all materials, labour and shuttering involved in all the operations.

**7.14 CEMENT CONCRETE FLOORING TILES**:

Cement concrete flooring tiles shall be of heavy duty floor tiles as per I.S. 1237-1980.

 **MATERIALS:**

**7.14.1 Cement**:

Cement used in the manufacture of tiles shall be ordinary Portland cement conforming to I.S. 269-1976.

**7.14.2 Aggregate:**

Aggregates used in the backing layer of tiles shall conform to requirement of I.S. 383-1970. For the wearing layer unless other wise specified aggregate shall consist of marble chips or any other natural stone chips of similar characteristics and hardness, marble powder or dolomite powder or mixture of the two.

**7.15 MANUFACTURE**:

 Cement concrete flooring tiles shall be manufactured from a mixture of cement, natural aggregate and colouring material where required by pressure process. During manufacture, the tiles shall be subjected to a pressure of not less than 140 Kg per Sq.cm.

 The proportion of cement to aggregate in the backing of the tiles shall not be leaner than 1:3 by mass. On removal of mould, the tiles should be kept in moist condition continuously for such a period that would ensure their conformity to the requirements of the I.S. standards. Tiles shall be stores under cover.

**7.16 DIMENSIONS**:

The size of cement concrete flooring shall be as follows;

 Length Breadth Thickness

 Mm mm mm

 200 200 20

 250 250 22

 300 300 25

**7.16.1 Tolerances***:*

Tolerances are length or breadth of tiles shall be + or – 1 mm.

 Tolerance on thickness shall be + 5 mm. In addition the difference in thickness between the thickest and thinnest tile in the sample shall not exceed 3 mm.

 Thickness of wearing layer for heavy duty cement tile shall be 6 mm.

**7.17 GENERAL QUALITY***:*

Unless otherwise specified the tiles shall be supplied with initial grinding and grouting of the wearing layer. The wearing layer of the tiles shall be free from projections, depressions, cracks, holes, cavities and other blemishes. The edge of the wearing layer may be rounded.

**7.18 FINISH***:*

The colour and texture of wearing layer shall be uniform through out its thickness. No appreciable difference in appearance of the tiles, from the point of view of colour aggregate, its type and its distribution on the surface of wearing layer shall be present.

**7.19 PHYSICAL REQUIREMENTS**:

**7.19.1** **Flatness of the tile surface**: The tiles when tested, the amount of concavity and convexity shall not exceed 1 mm.

**7.19.2** **Perpendicularity**: When tested the longest gap between the arm of the ‘square’ and the edge of the tile shall not exceed 2 percent of the length of the edge.

**7.19.3** **Straightness**: When tested the gap between thread and plane of the tile shall not exceed 1 percent of the length of the edge.

**7.19.4 Water absorption**: When tested the average percentage of water absorption shall not exceed 10.

**7.19.5** **Wet transverse strength**: When tested the average wet transverse strength shall not be less than 30 Kg. per Sq.cm.

**7.19.6 Resistance to wear**: When tested the wear shall not exceed the following value;

a) For general purpose tiles

i) Average wears 3.5 mm

ii) Wear on individual specimen 4.0 mm

b) For heavy duty floor tiles

i) Average wears 2.0 mm

ii) Wear on individual specimen 2.5 mm

**7.20 CEMENT MORTAR SCREED**:

The screed bed for laying cement concrete tile shall be cement and sand mortar 1:6 in the case of floors and cement and sand mortar 1:3 in the case of skirting and dados. The base shall be cleaned of all scum, laitance or plaster droppings or any other loose foreign matter. It shall be properly wetted without allowing any water pools on the surface. The mortar shall then be evenly spread over the base for two rows of riles and about 3 to 5 metres in length. The top of mortar shall be kept rough, so that cement slurry can be absorbed. The thickness of the bedding shall be not less than 15 mm in any place.

**7.21 LAYING OF TILES**:

 Laying of tiles shall commence by the time the bedding becomes sufficiently hard to offer rigid cushion for the tiles. Neat cement slurry of honey like consistency shall be spread over the mortar bed, over such an area at a time as would accommodate about 20 tiles. The tiles shall be fixed in this grout one after the other, each tile being gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joint shall not exceed 1.5 mm width.

 After the tiles have been laid in a room or the days laying work is completed, the surplus cement slurry and the joints shall be cleaned and washed fairly deep with the help of broom stick. It shall be seen that the cement slurry is cleaned before it sets hard.

 The day after the tiles have been laid, the joints shall be filled with cement grout of the same shade as the colour of the matrix of the tiles.

 Tiles which are fixed in the floor adjoining the wall, shall go about 10 mm under the plaster, skirting or dado. For this purpose, the wall plaster may be left and finished by about 50 mm above the level of the proposed finished flooring, skirting or dado and the unfinished strip may be plastered later on after the tiles are fixed.

 After fixing, the flooring shall be kept moist and allowed to mature undisturbed for seven days, so that the bedding and joints set properly. After this it may be used for light traffic. Heavy traffic shall not be allowed on the floor for at least fourteen days after fixing the tiles.

 Wherever big areas floors are to be laid, the level of the centre portion of the floor shall be kept about 10 mm higher than the level marked at the wall.

**7.22 GRINDING AND POLISHING**:

 Grinding and polishing of the tiles shall be commenced only after the floor as well as the joints are properly set but in no case earlier than fourteen days of laying.

 Grinding shall preferably be done using a machine except for skirting and dados, chequered or grooved tiles shall be polished by hand.

 For grinding tile flooring, the first grinding shall be with carborundum stone of 48 to 60 grit. When the floor is rubbed even the chips show uniformity it shall be cleaned with water making bare pin holes. Grouting in the same shade is then briskly applied so that all pin holes are properly filled in. The grout shall be kept moist for a week for proper setting. Thereafter the second grinding operation with carborundum stone of 120 grit is commenced. The floor is grouted again to fill in fine pin holes. After curing for a week the floor is left with this protective film till other works are completed. Final grinding is done with carborundumof 220 to 350 grit using plenty of water. When surface is rendered smooth it is washed with water. Afterwards oxalic acid powder is vigorously applied with machine fitted with Hessian bobs to bring out shine. Floor is then washed clean and dry linen applied to suck in moisture.

 Where indicated, wax polish shall finally be applied mechanically with clez\an Hessian bobs. Superfluous wax is mopped-up with saw dust to prevent slipperiness. Saw dust may be allowed to remain on the surface till occupation. This will protect the surface and help to increase luster. When saw dust is spread, water should not be spilled as this is likely to leave stain on the polished surface.

 In the case of plain cement and coloured cement tiles, the process of polishing shall be the same as described for terrazzo tiles except that initial grinding with carborundum stone to 48 to 60 grit is not necessary.

**7.23 Mode of Measurement:**

Payment shall be on Sq.mm. basis. The rate shall include cost of all materials, labour and shuttering involved in all the operations mentioned above.

**SECTION - 8**

1. **JOINERY :**

**8.1 INDIAN STANDARDS**

The following IS apply to this section:-

|  |  |
| --- | --- |
| IS No. | Subject |
| 2202- Part I -1983 | Specification for wooden flush door shutters ( solid core type) Part I Ply wood face panels ( Fourth revision) |
| 287- 1973 | Recommendation for maximum permissible moisture content of timber used for different purpose (second revision with Amdt. 1 ) |

# 8.2 MATERIALS

**8.2.1** Timber for door/window chowkats (First class Malaysian Sal wood having density 800 kg./cum and Hollock wood having Density 920 Kg/cum) Timber for window shutters/wire gauge door

**8.2.2** Timber shall be of good quality, well kiln seasoned, chemically treated, fairly uniform in colour and texture and free from blemishes, hollow pockets and loose knots. Non coniferous sawn timber (hard wood) shall be free from bow , any kind of decay, live insect attack spiral or twisted grains, splits across the grains ,spring , warp, cup cup shake.

**8.2.3** Timber shall be obtained as sleepers and same will be cut to required size in the presence of Engineer-in-charge before seasoning, well in advance of commencement of fabrication and stacked at site of work in a suitable manner for seasoning.

**8.2.4 The fabrication of all joinery work would be executed strictly at site.**

**8.2.5** All single and double rebate Malaysian Sal wood chowkhats should be of section 100x 60 mm and 120x60 mm respectively. For Ivory coast panelled door and wire gauge shutters the vertical styles & top rail should not be less than 100mm. width, bottom rail not less than 200mm. width, lock rail not less than 150mm.width, wooden beading of ivory coast wood around plywood panel on both sides of paneled door, sash bars for wire gauge shutters should be of 25mm. square as per design & pattern shown in drawings. Wire gauge should be of 22x12 S.W.G. made from galvanized mild steel wire free from scales inequalities, splits and soft spots. However tolerances in section is allowable as per Pb. P.W.D. specifications.

**8.2.6** All wooden door/window chowkats along with window shutters would be surface treated with filler of approved quality before painting to the entire satisfaction of Engineer- in- charge**.**

# 8.3 MOISTURE CONTENT

The maximum permissible moisture content of timber for different uses , whether kiln or air seasoned, shall not exceed the limits laid down in **IS 287- 1973**. Recommendation for maximum permissible moisture content of timber used for different purpose.

# 8.4 TOLERANCES

Seasoned timber shall be deemed to conform to the moisture content requirements if the average moisture content of all samples from a given lot is within + 3 percent and the moisture content of individual sample is within + 5 percent of the maximum permissible content for the particular end use and locality .

# 8.5 WORKMANSHIP

 All members of the timber frames shall be straight without any warp or bow, and shall be exactly at right angles, which shall be checked from the inside surface of the respective members. Frame shall have smooth well planed surfaces except the surface touching the wall, lintels, cills etc., which may be left clean sawn, unless it is required for straightening up or to obtain over all sizes. Rebates, rounding and mouldings etc., shall be done before the members are jointed into frame.

 Timber frames shall have dovetail joints. The jam post shall be through tenoned into the mortices of the transom to fill width and the thickness of tenoned shall not be less than 15 mm. The tenons shall be closely fitted into the mortices without any wedging or filling and shall be pinned with hard wood or bamboo dowels not less than 10 mm dia. The depth of the rebate in the frames for housing the shutter shall be 15 mm. The joints before put together shall be glued with synthetic adhesive conforming to I.S. 851 of 1978 or 4835-1979.

 All door frames shall be clamped together so as to square and flat before being built in. Each assembled door frame shall fitted with temporary cross batten. The faces of frame abetting the wall, lintel, cill etc., shall be given two coats of hot tar before fixing, unless otherwise indicated.

# 8.6 FIXING OF CHOWKATES AND FRAMES:

 Timber frames of door shall be installed by **“built in method”.**  Unless indicated to be installed by prepared opening method. Precaution shall be taken to fix the door frames so as to take care of final floor level, and whether shutter opens inside or outside. Hold fast shall be tightly fixed to the frame by means of bolts or screws as indicated, the bolt hole in the frame being plugged suitably and flush neat unless otherwise indicated.

8.9 **Built In Method**:

 Masonry in the wall shall be built after installation of frames, so that the hold fast and pins, if any, at the bottom or well anchored to them. Suitable arrangements shall be made to hole the frame in rectangular shape and prevent warping and distortion of frames during construction. Usually one cross batten at the middle, one cross batten at the bottom and two cross battens diagonally will be necessary to hold the frame rectangular.

# BUILDERS HARDWARE:

**8.10.1M.S. Zinc coated butt hinges**: Hinges shall be well made, shall be free from flaws and defects. All hinges shall be cut clean and square. The hole for the hinge pin shall be central and square to the knuckles/boss. All sharp edges and corners shall be removed. The movements of hinges shall be free, easy and square and working shall not have any play or shake. The hinge pin shall fit inside the knuckles firmly notched and properly finished, so as to not to allow any play or shake. All screw holes shall be clean counter sunk, suitable for counter sunk head wood screws. M.S. Zinc coated butt hinges shall comply with relevant I.S. code. The hinge pin shall be M.S. Zinc coated, shall be hard, and sealed with oil, wax or lanolin. M.S. Zinc coated butt hinges shall be of the size indicated.

* + 1. **Mortice lock (vertical type**): These shall conform to I.S. 2209 – 1976, specification for mortice lock (vertical type). These shall be brass or aluminum as indicated. Number of levers shall also be as indicated.

**8.10.3** **Handles**: These shall conform to I.S. 208 of 1979, specification for door handles. Handles shall be of cast aluminum, aluminum alloy fabricated handles. Door handles shall be finished smooth, when the grip portion of the handle is jointed with the base piece by mechanical means, the arrangements shall be such that the assembled handle shall have adequate strength. Aluminum handles shall be anodized.

**8.10.4** **Aluminum tower bolt**: Shall conform to I.S. 204 (Part-II) – 1978, specification for tower bolts (Part-II) nonferrous metal. Aluminum tower bolts shall be of extruded section of aluminum alloy, shall be of barrel bolts shall have a knob integral with bolts and of robust construction. The type and size as indicated.

* + 1. **M.S. Nickel coated slide bolt**: These shall comply with relevant I.S. code specifications. Aluminum alloy sliding door bolts with hasp, staple and fixing clips of sheet, casting or extruded sections or casting of aluminum alloy.

The sliding door bolt shall have smooth sliding action. The hasp, when not cast integral with the bolt, shall be properly secured to the bolt. Sliding bolt shall be provided with fixing bolts. Aluminum bolts shall be anodized.

**8.11 WORKMANSHIP**:

 All builders' hardware shall be fixed to joinery in a secure and efficient manner. Special attention shall be

given to the size and fixing of screws to ensure that the screws are driven (and not hammered) tight and

heads of the screw do not protrude. All hinges shall be counter sung into the edge of the timber joinery and

frames to a depth equal to the thickness of the leaf of hinge.

###### **SECTION - 9**

1. **METAL WORKS - ANODISED ALUMINIUM DOORS, WINDOWS AND VENTILATORS**:

DELETED

###### **SECTION – 10**

**10.0 PAINTING WORKS:**

**10.1 INDIAN STANDARDS**:

The following I.S. apply to this section;

|  |  |
| --- | --- |
| **I.S. NO.** | **SUBJECT** |
| 5410-1969 | Specification for cement paint, colour as required. |
| 2932-1974 | Enamel, synthetic, exterior, under coating and finishing (First Revision) |

**10.2 CEMENT PAINT**:

10 2.1 Cement paint shall comply with I.S. 5410-1969, specification for cement paint,

colour as required. The material shall be in powder form, free from lumps that are not friable and when mixed with required volume of water shall be suitable for use on porous surface of masonry, concrete and rough plaster work.

**10.3 PREPARATION OF SURFACE**:

10.3.1 The surface shall be thoroughly cleaned of all dirt, mortar drops, efflorescence, chalking, grease and foreign matter.

10.3.2 Before applying cement paint the surface shall be thoroughly wetted to control surface suction. The surface shall be moist but not dripping wet when paint is applied. Surfaces which readily absorb moisture shall be wetted in one operation not more than one hour before painting. Surface which absorbs moisture slowly shall be wetted in at least two operations not less than 30 minutes.

**10.4 PREPARATION OF CEMENT PAINT**:

Cement paint shall be made by adding equal volume of paint powder to water and the mix stirred to obtain a thick paste. Which shall then be diluted to a brush able consistency in the proportion recommended by manufacturer differs; the recommendation of manufacturer shall invariably follow? The water mixed paint shall be kept well stirred during use and shall be applied within one hour of preparation. To prevent algae and moss growth and efflorescence, silicon base water repellent compound may be added to mixture at the rate as recommended by the manufacturer. The lids of cement paint drums shall be kept tightly closed and not in use as the cement paint rapidly become air set.

**10.5 APPLICATION OF PAINT**:

**10.5.1** To maintain uniform mixture and to prevent segregation, the paint shall be stirred frequently in the bucket.

**10.5.2** Unless otherwise indicated new surface shall be treated with a minimum of two coats of cement paint of the same colour. Not less than 24 hours shall be allowed between two coats and the second or subsequent coat shall not be started until the preceding coat has become sufficiently hard to resist marking by the brush being used. In hot dry weather the preceding coat slightly moisten before applying the subsequent coat. The paint shall be brushed in uniform thickness and free from excessive brush marks. The laps shall be well brushed out.

**10.5.3** The colour shall be even shade over the whole surface. If it is patchy or otherwise badly applied the work shall redone by the contractor at his own cost.

**10.5.4** Surface treatment to external walls is to done with water resistant grade anti fungal, anti rusting, anti foaming high percentage acrylic binder washable surface with two or more coats to be provided with spatula Altek or Equivalent make over one coat of cement primer including preparation of surface with WR grade subject to the entire satisfaction of Engineer-in-charge.

**10.6 CURING**:

Painted surface shall be sprinkled with water using a fog spray two or three times a day. Curing shall be done between coats and for at least two days following the final coat. The curing shall be started as soon as the paint has hardened so as not to damage of the spray, about twelve hours after the application.

**10.7 PAINTING WOOD WORK:**

**10.7.1 Preparation of New Surface:**

All wood work shall be dried free from dust, dirt or any extraneous materials. Flat portion shall be smoothening with abrasive paper used across the grain prior to painting. All loose knots removed and holes filled.

**10.7.2 Priming:**

On clean prepared surface a priming coat of paint shall be applied by brushing. Unless otherwise directed, the priming coat shall be applied before the wood work fixed in position.

**10.7.3 Filler Coat**:

Filler coat where indicated, shall be applied with a putty knife and subsequently rubbed down to a level surface, with the abrasive paper. The filler coat shall be of an optimum thickness and shall be allowed to fully harden and flatten before subsequent coat is applied. As many layers or filler is necessary shall be applied allowing each coat to harden and flatten before next coat is applied.

**10.7.4 under Coat**:

Under coat shall be applied by brush after the surface has been primed, stopped, filled and rubbed down to a smooth surface. After drying, the under coat shall be carefully rubbed down and wiped clean before the finishing coat is applied.

**10.7.5 Finishing Coat***:*

The finishing coat shall be applied by brush, the finished surface shall be free from hair or brush marks, streaks, clogging of paint, puddles in the corner etc. all the joiner work on outside is to be painted with superior quality mat finish exterior paint.

**10.8 PAINTING STEEL AND IRON WORK:**

**10.8.1 Preparation of New Surfaces**:

 The surface shall be thoroughly cleaned of dirt, fluxing material, and other foreign material and scrapped thoroughly with hand scrapper followed by wire brushing first with course and then with fine wire brushed and finally sand papering the surface to remove all mill scale and dust. The surface shall then be wiped finally with mineral turpentine to remove oil and grease etc.

 Temporary rust protective materials applied to steel sheets to protect during transport and storage shall be removed with suitable solvent as a preliminary to other preparatory treatment.

 Surfaces already pretreated or primed in a factory shall be carefully inspected and damage areas shall be thoroughly degreased and cleaned of all dust and touch up.

**10.8.2 Primer Coat**:

Immediately after the preparation of the surface priming coat shall be applied by brush, working in the paint into the fine dents and ensuring a continuous film without runs and holds.

**10.8.3 Filler Coat**:

 After the primer coat is harden and dry, the surface shall be rough sanded with out scratching or in any way damaging primer coat and surface cleaned free from dust. Deep dents and scratches, if any shall be filled with paste filler using a good putty knife pressing firmly into the dents applying in optimum layers. Each layers shall be allowed to dry hard and then cut down by wet rubbing to a smooth finish.

 Where indicated, after the paste filler is hard dry, a coat of liquid filler shall be applied by brush to fill all fine dents allowed to hard dry and then wet rubbed to a smooth finish.

**10.8.4 under Coat**:

Under coating shall be applied by brush. The film shall be allowed to hard dry, wet rubbed and cut down to a smooth finish ensuring that at no place under coat is completely removed.

**10.8.5 Finishing Coat**:

Finishing coat shall be applied for brush. Special care shall be taken while painting over bolts, nuts, rivets and overlaps etc.

**10.9 Mode of Measurement:**

Payment shall be made on Sqm. Basis as per provisions of Pb. PWD B&R specifications.

**14.0 ANTI-TERMITE TREATMENT:**

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 Architect.

The work to be got carried out from the specialist firm to be approved by Engineer-in-charge and shall be having a experience of at least 10 years in similar works completed successfully. A certificate to this effect is required to be furnished by him from the client preferably from Government agencies.

The treatment shall be carried out generally in accordance with the stipulations laid down by IS 6313 ( Part –II) –1971 (code of practice for anti termite measures in buildings –Part II- pre constructional chemical treatment measures) subject to the minimum requirements given in this specifications.

**14.1 MINIMUM SPECIFICATIONS:**

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 chemicals to be used for the treatment shall be Chloropyriphos 20% E.C. conforming to the requirement and concentration laid down in IS 6313 (Part-II) 1981.

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 above. The prepared emulsion shall be applied as described below.

Column pits, wall trenches, etc.

The bottom surface and sides of the excavations (upto a height of 30 cm from the bottom) made for column foundations, wall foundations etc. (excepting RCC foundations) shall be treated with the chemical emulsion at the rate of 5 litres per Sqm of surface area.

**14.2 TREATMENT TO BACK –FILL**

After the column foundations, wall foundations etc. come up the back fill in immediate contact with the foundation structure shall be treated @ 15 litres –per Sqm of the surface of the sub-structure for each side. If water is used for ramming operation is completely by Roding earth at 15cm.,centres close to the wall face and spraying the chemical with the above doze. The earth is to be returned in layers and the treatment shall also be carried out in similar stages. The chemical emulsion shall be directed towards the masonry wall surfaces so that the earth in contact with these surfaces is well treated with the chemicals.

In the case of RCC walls and columns, the treatment shall start at the depth of 50cm below natural ground level. From this depth the back fill around the RCC columns, walls etc., shall be treated at the rate of 15 litres per Sqm of the surfaces.

**14.3 TOP SURFACES OF PLINTH FILLING**

The top surface of the plinth fill ( just below the stone soling) shall be treated with chemical emulsion at 5 Litres per Sqm of the surface before the stone laid. If the filled earth has been well consolidated and does not permit the emulsion to seep through, holes upto 50 to 75mm deep at 150mm centres both ways may be made with cow bars to facilitate saturation of the soil with the chemical emulsion.

**14.5 JUNCTION OF WALL AND FLOOR**

A channel of size 3 x3 cm shall be made at all the junctions of walls and columns with the floor (before laying the soling) and rod holes made in the channel upto the ground level at 15 cm centres. The solution is poured into the channel @ 15 litres per Sqm of the vertical surface and allowed to soak through the holes fully so that the solid in contract with the chemical. The soil shall be tamped back into the channel and consolidation to original conditions.

**14.6 EXTERNAL PERIMETER OF BUILDING:**

After the building is complete, holes shall be made along the external perimeter of the building at intervals 15cm and depths of 30cms and the emulsion shall be allowed to soak through these holes fully at the rate of 5 litres per R.M. of the perimeter wall.

**14.7 SOIL SURROUNDING PIPES:**

Wherever may 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.

**14.8 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 Architect.

**14.9 TREATMENT UNDER APRON.**

The soil below the concrete for stone aprons to be provided around the perimeter walls of all building shall also be treated with the chemical solution @ 5 litres per Sqm.

**14.10 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.

**14.11 SPRAYING EQUIPMENT:**

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.

**LIST OF MAKES/BRANDS FOR CIVIL WORKS**

|  |  |  |
| --- | --- | --- |
| **S.No** | **ITEM** | **BRAND/MAKE** |
| **1** | Cement | L&T/ACC/Birla/Ambuja/JK/Shree Ultra/CCI |
| **2** | Steel | Kamdhenu/Rathi/ Fortune. |
| **3** | Terrazzo Tiles/ Chequred Tiles | NTC Panchkulla, Golden India Chandigarh |
| **4** | Glazed Tiles  | RAK/ Johnson/ Kajaria,/Nitco. |
| **5** | Flush Doors & Plywood  | National / Duro / Green / Century. |
| **6** | Aluminum Fittings for Joinery Work.  | Classic, New Light, Jindal, Rajdoot. |
| **7** | Zinc Coated Hinges.  | Sona |
| **8** | Water Proofing Compound  | Acqua proof/ Piddilite. |
| **9** | Paints & Distemper | Nerolac/ Asian,/Berger/Dulex. |
| **10** | Glass.  | Modi/ Saint Gobian/ASHYEE. |

**NOTE-**

1. **Beside the above Makes / Brands equivalent Quality make can also be used with the prior approval of the Engineer Incharge.**
2. **Any material/ item having logo of “a quality brand from \_ \_ \_ \_ “is not allowed.**

**TECHNICAL SPECIFICATIONS FOR PUBLIC HEALTH WORKS.**

1. **PIPES**

 All pipes within and outside the building in exposed locations and shafts including

 Connections buried under floor shall be M.S. Pipes as follows:

1. Pipes 150 mm dia and below IS: 1239 Heavy Class
2. Pipe 200 mm dia and above IS 3589 of thickness specified.
	1. **PIPE FITTINGS.**

Pipe fittings means tees, elbows, couplings, flanges, reducers etc. And all such connecting devices that are needed to complete the piping work in its totality.

 Fabricated fittings shall not be permitted for pipe diameters 50 mm and below.

 When used, they shall be fabricated, welded and inspected in workshops whose welding procedures have been approved by the TAC as per TAC rule 4102 for sprinkler system and applicable to hydrant and sprinkler system. The inspection shall be supervised by authorized representative of the OWNER. For "T" connections, pipes shall be drilled and reamed. Cutting by gas or electrical welding will not be accepted.

**1.03 JOINTING**

* 1. Screwed (50 mm dia pipes and below):

Joint for black steel pipes and fittings shall be metal-to-metal thread joints. A small amount of red lead may be used for lubrication and rust prevention. Joints shall not be welded or caulked. (With screwed M.S. forged fittings)

* 1. Welded (65 mm dia and above):

Joints between M.S. pipes and fittings shall be made with the pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner. Buried pipes will be subject to X-Ray test from an approved agency as per the TAC norms at the cost of contractor. (With welded M.S. fittings heavy class with V-Groove). The welding machine shall be 3 Phase of required current and capacity.

* 1. Flanges:

Flanged joints shall be provided on;

* + 1. Straight runs not exceeding 30 m on pipelines 80 mm dia and above
		2. Both ends of any fabricated fittings e.g. bends, tees etc. of 65 mm dia or

 Larger diameter

* + 1. For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and required as good for engineering practice.
			- 1. Flanges shall be as per I.S.6392-1971, Table 17/18 with appropriate number of G.I. nuts and bolts, half threaded of GKW make or equivalent with 3 mm insertion neoprene gasket complete.
				2. Unions:

Approved type of dismountable unions on pipes lines 65 mm and below in similar places as specified for flanges shall be provided.

1. **PIPE PROTECTION**
	1. All pipes above ground and in exposed locations shall be painted with one coat of Red Oxide Primer and two or more coats of Synthetic Enamel Paint of approved shade.
	2. All black steel pipes under floors or below ground shall be provided with protection against corrosion by application of 100/ 150 mm wide and 4mm thick layer of PYPKOTE/ MAKPOLYKOTE over the pipe, as per manufacturers specifications.

# Annexure B

# List of makes of materials

### A. For Plumbing and SANITARY Works

|  |  |  |
| --- | --- | --- |
| **S.No** | **MATERIALS** | **BRAND/MAKE** |
| 1 | Soil, Waste & R.W. Pipesa)Centrifugally Cast Iron |  Bajaj NECO Kapilansh |
| 2 | Centrifugally cast iron fittings of pipes such as HR bend, Plain bend, Door bend, Door junction, Collar, Cowl etc. | Bajaj NECO Kapilansh |
| 3 | PVC Pipes / UPVC | I.S.I marked to be approved by the Engineer - In- charge.  |
| 4 | G.I. Pipes B- Class | Jindal(Star)Jindal(Hissar) Ravindra. Tata  |
| 5 | G.I. Fittings  | UCO UNIK SVW |
| 6 | Gunmetal Valves (full way | Danfoss /Kitz Zoloto, S.B. duly I.S.I. marked |
| 7 | Brass Ball Valve with PVC Ball  | Danfoss /Kitz Zoloto, S.B. duly I.S.I. marked |
| 8 | Gun Metal Full Way Check Valve Globe valve  | Danfoss /Kitz Zoloto, S.B. duly I.S.I. marked |
| 9 | C.P.Brass fittings such as Bib cock Stop Cock, Angle stop Cock, pillar cock, wall mixer, single hole mixer, concealed stop  Cock , shower, Towel rail, Towel Ring ,  Soap dish, Fresh Air Purifier Container  | EssEss, Hindware, Excel  |
| 10 | Vitereous China Sanitary Ware Such as  I.W.C., O.W.C., E.W.C., Wash hand basin, Low level cistern. | Hind, Cera, Parry ware |
| 11 | Stainless Steel Sinks  | Neel KanthJayna |
| 12 | PVC water storage Tanks four layers  | URO tanks four layers or I.S.I. Marked asapproved by Engineer- in- Charge.  |
| 13 | Stoneware Pipes & Gully traps | C.S.W., OCR or any other make Approved by Engineer in charge. |
| 14 | RCC Man Holes Frame & cover | Cemocrete, OCR or other ISI Markedcode 12592/1988/1991 approved by Engineer in charge.  |
| 15 | C.I. Pipes & fittings / GT / HT Covers etc | Neco/ RIF/ BIC &ISI marked as approved by Engineer in Charge. |
| 16 | HCI Gully Traps | Neco/ RIF/ BIC &ISI marked as approved by Engineer in Charge.  |
| 17 | D.I.pipes& fittings (S&S with rubber tyton joints) (Pipe protection)  | Kesoram Electrosteel Jindal |

**NOTE-**

1. **Beside the above Makes / Brands equivalent Quality make can also be used with the prior approval of the Engineer Incharge.**
2. **Any material/ item having logo of “a quality brand from \_ \_ \_ \_ “is not allowed.**

**ADDITIONAL TECHNICAL SPECIFICATIONS FOR PUBLIC HEALTH WORK**

**Section 1 General Requirements**

1 **Scope of work**

1.1 Work under this Contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the plumbing and other specialized services as described hereinafter and as specified in the schedule of quantities and/or shown on the plumbing drawings.

1.2 Without restricting to the generality of the foregoing the work shall include the following:

**Plumbing Works includes:**

a) Through rates for Plumbing Fixtures & CP Fittings.

b) Soil, Waste & Vent Pipes & Fittings

c) Rainwater Pipes & Fittings and rainwater harvesting where specified.

d) Internal Water Supply System (Cold & Hot)

**SECTION 2 PLUMBING FIXTURES**

**1. Scope of work**

1.1. Work under this section shall consist of furnishing all materials &labour necessary and required to completely install all sanitary fixtures, chromium plated fittings and accessories as required by the drawings and specified in the Bill of Quantities.

1.2 Without restricting to the generality of the foregoing the sanitary fixtures shall include the following:-

1. Sanitary fixtures
2. Bath tubs, shower trays
3. Chromium plated fittings
4. Porcelain or stainless steel sinks

 e) Accessories e.g. towel rods, toilet paper holders, soap dish etc.

1.3. Whether specifically mentioned or not, the rates quoted for the installation of the fixtures, appliances and accessories shall be provided with all fixing devices, nuts, bolts, screws, hangers as required.

1.4. All exposed pipes within toilets and near fixtures shall be chromium plated brass or copper unless otherwise specified.

# 2 General

2.1 All sanitary fixtures, CP Fittings and CP/SS accessories shall be as per list of approved brands as per DNIT.

2.2 All fixtures and fittings shall be provided with all such accessories and fixing devices as are required to complete the item in working condition, even if the same is not specifically mentioned the Bill of Quantities, Specifications or shown on the drawings. The rate quoted will include all devices for proper fixing arrangement, nuts, bolts, screws and required connection pieces.

2.3 Fixing screws shall be half round head stainless steel wood screws or bolts with Stainless Steel washers. Iron screws rust and will not be permitted.

2.4 All fittings and fixtures shall be fixed in a neat workmanlike manner true to level and heights shown on the drawings and in accordance with the manufacturer’s recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor, tiling or terrace shall be made good at Contractor's cost.

2.5 Contractor shall provide poly-sulphide sealant appropriate for its use for all fixtures fixed near wall, marble and edges.

**3. FIXTURES**

**3.1 Heath faucet/spray (Optional)**

A chromium plated spray with integral hand control valve and connected to a flexible pipe and angle valve with wall flange and hook are fixed as shown on the drawings or directed by the Project Manager. The angle valve and flange shall be paid under relevant item.

### 3.2 Accessories

3.2.1 Accessories shall be of any of the following types:

* Towel rails
* Towel rings
* Coat hooks
* Soap dispensers
* Soap dishes

3.2.2 Accessories shall be fixed with stainless steel half round head screws and cup washers in wall with rawl plugs or nylon sleeves and shall include cutting and making good.

3.3.3 Porcelain accessories shall be fixed in walls and set in cement mortar 1:2 (1 cement: 2 coarse sand) and fixed in relation to the tiling work. The flange of the recessed fixture shall cover the recess in the wall fully.

# 4 Measurement

4.1 Sanitary fixtures shall be measured by numbers.

4.2 Rates for all items mentioned above shall be inclusive of cutting holes and chases and making good the same, stainless steel screws, nuts, bolts and any fixing arrangements required and recommended by manufacturers, testing and commissioning.

4.3 University Engineer’s decision with respect to the correct interpretation regarding mode of measurement shall be final and binding on the contractor.

**END OF SECTION 2**

**Plumbing Fixtures**

**ECTION 3 Soil, Waste, Vent & Rainwater Pipes & Fittings**

**1 Scope of work**

1.1 Work under this section shall consist of furnishing all labour, materials, equipments and appliances necessary and required to completely install all soil, waste, vent and rainwater pipes and fittings as required by the drawings, and given in the Schedule of Quantities.

1.2 Without restricting to the generality of the foregoing, the system shall include the following:-

1. Vertical and horizontal soil, waste, vent and rain water pipes, and fittings, joints, clamps and connections to fixtures.
2. C.I. soil &uPVC rainwater pipes.
3. Connection of all pipes to sewer lines as shown on the drawings at ground floor levels.
4. Basement drainage, ramp, channel gratings & floor drains.
5. Floor and urinal traps, cleanout plugs, inlet fittings and rainwater heads/Khurras.
6. Testing of all pipe lines.

**2 General requirements**

2.1 All materials shall be new of the best quality conforming to specifications and subject to the approval of University Engineer.

2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

2.3 Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

2.4 Pipes shall be securely fixed to walls and ceilings by suitable clamps intervals specified.

2.5 Access doors for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance.

**3 Piping System**

3.1 Soil, Waste & Vent Pipes

1. The Soil & Waste pipe system above ground has been planned as a "two pipe system" as defined in IS: having separate pipes for waste for kitchen sinks, bath tubs, showers, washbasins, condensate drains and floor drains and is approved by University Engineer.
2. Vertical soil & waste stacks shall be connected to a common horizontal drain pipe at basement ceiling or to an external manhole directly where feasible and shown on the drawings.
3. Floors of toilets, kitchens and other service areas located on structural slab are SUNK below the finished floor level (FFL).

3.2 Rainwater Pipes

1. All terraces shall be drained by providing down-takes rainwater pipes.
2. Rainwater pipes are separate and independent and connected to the storm water drainage system as shown on the drawings.
3. Rainwater in enclosed courtyards shall be collected in catch-basins and connected to storm water harvesting chambers as shown in drawings..
4. Any dry weather flow from waste appliances, AHU's pump rooms, shall not be connected to the sewerage system.

3.3 Balcony/Planter drainage

 All balconies, terraces, planters and other formal landscape areas will be drained by vertical down takes as per the landscape/architectural drawings and details

3.4 Cast iron pipes & fittings (for Soil, waste, anti siphon age Pipes)

3.4.1 Pipes

3.4.2 All pipes shall be straight and smooth and inside free from irregular bore, blow holes, cracks and other manufacturing defects. Pipes shall be centrifugally spun iron soil pipes conforming to sand cast to I.S. 3989.

3.4.3 Standard weight dimensions and pig lead required for joints shall be as follows:-

1. Sand Cast Iron Pipes & Matching Fitting shall be to I.S. 1729
2. Centrifugally cast (spun) iron pipes and fittings to I.S. 3989

3.4.4 Tolerance as per the I.S. code

3.5 PVC pipes & fittings

(For Rain water Pipes)

3.5.1 Where specified, Polythene pipes shall be UPVC pipes confirming to I.S: 4985-1988. The details of the nominal outer diameter, weight and working pressure. Shall be as per the standards, for the respective pressure rating as specified in the B.O.Q. / Relevant Code

3.5.2 Polythene pipes may be cold bending to a radius of not less than eight times of their external diameter. Pipes bent for smaller radius may be made by hot bending.

3.5.3 Fittings used for Polythene pipes shall be compression molded fittings matching to the above specifications.

3.6 Jointing

 All Polythene pipes shall be laid and jointed as per manufacturer’s specifications and relevant I.S codes.

3.6.1 All pipes shall be tested after installation for a pressure equal to twice the maximum working pressure in the line as per manufacturer’s specifications.

3.7. Fittings

3.7.1 Fittings shall conform to the same Indian Standard as for pipes. Pipes and fittings must be of matching IS Specification. Interchange of pipes of one standard with fittings on the other standard will not be permitted.

3.7.2 Fittings shall be of the required degree of curvature with or without access door.

3.7.3 Access door shall be made up with 3 mm thick insertion rubber washer and white lead. The bolts shall be lubricated with grease or white lead for easy removal later. The fixing shall be air and water tight.

3.8 Fixing

3.8.1 All vertical pipes shall be fixed by galvanized **clamps** truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard).

3.8.2 Horizontal pipes running along ceiling shall be fixed on **galvanized structural adjustable clamps** (Clevis clamps) of special design shown on the drawings or as directed. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them.

3.8.3 Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the Project Manager/Building Contractor for making such provisions in the structure as necessary. All damages shall be made good to restore the surfaces.

**4 Clamps**

4.1 Holder bat clamps shall be of standard design and fabricated from **galvanized M.S. standard flats** 40x3 mm thick and 12 mm dia MS Rod and 6 mm nuts and bolts. Holder bat clamps shall be fixed in cement concrete 1:2:4 mix blocks 10x10x10 cms deep.

4.2 Where holder bat clamps are to be fixed in RCC column or slotted angles, walls or beam they shall be fixed with **galvanized** 40x3 mm flat iron "U" type clamps with anchor fasteners of approved design or 6 mm nuts and bolts.

4.3 Structural clamps shall be fabricated by electro-welding from M.S. structural members e.g. rods, angles, channels flats as per detailed drawing. Contractor shall provide all nuts & bolts, welding material. All fabricated clamps, nuts, bolts and washers shall be not dipped galvanized.

4.4 Galvanized slotted angle/channel supports on walls shall be provided wherever shown on drawings. Angles/channels shall be of sizes shown on drawings or specified in schedule of quantities. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with suitable anchor fasteners. The spacing of support bolts horizontally shall not exceed 1 m.

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

4.6 For sleeves, anchor fasteners and clamp spacing chart see Special Conditions.

**5 Traps**

5.1 Floor traps

Floor traps shall be siphon type full bore P or S type cast iron having a minimum 50 mm deep seal. The trap and waste pipes shall be set in cement concrete blocks firmly supported on the structural floor. The blocks shall be in 1:2:4 mix (1 cement :2 coarse sand : 4 stone aggregate 20 mm nominal size) and extended to 40 mm below finished floor level. Contractor shall provide all necessary shuttering and centring for the blocks. Size of the block shall be 30x30 cms of the required depth.

5.2 Urinal traps

 Urinal traps/horn shall be cast iron P or S traps with or without vent and set in cement concrete block specified for floor traps.

5.3 Floor trap inlet

 Bath room traps and connections shall ensure free and silent flow of discharging water. Where specified, Contractor shall provide a special type inlet fitting fabricated from G.I. pipe, with one, two or three inlet sockets welded on side to connect the waste pipe. Joint between waste and hopper inlet socket shall be lead caulked. Inlet shall be connected to a C.I. P or S trap. Floor trap inlet hoppers and the traps shall be set in cement concrete blocks as specified in Para above without extra charge.

5.4 Gratings for traps

 Floor and urinal traps shall be provided with 100-150mm square or round C.P./Stainless steel grating, with rim of approved design and shape. Minimum thickness shall be 4 mm or as specified in the Schedule of Quantities.

5.5 Jointing

Soil, waste vent, anti-syphonage and rainwater pipes shall be jointed with refined pig lead conforming to I.S. 27-1977. Sufficient skein of jute rope shall be caulked to leave a minimum space for the pig lead as given in Para 3.4.3 to be poured in. After the pouring the lead shall be caulked into the joint with caulking tool and hammer. All surplus lead shall be cut and joint left flush with the rim of the socket neatly.

**6 Cleanout Plugs (on soil pipes)**

6.1 Clean out plug for Soil, Waste or Rainwater pipes laid under floors shall be provided near pipe junctions bends, tees, “Ys” and on straight runs at such intervals as required as per site conditions. Cleanout plugs shall terminate flush with the floor levels. They shall be threaded and provided with key holes for opening. Cleanout plugs shall be Cast Brass suitable for the Pipe dia. With screwed to a G.I. socket. The socket shall be lead caulked to the drain pipes.

6.2 Cleanout on Drainage Pipes

a) Cleanout plugs shall be provided on starting point of each drain and in between at locations indicated on plans or directed by the Project Manager. Cleanout plugs shall be of size matching the full bore of the pipe but not exceeding 150 mm dia. CO Plugs on drains of greater diameters shall be 150 mm dia. Fixed with a suitable reducing adapter.

b) Cleanouts provided at ceiling level pipe shall be fixed to a CI flanged tail piece. The cleanout doors shall be specially fabricated from light weight galvanised sheets and angles with hinged type doors with fly nuts, gasket etc. as per drawing.

**7 Waste pipe from appliances**

7.1 General

a) Waste pipe from appliances e.g. washbasins, sinks and urinals shall be of galvanized steel/PVC, as given in the Schedule of Quantities or shown on the drawings.

b) All pipes shall be fixed in gradient towards the outfalls of drains. Pipes inside a toilet room shall be in chase unless otherwise shown on drawings. Where required pipes may be run at ceiling level in suitable gradient and supported on galvanized structural clamps. Spacing for clamps for such pipes shall be as per good engineering practice approved by the University Engineer.

 7.2 Galvanized pipes

 Waste pipes from appliances shall be galvanized steel tubes conforming to I.S.1239 (Medium class) and quality certificates shall be furnished. Pipes shall be provided with all required fittings e.g. tees, couplings, bends, elbows, unions, reducers, nipples, plugs. All G.I. waste pipes shall be terminated at the point of connection with the appliance with an outlet of suitable diameter. Pipes in chase shall be wrapped with bitumen tape and then painted with two coats of black bitumen paint. Exposed pipes with one coat of red oxide primer and two or more coats of synthetic enamel paint or as given in the Schedule of Quantities. Colour shall be as per the approved colour code.

**8 Cast iron pipes for drainage**

8.1 All drainage lines passing under building, in exposed position above ground e.g. basement ceiling etc. shall be cast iron pipes. Position of such pipes shall generally be shown on the drawings.

8.2 Cast iron pipes shall be spigot & socket (S&S) centrifugally spun iron pipes conforming to I.S. 1536. (Class LA) suitable for pre-moulded rubber joints Tyton joints. Quality certificates shall be furnished.

8.3 Fittings

* 1. Fittings used for C.I. drainage pipe shall conform to I.S.1538 (Heavy class). Wherever possible junction from branch pipes shall be made by a Y tee.

8.4 Joints

1. Joints between pipes shall be made with pre-moulded rubber joints (Tyton Joints) supplied by the manufacturer to ensure compatibility and water tightness.
2. Joints between pipes and fittings shall be made by caulked spun yarn dipped in
3. tar and molten pig lead 45 mm deep by hammering with caulking tools.

**9 Encasing pipe in Cement Concrete**

 Cast iron soil and waste pipes under floor in sunken slabs and in wall chases (when cut specially for the pipe) shall be encased in cement concrete 1:2:4 mix (1 cement : 2 coarse sand :4 stone aggregate 12 mm size) 75 mm in bed and all-round. When pipes are running well above the structural slab, the encased pipes shall be supported with suitable cement concrete pillars of required height at intervals of 1.8 m. Rate for concrete round pipes shall be inclusive of pillars, supports, shuttering and centring.

**10 Painting**

10.1 All cast iron, soil, waste vent, anti-syphonage and rainwater pipes in exposed location in shafts and pipe spaces shall be painted with two or more coats of synthetic enamel paint to over a priming coat to give an even shade.

10.2 Paint shall be of approved quality and shade. Where directed pipes shall be painted in accordance with approved pipe colour code.

10.3 G.I. waste pipes in chase shall be painted with two coats of bitumen paint, covered with polythene tape and a final coat of bitumen paint. Exposed pipes shall be painted with two or more coats of synthetic enamel paint over a priming coat.

10.4 C.I. soil and waste pipes below ground and covered in cement concrete or lead pipes shall not be painted.

**11 Cutting and making good**

11.1 Pipes shall be fixed and tested as building proceeds.

Contractor shall provide all necessary holes cut outs and chases in structural members as building work proceeds. Wherever holes are cut or left originally, they shall be made good with cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size) or brick work in cement mortar 1:2 (1 cement: 2 coarse sand) and the surface restored as in original condition.

**12 Testing**

 12.1 Testing procedure specified below apply to all soil, waste and vent pipes above ground including C.I. LA pipes laid in basement ceiling.

12.2 Entire drainage system shall be tested for water tightness during and after completion of the installation. No portion of the system shall remain untested. Contractor must have adequate number of expandable rubber/bellow plugs, manometers, smoke testing machines, pipe and fitting work test benches and any other equipment necessary and required to conduct the tests. All testing shall be certified for its calibration by an approved laboratory.

12.3 All materials obtained and used on site must have manufacturer's hydraulic test certificate for each batch of materials used on the site. All testing equipment must be calibrated and shall carry certificate from an approved laboratory.

12.4 Testing soil, waste and rainwater pipes

1. Apart from factory test all pipes and fittings shall be hydraulically tested for a head of 3 m preferably on a specially set up work bench. After applying pressure, strike the pipe with a wooden pallet and inspect for blow holes and cracks. Pressure may be applied for about 2 minutes. Reject and remove all defective pipes.
2. After installation all connections from fixtures, vertical stacks and horizontal drains including C.I. LA pipes shall be tested to a hydraulic pressure not exceeding 3 m. Such tests shall be conducted for each floor separately by suitable plugs.

c) The entire installation shall be tested by smoke testing machine. The test can be conducted after the plumbing fixtures are installed and all traps have water seal or by plugging all inlets by bellow plugs. Apply dense smoke keeping the top of stack open and observe for leakages. Rectify or replace defective sections.

d) After the installation is fully complete, it should be tested by flushing the toilets, running at least 20% of all taps simultaneously and ensuring that the entire system is self draining, has no leakages, blockages etc. Rectify and replace where ever required.

12.5 Contractor shall maintain a test register identifying date and time of each area. All tests shall be conducted in presence of University Engineer and signed by both.

**13 Measurements**

13.1 General

a) Rates for all items quoted shall be inclusive of all work and items given in the specifications and Schedule of Quantities.

b) Rates are applicable for the work in basements, under floors, in shafts at ceiling level area for all heights and depths.

c) Rates are inclusive of cutting holes and chase in RCC and masonry work and making good the same.

d) Rates are inclusive of pre testing, on site testing, of the installations, materials and commissioning of the works.

e) Pipes (unit of measurement. Linear meter to the nearest centimetre).

13.2 All C.I. Soil, waste, vent, anti-syphonage and rain water pipes shall be measured net when fixed correct to a centimetre including all fittings along its length. No allowance shall be made for the portions of pipe lengths entering the sockets of the adjacent pipes or fittings. The above will apply to both case i.e. whether pipes are fixed on wall face or pillars or embedded in masonry or pipes running at ceiling level.

13.3 Pipes shall measured per running metre correct to a centimetre for the finished work which shall include fittings e.g. bends, tees, elbows, reducers, crosses, sockets, nipples and nuts. The length shall be taken along centre line of the pipes and fittings. All pipes and fittings shall be classified according to their diameter, method of jointing and fixing substance, quality, and finish. The diameters shall be nominal diameter of internal bore. The pipes shall be described as including all cutting and waste. In case of fittings of unequal bore, the largest bore shall be measured.

13.4 Cement concrete around pipes shall be measured along the centre of the pipe line measured per linear metre and include any masonry supports, shuttering and centring cutting complete as described in the relevant specifications.

13.5 Slotted angles/channels shall be measured per linear metre of finished length and shall include support bolts, nuts and clamps embedded in masonry walls with cement concrete blocks and nothing extra will be paid for making good the same.

13.6 Fittings

 Unit of measurement shall be the number of pieces. Pipe fittings are included in the rate for pipes. Urinal traps, trap gratings, hoppers, cleanout plugs shall be measured by number per piece and shall include all items described in the relevant specifications and Schedule of Quantities.

13.7 Painting

 Painting of pipes shall be measured per running metre and shall be inclusive of all fittings and clamps. No deduction for fittings shall be made.

13.8 Excavation for soil pipes

 No payment shall be admissible with respect to excavation, refilling and disposal of surplus earth for cast iron soil and waste pipes laid below ground, in sunken slabs or over basement rafts.

13.9 University Engineer’s decision with respect to the correct interpretation regarding mode of measurement shall be final and binding on the contractor.

**Section 4.**

**Water Supply System**

**1 Scope of work**

1.1 Work under this section consists of furnishing all labour, materials equipment and appliances necessary and required to completely install the water supply system as required by the drawings, specified hereinafter and given in the Schedule of Quantities.

1.2 Without restricting to the generality of the foregoing, the water supply system shall include the following:-

1. Rising main from water supply line to all over head tanks.
2. Distribution system from overhead tank to all fixtures and appliances for cold & hot water.
3. Insulation to hot water pipes within toilets.
4. Connections to all plumbing fixtures, and appliances.

**2 General requirements**

2.1 All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the University Engineer.

2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

2.3 Short or long bends shall be used on all main pipe lines as far as possible. Use of elbows shall be restricted for short connections.

2.4 As far as possible all bends shall be formed by means of a hydraulic pipe bending machine for pipes upto 25 mm dia. bends and elbows may be used for pipe dia greater than 32 mm.

2.5 Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

2.6 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals approved by the University Engineer.

2.7 Valves and other appurtenances shall be so located as to provide easy accessibility for operations, maintenance and repairs.

**3 Water Supply System**

3.1 Contractor should study the site plan and water supply system diagram for overviews of the system.

3.2. Source

a) Water supply will be obtained from captive tube-wells within the site. The rising mains will be connected to the main domestic water tank located on terrace.

3.3 Water supply piping for garden hydrant and sprinkler and irrigation system will be separate and independent connected to a different pumping system.

**4 G.I. pipes, fittings & valves**

4.1 All pipes inside the buildings and where specified, outside the building shall be galvanized steel tubes conforming to I.S. 1239 of class specified. When class is not specified they shall be heavy class.

4.2 Fittings shall be of malleable iron galvanized of approved make. Each fitting shall have manufacturer's trade mark stamped on it. Fittings for G.I. Pipes shall include couplings, bends, tees, reducers, nipples, unions, and bushes. Fittings shall conform to I.S.1879-(Part I to X).

4.3 Pipes and fittings shall be jointed with screwed joints. After cutting a pipe with a hacksaw or a cutting machine care shall be taken to remove burr from the end of the pipe after reaming with a proper file.

4.3.1 Pipe threaded joints will be made by applying suitable grade of TEFLON tape used for drinking water supply**.( Use of red or white lead and sutli will not be permitted for screwed joints)**

4.3.2 All pipes shall be fixed in accordance with layout and alignment shown on the drawings. Care shall be taken to avoid air pockets. G.I. Pipes inside toilets shall be fixed in wall chases well above the floor. No pipes shall be run inside a sunken floor as far as possible. Pipes may be run under the ceiling or floors and other areas as shown on drawings.

4.4 Clamps

 G.I. Pipes in shafts and other locations shall be supported by galvanized M.S. clamps of design approved by University Engineer. Pipes in wall chases shall be anchored by G.I. hooks. Pipes at ceiling level shall be supported on structural clamps fabricated from M.S. structural. Pipes in typical shafts shall be supported on slotted angles/channels as per standard drawings.

4.5 Spacing of clamps, hooks etc. shall be as per good engineering practice approved by the University Engineer.

4.6 Unions

 Contractor shall provide adequate number of unions on pipes 50 mm and below to enable easy dismantling later when required. Unions shall be provided near each gunmetal valve, stop cock, or check valve and on straight runs as necessary at appropriate locations as required and/or directed by University Engineer.

5 Copper Pipes & Fittings

5.1 The fittings will also include male/ female copper to BSP pipe threaded adopters for making connections to all bathroom fixtures, mixtures, valves so that all screwed fittings can be fixed accordingly.

5.2 Contractor shall provide a die-electric brass connector at the point of each connection to the Galvanized vertical risers or mains for cathodic protection of the GI Pipes.

**6 Flanges**

6.1 Trenches

 All water supply pipes below ground shall be laid in trenches with a minimum cover of 60 cms. The width and depth of the trenches shall be as follows:-

6.2 **Dia of pipe Width of trench Depth of trench**

15 mm to 50 mm 30 cms 75 cms

 65 mm to 100 mm 45 cms 100 cms

6.3 Sand filling

 Where specified in the Schedule of Quantities all G.I. pipes in trenches shall be protected with fine sand 15 cms. All-round before filling in the trenches.

6.4 Where shown on the drawings main pipe lines may be run in masonry trenches from the pump house to the buildings in phase I & II , filled up with sand and buried in ground as per architectural /landscape details.

6.5 Painting

6.6.1 All pipes above ground shall be painted with one coat of red lead and two coats of synthetic enamel paint of approved shade and quality. Pipes shall be painted to standard colour code specified by University Engineer.

6.7 Pipe protection

6.7.1 Where specified in the Schedule of Quantities all pipes in chase or below floor shall be protected against corrosion by the application of two coats of bitumen paint covered with bitumen tape and a final coat of bitumen paint before covering up the pipe.

**7 Insulation**

 Hot water pipes within a toilet /kitchen from hot water heater shall be insulated with 6mm thick “Vidoflex “pre formed insulation to be installed as per manufacturer’s instruction.

**8 Valves**

8.1 Ball valves

8.1.1 Valves 50 mm dia and below shall be screwed type ball valves with stainless steel balls spindle Teflon seating and gland packing tested to a hydraulic pressure of 20 kg/cm2. And accompanying couplings and steel handles to B.S. 5351**.**

8.2 Butterfly Valves

8.2.1 Valves 65 mm dia and above shall be cast iron butterfly valve to be used for isolation and/or flow regulation. The valves shall be bubble tight, resilient seated suitable for flow in either direction and seal in both direction. Valves shall be provided with matching flanges with neoprene insertion gasket 3 mm thick

8.2.2 Butterfly valve shall be of best quality conforming to IS: 13095.

8.3 Non Return Valve

8.3.1 Where specified non return valve (swing check type) shall be provided through which flow can occur in one direction only? It shall be single door swing check type of best quality conforming to IS: 5312.

8.3.2 Each butterfly and slim type swing check valves shall be provided with a pair of flanges screwed or welded to the main line and having the required number of galvanized nuts, bolts and washers of correct length.

8.3.3 Sluice valves shall be of approved makes conforming to I.S.:780 of class as specified.

**9** **Storage Tanks**

9.1  **Overhead Tanks**

Overhead water storage tanks for water supply shall be PVT Tanks 4 Layers URO.

**9.2 Tank connection and accessories**

9.2.1 Contractor shall provide the following to each tank:

a) Inlet and outlet connections to main pipe lines.

b) Tank overflows with mosquito proof gratings

c) Scour drain and valve as per drawings

**10 Testing**

10.1 All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 1.5 times the working pressure or 10 kg /cm2 whichever is more. Pressure shall be maintained for a period of at least thirty minutes without any drop.

10.2 A test register shall be maintained and all entries shall be signed and dated by Contractor(s) and University Engineer.

10.3 In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the overhead tanks or pumping system or mains. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

10.4 After commissioning of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.

**11 Measurement**

11.1 G.I. pipes

 G.I. pipes above ground shall be measured per linear metre (to the nearest cm) and shall be inclusive of all fittings e.g. couplings, tees, bends elbows, unions, and flanges. Deduction for valves shall be made. Rate quoted shall be inclusive of all fittings, clamps, cutting holes chases and making good the same and all items mentioned in the specifications and Schedule of Quantities.

11.2 G.I. pipes below ground shall be measured per linear metre (to the nearest cm) and shall be inclusive of fittings, e.g. Couplings, tees, bends, elbows, unions. Deduction for valves shall be made. Rates quoted shall be inclusive of all fittings, excavation, back filling and disposal of surplus earth, cutting holes and chases and making good and all other items mentioned in the specifications and Schedule of Quantities.

11.3 Gunmetal, cast iron, butterfly and non return valves puddle flanges, level indicators and meters shall be measured by numbers.

11.4 Brick masonry chamber for valves and meters shall be measured by number and include all items given in the Bill of quantities.

11.5 Painting/pipe protection

 Painting/pipe protection for pipes shall be measured per linear metre over finished surface and shall include all valves and fittings for which no deduction shall be made.

11.7 University Engineer’s decision with respect to the correct interpretation regarding mode of measurement shall be final and binding on the contractor.

**------ Water supply -----**

**Section 5.**

1.

**1 to 4.3 Deleted**

**4.4 Trench Excavation**

 The trenches for the pipes shall be excavated with bottoms formed to level and gradients as shown on the drawings or as directed by the Engineer’s Representative. In soft and filled in ground, the Engineer’s Representative may require the trenches to be excavated to a greater depth then the shown on the drawings and to fill up such additional excavation with concrete (1:4:8) consolidated to bring the excavation to the required levels as shown on the drawings.

 All excavations shall be properly protected where necessary by suitable timbering, piling and sheeting as approved by the Engineer’s Representative. All timbering and sheeting when withdrawn shall be done gradually to avoid falls. All cavities be adequately filled and consolidated. No blasting shall be allowed without prior approval in writing from the Engineer’s Representative. It shall be carried out under thorough and competent supervision, with the written permission of the appropriate authorities taking full precautions connected with the blasting operations. All excavated earth shall be kept clear of the trenches to a distance equal to 75 cms.

 **4.5 Obstruction of Roads**

 The contractor shall not occupy or obstruct by his operation more than one half of the width of any road or street and sufficient space shall then be left for public and private transit. He shall remove the materials excavated and bring them back again when the trench is required to be refilled. The contractor shall obtain the consent of the Engineer’s Representative in writing before closing any road to vehicular traffic and the foot walks must be clear at all times.

**4.6 Protection of Pipes etc.**

 All pipes, water mains, cables etc. met in the course of excavation shall be carefully protected and supported. Care shall be taken not to disturb the cables, the removal of which shall be arranged by the contractor with the written consent from the Engineer’s Representative.

**4.7 Trench Back Filling**

 Refilling of the trenches shall not be commenced until the length of pipes therein has been tested and approved. All timbering which may be withdrawn safely shall be removed as filling proceeds. Where the pipes are unprotected by concreted haunching, selected fine material shall be carefully hand-packed around the lower half of the pipes so as to buttress them to the sides of the trench.

 The refilling shall then be continued to 150mm over the top of the pipe using selected fine hand packed material, watered and rammed on both sides of the pipes with a wooden hammer. The process of filling and tamping shall proceed evenly in layers not exceeding 150mm thickness, each layer being watered and consolidated so as to maintain an equal pressure on both sides of the pipe line. In gardens and fields the top solid and turf if any, shall be carefully replaced. Contractor shall provide protection of deep trenches in such a way that no body hurt particularly during night.

 **4.8 Contractor to ensure Settlement and Damages**

 The contractor shall at his own costs and expenses, make good promptly during the whole period for the works in hand if any settlement occurs in the surfaces of roads, beams, footpaths, gardens, open spaces etc. in the public or private areas caused by his trenches or by his other excavations and he shall be liable for any accident caused thereby. He shall also, at his own expense and charges, repair (and make good) any damage done to building and other property. If in the opinion of the Engineer’s Representative he fails to make good such works with all practicable dispatch, the Engineer’s Representative shall be at his liberty to get the work done by other means and the expenses thereof shall be paid by the contractor or deducted from any money that may be or become due to him or recovered from him by any other manner according to the laws of land.

 The contractor shall at his own costs and charges provide places for disposal of all surplus materials not required to be used on the works. As each trench is refilled, surplus soil shall be immediately removed, the surface shall be properly restored and roadways and sides shall be left clear.

* 1. **4.9 Deleted**

**4.10 Route Markers**

Markers indicating the particular service shall be provided along with the routes of pipe trenches. Markers shall be of mild steel indicating the type of service installed and the direction of flow painted on it. The markers shall be set firmly in a concrete base and installed at all corner and turning points. Over straight runs, markers shall be spaced centre to centre at 50 meter centre (generally).

**4.11 4.11 Deleted**

**5. FIXING OF GULLY TRAP**

 The excavation for gully traps shall be done true to dimensions and levels as indicated on plans or as directed by the Engineer’s Representative. The gully traps shall be fixed on cement concrete foundation 65cm square and not less than 10cm thick. The mix for the concrete will be 1:4:8. The jointing of gully outlet to the branch drain shall be done similar to the jointing of pipes described earlier. After fixing and testing gully and branch drain, a brick work of specified class in cement mortar 1:5 shall be built with a half brick masonry work round the gully trap from the top of the bed concrete up to ground level. The space between the chamber and trap shall be filled in with cement concrete 1:3:6.The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside the cement mortar 1:3 finish with a floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

Cast iron cover with frame 300 X 300 mm (inside) shall then be fixed on the top of the brick masonry with cement concrete 1:2:4 and rendered smooth. The finished top cover shall be so as to prevent the surface water from entering the gully trap.

**6. Deleted**

**7. Deleted**

 **8.** **COVERS for Inspection Chamber and Gully Traps:**

Covers shall be of size and duty as mentioned in schedule of quantities. Covers shall be of cast iron as per the details given in the drawing and shall be fixed on M S frame embedded in concrete.

 a. Cast iron steps shall be provided at tow corners of the chamber.

b. All Cast Iron and MS items shall be painted with two coats of bitumenstic paint.

 **9. SHIFTING OF EXCAVATED SURPLUS MATERIAL**

Contractor shall make his own arrangement to shift the surplus excavated material as directed by Engineer’s Representative.

TECHNICAL SPECIFICATIONS OF ELECTRICAL ITEMS

 **POINT WIRING (LIGHT, BELL, FAN &PLUG)**

The point wiring shall be confirm IS:5908 - 1970. A point shall consist of the branch wiring from the branch distribution board (modular switch board) together with a switch as required, as far as and including the ceiling rose or socket-outlet or suitable termination. A three-pin socket-outlet point shall include, in addition, the connecting wire or cable from the earth pin to the earth stud of the branch distribution board.

 The installation shall generally be carried out in conformity with the requirements of the Indian Electricity Act, 1910, as amended up to date and the Indian Electricity Rules, 1956.

 The point wiring shall be carried out in the under mentioned manner:

(a) PRIMARY LIGHT POINT: - Supply, installation, fixing of conduits with necessary accessories, junction / inspection / modular switch / outlet boxes.

(b) SECONDARY LIGHT POINT: - Supplying and drawing of wires of required size including insulated earth continuity wire. (Looped from primary point wiring and controlled by the same modular switch.)

(c) Supplying and drawing of wires of required size including insulated earth continuity wire.

(d) Supply, installation and connection of Modular type switches, sockets, screw less cover plates, switch plates, fan regulators etc. as specified.

 (e) The light point shall be complete with branch wiring from the primary light point (switch board to the outlet point) through other loop. Switch boards if necessary in a circuit, conduit with accessories, junction, inspection boxes, control modular switch, modular socket outlet boxes, ceiling roses, connector etc. Unless otherwise mentioned, the system of wiring shall consist of single core 650/1100 volt grade PVC insulated wire with copper conductor laid through concealed in wall and ceiling rigid PVC pipe, conduitsetc. as specified. The rigid PVC pipe shall confirm to IS: 9537 with minimum wall thickness of 1.5mm. The corresponding accessories shall confirm to IS: 3419. The minimum diameter of pipe shall be 20mm.

 The wiring shall be as per colour code viz. Red for R phase, Yellow for Y phase, Blue for B phase, Black for neutral, Green for earth, Grey for control, white for bell point and all off wires shall be same as phase wire. The wiring shall be done in a looping manner. All looping shall be made only in switch boards.

 The switches and socket outlets shall be shockproof modular type, screw less cover plate with silver-coated contacts with ISI Marked IS: 3854.

 The Conduit run on surfaces shall be supported on metallic 1.2mm. thick saddles/heavy duty PVC saddles which in turn shall securely screwed to wall or ceiling. Saddles shall be at intervals of not more than 500mm. Fixing screws shall be with round or cheese head and of rust-proof materials. No cross-over of conduits shall be allowed. Unless it is unavoidable. The entire conduit installation shall be clean and neat in appearance.

 The Conduits embedded into the walls shall be fixed by means of staples at intervals of not more than 500mm. Chases in the walls shall be neatly made with electrically operated masonry wall cutter and shall be refilled after laying the conduit with suitable mortar and brought to the finish of the wall. Conduit burried in concrete structure shall be put in position and securely fastened to the reinforcement. Proper care shall be taken to ensure that the conduits are neither dislocated nor choked out at the time of pouring concrete necessary fish wire shall be drawn in all conduit run.

 The all materials and accessories used shall confirm to Indian Standard Specification. All types of wiring shall be capable of easy inspection. The open (unconcealed) wiring shall run along with walls should run as near the ceiling as possible. All runs of wiring and the exact positions of all points and switch boards shall be first marked on the building and got approved from the in-charge electrical engineer before actual commencement of work.

 The conduit for point wiring shall have a nominal cross-sectional area not less then either 1.00 mm2 copper or as specified. For open type switch boards shall not be erected within 2.5 meter of any washing unit or in bathrooms lavatories on toilets or kitchens. The switchboards shall be recessed in the wall for concealed type wiring. The front shall be fitted with screw less cover plate. Ample room shall be provided at the back for connection and at the front between the accessories mountings. The concealed base shall be of either 16 gauge M.S. or teak wood as specified or instructed

 The Maximum load of each circuit shall not exceed 800 watts and maximum points of each circuit shall not exceed 10 points. Where wiring passes through wall, care shall be taken to see that wire pass very freely through protective pipe [rigid regidpvc pipe and that the wires pass through without any twist or cross in wires, or either ends of holes.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **MAINS AND SUB MAIN:**

The Mains shall be with ISI Marked PVC insulated wire with copper conductor as specified. The size of phase and neutral shall be same while the size of earth conductor shall be as specified in the item. The number and size of conductor shall be as specified in the item. All wires shall be single core multi-strand PVC insulated as per IS:634 and shall be 660 V/1100V. grade. All wires shall be as per colour code viz. Red for R phase, Yellow for Y phase, Blue for B phase, Black for neutral, Green for earth conductor.

 The Necessary connections to control switchgear, MCB Distribution.board, plug etc. shall be made firmly as per requirement and as instructed by in-charge-electrical engineer.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **RIGID PVC PIPE :**

TheRigid PVC pipe shall confirm IS:2509 or ISI marked a specified Rigid PVC pipe shall be 1.5 mm to 1.6 mm. thick manufactured from high grade verging PVC. The diameter of PVC pipe shall be as per specified. Fittings for rigid PVC pipe such as bends, elbows, nipples, couplings, reducers, plugs etc. shall be specifically designed and manufactured for their particular application. All fittings shall confirm to IS:3415.

 The rigid PVC pipe shall be erected on wall/ceiling with properly screwed heavy duty rigid PVC saddles at the intervals not more than 500mm. and pipes to pipes and pipes to fittings shall be fixed with adhesive solution. 16 gauge G.I. fish wire shall be erected with erection of pipe as a drawer wire. The installation of pipes shall be as per IS:4648, IS:732 and IS:1646.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **BELL PUSH**

 The bell push shall be shock proof modular type for 250 V. complete erected in square GI gang box or concealed in wall with screw less front plate.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **MODULAR TYPE 6/16 AMP SWITCH SOCKET**

The 6/16 A socket outlet shall be of 6 pin type (6A & 16 A Combined) in same unit & shall be controlled by 16 A single pole modular type switch with necessary inter connections & earth continuity. The Socket shall confirm IS:1293. The switch & socket shall be erected on GI sang box with screw less front plate sheet.

 The socket outlets shall have provision not to receive the matching plug unless the grounding pin is in correct position.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **TELEPHONE PLUG SOCKET**

The Telephone plug & socket shall confirm Indian Standard Specification or IS:1293 The telephone socket outlet shall be two points type. The dimension of socket and plug shall have silver coated pins & pin seating of exact dimensions. so that pin of plug shall firmly fitted to seat in socket & no loose contact may arise. The connections to socket with telephone cable shall be made by tinned / silvered soldering. The socket shall be of flush mounted modular type as specified.

 The telephone socket shall be erected on concealed box covered with screw less front plate, general specification give in tender booklet shall also be considered as a past of agreement. The telephone plug & socket shall be of approved make as specified in the tender booklet or approved by in-charge electrical.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **CALL BELL INDICATOR :**

The Call bell indicators shall be of approved make as specified or as per instruction of in-charge-electrical engineer. The indicator shall be with Red light indicating lamp with red light push button to attend the call and shall have a buzzer with buzzing sound. The buzzer and indicator shall be suitable for 240 volts, 50 Hz. A.C. electrical power system. The Indicator shall be erected on polished teak wood board of minimum thickness of 25mm. with cover of 3mm. thick laminated sheet. Necessary numbering with engraved PVC label shall be provided on indicator as per instruction given by in-charge-electrical engineer.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **CALL BELL/BUZZERS/GONG TYPE CALL BELL :**

The call bell/buzzers shall be confirming to Indian Standard Specification No. IS:2268-1986 & IS:302-1979. The call bell/buzzers shall be rated for connection to supplies at voltages not exceeding 250 volt A.C. single phase 50 Hz.

 The call bell shall comprise a hammer actuated so as to strike a bell, pipe, strip, gong etc. to produce sound. The buzzer shall be without hammer. The sound shall be produced by the vibration of an armature. The electrical insulation at operating temperature shall be adequate and the leakage current in normal use shall not be excessive. The call bell or buzzer shall operate satisfactorily with a 10% of over voltage and under voltage considering normal voltage of 230 Volt.

 The call bell shall be completely erected on existing polished wooden block or laminated sheet by using chrome plated counter shunned head round steel screws. Necessary connection to supply wire shall be made firmly by soldering and necessary sleeking etc.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

**TRIPLE POLE MCCB, 25 AMP TO 250 AMPS.**

### 1. General

 The circuit breakers shall comply with IEC947.2 & IS 13947 part 2.

 The breaking capacity performance certificates shall be available for category A to the above mentioned standards. . The test shall be carried out under the breaking performance during operation (Ics) equal to 50 % of the ultimate breaking capacity (Icu). Certificate for all the sequences **(Sequence 1 mandatory)**should be available.

All circuit breakers shall have a rated operational voltage of 600V AC (50/60Hz).

The rated insulation voltage shall be 600V and 660V at 50/60 Hz. for low breaking capacity and high breaking capacity MCCBs respectively.

 Thermal overload release adjustment can be done from a single point. MCCB cover need not to be opened for doing such adjustment.

There should be different levels of breaking capacities starting from 10kA upto 50kA for flexibility in selection.

The breaker shall be maintenance free and fully tropicalized.

 It shall either be 3 poles or 4 poles (switched neutral).

Production site organization shall be certified to comply with ISO 9001 standard.

### . Construction

Operating mechanism shall be of the quick make quick break type, with the speed of operation independent of the operator, and mechanically trip free from the operating handle so as to prevent the contacts from being held closed against short-circuit and overload conditions. The operating mechanism shall be constructed to operate all poles in a multi-pole breaker simultaneously during opening, closing and tripped conditions.

It shall not require any external power supply to operate the tripping mechanism.

The breakers shall be operated by a toggle which shall clearly indicate the

three fundamental position ON, OFF and TRIPPED.

 If required, the breaker will be equipped with rotary handles.

The breaking and extinction of the electrical arc shall be achieved by means of non-welding contacts and an arc chute surrounding these contacts.

If required all electrical accessories should be fitted by manufacturer to avoid tampering at site.

### 3. Characteristics

 The protection unit shall have as required.

Variable overload setting from 80 to 100% of In. The setting knob should be centrally adjustable from front.

 MCCB cover need not to be opened for carrying out adjustment.

Short circuit setting should be fixed at 10In +/- 20% as specified in IEC 947 and IS:13947 part2.

 Earth fault protection (when required) shall be provided as an integral part.

1/2

### 4. Operation

If required, the breaker shall be provided with the facility for padlocking and door interlocking.

The electrical and mechanical endurance of the moulded-case circuit breakers should be as defined by IEC 947-2 standard.

The moulded-case circuit breakers shall be equipped with a "push to trip" button in front to test operation and
the opening of the poles.

The circuit breaker rating, the "push to trip" button, outgoing circuit identification and the contact position indication must be clearly visible and accessible from the front, through the front panel or the door of the switchboard.

**5.** **Options**

 It shall be possible to combine the following functions into the circuit breaker

 Earth fault protection

Remote indication of circuit breaker trip condition and operational conditions (ON/OFF).

 Auxiliary contacts, alarm contacts should be available if required.

 6. Installation

 It should be possible to terminate Aluminium cable of required size for the defined current carrying capacity. The requisite size should be made available by means of extended terminals (as a standard offer) in case the direct terminals are not of adequate size. Adequate phase to phase clearance has to be ensured in case of extended terminations.

2/2

The circuit breaker should provide the flexibility of terminating line and load from any direction. Manufacturers should test the circuit breaker for this condition and requisite test certificate should be available.

Phase barrier should be provided as a standard feature.

 **FOUR POLE CHANGE OVER SWITCH, 16A TO 400A.**

The Change over switch shall be iron clad or metal clad with four pole system. Side operated or front operated handle switching mechanism shall be provided as specified or approved by in-charge-electrical engineer. The C.O. switches shall be 'OFF' load or 'ON' load system as per the demand of in-charge-electrical engineer. The capacity of switchgears shall be as specified in schedule - 'B'. The C.O. switch shall be double break type suitable for load break duty (AC-23), quick make and break action. The operating mechanism shall be interlocked so as to prevent opening of the door when the switch is in 'ON' position and also prevent closing of the switch when the door is not properly secured. All contacts shall be silver plated. The two incoming and one outgoing of switch shall adequately sized to receive proper size of cables. Kit Kat pattern or HRC type fuse links shall be provided as specified or instructed. The switch shall confirm IS:2208-1962 and IS:4047 - 1967 as amended to date.

 The switch shall be erected on angle iron frame duly coloured with two coats of enameled paint of approved quality and shade or on polished wooden board as specified.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

###  BUSBAR CHAMBERS

 The busbar chamber and busbar shall conform IS: 375.

 The busbar chamber shall be fabricated with sheet steel of thickness not less than 3mm. having hinged doors. The chamber shall be made dust and vermin proof with the help of synthetic neoprene rubber gasket on all sides. The cover/door shall be secured to the box with cadmium plated iron screws. The busbar chamber shall be painted with a coat of primer red oxide paint and finished with two coats of enamel paint of approved shade.

 The busbar shall be air insulated and made of high quality, conductivity and strength copper/Aluminium as specified conforming to relevant Indian Standards and shall be of sufficient cross section as specified. The busbar shall be of 3 phases and neutral system with separate neutral and earth bar. The cross section of the neutral busbar shall be the same as that of the phase busbar for the capacities upto 400Amp. and for higher capacities the neutral busbar must not be less than half the cross section of the phase busbar. The bus bars shall be of rectangular cross-section designed to withstand full load current at the rated voltage. The busbar shall have uniform cross section throughout the length. The busbar shall be warped with coloured heat shrinkable insulated PVC sleeves/tape.

 The busbar shall be firmly fixed on supports constructed from a suitable insulated materials such as phonolic lamination/DMC. The busbar supports shall be unbreakable, non-hygroscopic and sufficiently robust to withstand electro mechanical stresses produced in the event of short circuit. The busbar supports shall be placed at sufficiently close intervals to prevent busbar sag.

 The minimum clearance to be maintained for rated voltages upto 600 volts shall be between phase to phase 32 mm. and phase to earth 25mm. The busbar shall be isolated with 3 mm. bakelite sheet to avoid any accidental contact.

 The Connections to busbar of ratings more than 400 mp.shall be made with clamping arrangement with bolts and nuts and for busbar of smaller ratings, use of holes drilled into the busbar shall be made. The bolts and nuts used for connections to busbar shall be of aluminium alloy or tinned forged brass or tinned copper. Suitable precaution shall be taken against heating due to bimetallic contact. Tapping of connections from busbar shall be made with PVC insulated wire of suitable size for current capacities upto 100 Amp. and for higher current capacities solid conductor strip suitably insulated with PVC sleeve tape with soldered or crimped lugs.

 The busbar chamber shall be erected on wall on polished teak wood block of width minimum 25mm. or on angle iron frame as specified and directed.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **METAL CLAD DISTRIBUTION BOARDS**

TheMetal Clad Distribution Boards shall have incoming of MCB 63/40 amp four pole / double pole switch &out going MCB of 6 Amp to 32 Amp single pole, operating & short circuit tripping elements of breaking capacity of 10 KA conforming to ISS 8828/1996 with ISI Mark suitable size of neutral link of tinned copper busbar link with all necessary interconnecting. MCB should be erected in surface type in 16 SWG MS sheet cover **(Double door type)** complete suitable integral single piece construction with suitable category mentioned in tender schedule ''B'' and approved make as per list of tender booklet should be given on angle iron frame with necessary earthing.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **METAL CLAD MCB PLUG**

The MCB-SPN of 'G' series of 20 Amp.shall be with ISI mark of Indian standard specification No. IS:8828/1996. MCB shall be with overload and short circuit tripping elements. The breaking capacity of fault current of MCB shall not be less than 1000 Amp. ata electric pressure of 230 volt.

 The Metal clad socket and MCB-SPN shall be incorporated in company fabricated powder coated sheet steel enclosure. The metal clad socket and MCB shall be embedded in sheet steel enclosure. The enclosure shall be fabricated from 2.0mm. thick mild steel. Separate screwed earth terminal shall be provided in enclosure for earthing purpose. The enclosure shall have knockout holes of required diameter for suitable conduit/cable entry.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **ELCB**

The ELCBs shall be of approved make & should be conforming to IS:12640/1988 & BS:4293/1983 having sensitivity of 30 MA & breaking capacity of 10 KA & suitable for 240/415 V 40 Amp. Rating ELCBs should have characteristics of quick acting & tripping with all advanced features & do not incorporate any electronic component. The wiring for connection shall be used of PVC copper wires of adequate capacity with proper size of lugs.

 The ELCBs shall be erected on polished wooden board as per direction of Engineer in charge.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **DANGER NOTICE BOARD:**

The danger notice board shall be as per IS:2557 Danger notice plates. The danger notice board shall indicate danger notice both Hindi and English and with a sign of skull and bone. Overall dimension of the board shall be 200mm. wide 150mm. high, 1.5mm. minimum thickness prepared from M.S. steel sheet. The plate shall be painted white with vitreous enamelled paint on both front and rear surface of the plate. The letter, the figure, the conventional skull and bone shall be in signal red colour as per IS:5/1978 and shall be positioned on the plate as per IS:2551 - 1982. The danger plate shall have rounded corners. The danger notice board shall be affixed in a permanent manner with screwing with the help of chrome plate screws on four corners at the place and height as per instruction of in-charge-electrical engineer.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **COPPER WIRE**

 The copper wire of 1 mm² up to 6mm² shall be use for earthing of switch gear. The wire shall be pvc insulated copper Wire. The copper wire shall be erected as per the requirement and instruction of Engineer in charge.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **EARTHING**

The earthing of an installation shall confirm to I.E. Electricity Rules, IS-3043, latest edition and I.E.E. The copper earth plates should be tinned before installation. The earth plates of Cast iron, having size of 30 x 30 x 0.35 cms. in separate pit. Specially prepared 2.5 mtr deep with necessary to real moist earth surface. The earth pit should be provided with 40 mm dia GI Pipe 2 mtr long. Alternative layers of salt and coke shall be provided surrounding the plate.

 The pits shall be filled whessn the plates are in position and in presence of Engineer in Charge. The earthing resistance of each earth plate should be measured by resistance meggar in the presence of Engineer in Charge. Three days after the completion of earthing work the value should conform to regulations.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **PVC INSULATED CABLE 2, 3, 3½ & 4 core**

 **Scope :-**The Scope of work shall cover supply, laying, connecting, testing and commissioning of low and medium voltage power cabling.

 All Cables shall be as per relevant Indian Standard with ISI Mark.

 **Materials :-**All cables shall be 1100 volt grade PVC insulated, PVC sheathed aluminium or copper conductor with or without armouring as specified and with an outer pvc protective sheath heavy duty. Cables shall have high conductivity stranded aluminium or copper conductors and cores colour coded to the Indian Standard. Type designation and core identification of cables shall be as per relevant Indian Standard.

 All cables shall be new without any kind of visible damage. The manufacturers name, insulating materials, conductor size, voltage class and IS mark shall be marked on the surface of the cable at every 600mm length.

 **General :-** The cable shall be supplied in single length i.e. without any intermediate joint. The cable ends shall be suitably sealed against entry of moisture, dust, water etc. with cable compound as per standard practice.

 **Installation :-** Cable shall be laid in the routes as directed by in-charge Electrical Engineer.

 Cable running indoors shall be laid on walls or ceiling as per the site situation. Cables shall be fixed directly to wall or ceiling and supported with G.I. saddles / clamps at not more than 500 mm. interval with chrome plated screws.

 In case of cables buried directly in ground, cables shall be laid in an excavated trench not less than 900 mm from G.L., over a sand or soft earth cushion to provide protection against abrasion.

 In case cables entering the building or one room to another it would be done through porcelain / PVC pipes. After erection the pipes shall be sealed with M-seal.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **LIGHT CLASS PIPE**

 The Light class pipe shall be of galvanised iron “A” Grade pipe having 25/50 mm. to be erected on road crossing or on floor as directed for laying cable.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **BRASS CABLE GLAND & LUG**

The cable gland shall be of polished brass, double compression type and ends shall be shrouded. The inner size of gland should be suitable to received suitable size of cables. The cable glands shall be heavy duty and shall be fixed with switch fuse unit with suitable brass washers with rubber ring/gasket.

 The gland shall be erected with outgoing tails, insulating tape etc. complete in appropriate manner. The contractor shall drill holes for fixing glands.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **FLUORESCENT TUBES, 28 WATT & 36/40 WATT.**

The fluorescent tubes shall have bi-pin bases and a minimum approximate rated and guaranteed life of 6000 hrs. The colour spectrum of light shall be equivalent to Philips 'white'. The tubular fluorescent lamp for general lighting service shall confirm IS:2418:1977 (Part-1 to Part-4). The lamps shall be rated for operating on 230V/250V as directed by in-charge-electrical engineer.

 The lamp shall be with G-13 bi-pin caps and shall have colour temperature of 6500 K. The lamp shall be rated with nominal starting and operating current of 0.60 Amp. and 0.43 Amps. The nominal luminous flues shall be approx for 20Watt tube 970 LM, for 36 Watt tube 2450 LM and 40 Watt tube 2550 LM. The dimensions of lamps shall be 38mm. dia and 604mm. length for 20W. 26mm. dia and 1213 mm. length for 36 Watt and 38mm. dia and 1213mm. length for 40 Watt.

 The lamps shall be fixed in the fixtures hung fixed at a height not less than 2.5 meter above the floor/ground level as the case may be. The lamps fused before during the final testing of installation shall be replaced by the contractor at his own cost and no extra payment shall be made for such replacement.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **cfl lAMP**

 The CFL lamp shall be fluorescent type and shall be rated for operating on 230 Volts or 250 Volts as specified.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **BOX TYPE FLU TUBE FITTING**

 The Box type flu. fitting should be have sheet metal stove enameled grey housing fitted with gear tray, open type copper wound choke/ballast, rotary tube holders & tube starter & PF Capacitor of 1.5 mfd. All accessories should be pre-wired up to terminal block. The fitting should be equipped with earth terminal & shall be suitable for mounting on surface or down rod as per requirement on site. The fitting should be suitable for one tube of 40 watt - 120 cms fluorescent tube.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **MIRROR OPTICS FITTINGS :**

 The fitting shall be installed at mounting heights recessed in false ceiling or pendent mounting as specified in the item or as per instruction of in-charge-electrical engineer. Fixtures shall be completely wired. Wiring within the fixture and for connection to the branch circuit wiring shall be not less than 2.5 sp.mm. with copper conductor. Metal used in the fixtures shall be not less than 22 SWG. The metal parts of the fixtures shall be completely free from burns and tool marks.

 The Fitting shall be complete with all accessories like power factor improvement capacitors, ballast, starter, End plates, side holders etc. The ballast shall be as per IS:6616 with a low power losses. Ballast shall contain a thermosetting type compound not subject to softening or liquefying under any operating conditions. The starter shall be of safety type. It shall have bimetal electrode.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **DOWN ROD FOR FITTING**

 The Down Rod shall be made of 16 SWG conduit pipe white painted with ball sockets and nipples for suspension of fitting and shall be erected with consealed M.S. box covered with 3mm thick laminated sheet with check nuts. The length of the down rod shall be 45 to 50cm. according to the requirement of site.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **CEILING MOUNTED CFL FITTING**

 The CFL fitting shall be decorative type surface mounted mirror optic luminaire consisting of 9 / 11 / 13 watt tube, ballast, holder clear / opal diffuser and shall be rated for operating on 230 Volts or 250 Volts as specified.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **CEILING FAN**

 The Ceiling Fans shall conform Indian Standard Specification IS:374-1979. The enclosure of motors of Ceiling Fans shall be of the totally enclosed type. The enclosure of regulators shall be ventilated type. The stamping of fan motors shall be made from electrical steel sheet. The Ceiling Fans shall have three numbers well balanced blades made from metal or other suitable material. The blades and motors shall be securely fixed so that they do not lossen in operation.

 The size of Ceiling Fans shall be as specified. The Ceiling Fans shall be suitable for operation on electric A.C. single phase 230 volt, 50 Hz power supply. Proper type of lubrication bearings shall be used to ensure a reasonable amount of silent operation.

 The earthing terminal shall be provided on the suspension system. The live parts shall not be accessible in the assembled fan and regulator. capacitor of the fan shall conform IS:1709-1960. The suspension system shall be either bolted or screwed at the motor end and the suspension system shall be either bolted or screwed at the motor end and the suspension end. The suspension system of the Ceiling Fans shall be of adequate strength to with stand a tensile load of 1000 Kg without breakage and a torsion load of 500 Kg without breakage current carrying parts and other metal parts shall be corrosion resistant under normal conditions. The terminals shall be prepared from stainless steel or other corrosion resistant alloys. Radio and television interference suppressors shall be fitted.

 The Regulators shall be capable of reducing the speed of the fan at least 50 percent of the full speed. The regulators shall be provided with an off portion and minimum five running positions excepts in case of continuously variable electronic type speed regulators. The regulator handle or knob shall either be of insulating material or adequately electrically and thermally insulated metal. The mechanism of the regulator shall be so designed to ensure positive contact at each running position. The voltage drop across the electronic type regulators at the maximum speed position shall not exceed 2% of the service value at the test voltage and at full speed shall be as per I.S.S.

 The Ceiling Fans shall be connected with ISI marked twin twisted flexible wire of size not less than 24/0.2mm.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **DOWN ROD FOR FAN**

 The Down Rod shall be made of 19 / 20mm nominal bore “B” class G.I. pipe white painted suitable for erection of ceiling fan. The length of the down rod shall be 45 cm. according to the requirement of site.

 The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **CONCEALED FAN HOOK WITH M.S. BOX:**

 The dimensions M.S. box shall be 175 x 175 x 75 mm. The wall thickness of the box shall be 16 gauge 15 mm. dia. M.S. rod in the shape of 'U' with their vertical legs bent horizontally at the top at least 19mm. on either side and shall be inserted through M.S. box on both sides. At the time of erection, the two ends of M.S. rod shall be bound to the top reinforcement of the roof. Necessary knockout on both sides in the centre shall be made in M.S. box for entry of conduit in the box.

 The entire fan hook shall be so fabricated that the fans revolve steadily. The size of fan hook shall be of such that the hook shall be completely hide by the top canopy of the fanned and the fans revolve steadily and bushing in the top suspension.

 The box shall be free from burns, fins and internal roughness. During erection care shall be taken the outer surface of the box shall properly flush with the ceiling. There shall be full threaded holes on four corners of box for fixing screws.

 The laminated sheet shall be 2.5 mm. thick and erected to cover the fan hook or M.S. Box. The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

 **RECESS IN WALL OR WINDOW FRAME:**

The recess shall be made in wall or window frame suitable for erection of exhaust fan as per the instruction of in-charge-electrical engineer.

 The wall shall be refinished with smooth plastering then colour washing shall be made to match the colour of wall. The window shall be repainted with two coats of enameled paint as per original colour of window. Necessary expanded metal shall be provided in order to render the fitting in accessible and the room water-proof.

 The whole work shall be done as per the instruction of in-charge-electrical engineer without any damage to civil construction by using precise instruments of cutting masonry or wood as per necessity.

BEFORE ENERGISING THE SYSTEM, THE FOLLOWING TESTS SHOULD BE GIVEN BY THE CONTRACTOR, SO AS TO FIND OUT THE INSTALLATION CONFIRM THE RELEVANT RULES/REGULATIONS:-

1. Earth resistance test.
2. Earth continuity test of conduit pipe or other Iron clad system etc.
3. Polarity test.

All the conduit pipe to be used on the work shall be of heavy gauge welded screwed type conduit pipe upto 32mm dia. Made of 1.6 mm thick M.S. sheet and more than 32mm dia 2.0 mm thick sheet. For the purpose of checking gauge of the sheet the under noted weight of various sizes of conduit shall be considered as standard weight and considered by the contractor must confirm to these weight.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nominal size/outside Diameter of Conduit** | **Tolerance of Outside diameter** | **Minimum outside diameter(1) –(2)** | **Minimum Wall thickness** | **Weight per metreGm/meter** |
| **1** | **2** | **3** | **4** | **5** |
| **20** | **-0.3** | **19.7** | **1.6** | **735** |
| **25** | **-0.4** | **24.6** | **1.6** | **935** |
| **32** | **-0.4** | **31.6** | **1.6** | **1215** |
| **40** | **-0.4** | **39.6** | **2.0** | **1910** |
| **50** | **-0.5** | **49.5** | **2.0** | **2660** |
| **63** | **-0.5** | **62.5** | **2.0** | **3340** |

The whole system of conduit in a building shall be erected and the inside of it thoroughly dried of all swathing or dampness by means of drawing in a cloth fixed to steel fish wire through it before the conductors are put into it further before putting conductors in the conduit pipe the earth continuity test of whole the system should be taken by the Engineer In charge who would submit the result of factual test to the University Engineer along with the bill. It would the responsibility of the contractor to arrange and given such tests.

All the cable, poles and street light fittings etc. to be purchased by the contractor form the manufacturers for installation at the site of works shall be inspected in the premises of the factory it-self by the concerned Engineer in charge/ University Engineer before the material is received at site by the contractor. This will be a binding on the contractor to inform the concerned Engineer in charge/ University Engineer under whom the work is to be executed while placing orders at their levels.

The firm shall have to supply any documents if so desired by the Engineer-in-charge in support of the authenticity of the makes of the material brought at site.

The contractor shall be responsible for maintaining the light including the replacement of lamps, chokes, ingnitors, starters etc. for a period of one year after the completion of work and final payment shall be released to the contractor only after the work is handed over to the Department complete in all respect.

The contractor shall be responsible to visit the client / consultant at manufacturer / factory for inspection of electrical installation items like panel / feeder pillar and others before the material is received at site.For this no expenditure will be given to the contractor. The contractor shall also be responsible to co ordinate all the people.

***SPECIAL NOTE***

**PROCEDURE TO BE FOLLOWED FOR ELECTRICAL WORKS.**

1) It is to clarify that where “Engineer-in-charge” word is written in Item No. tender form that is to be understood as “University Engineer” shall be the Engineer in charge for Electrical work shown in Bill of Quantities/Schedule–B

2) The Contractor whose tender is accepted, shall have to enter in to agreement with the Registrar RGNUL Patiala.

3) The Electrical works as per Schedule-B of Bill of Quantities shall be supervised, measured, billed passed by the University Engineer RGNUL.

4) The decision and instructions regarding Electrical works given by the University Engineer RGNUL shall be binding to the contractor and the shall be liable to act in accordance with the instruction issued for the quality and workmanship etc.

5) The contractor shall observed the prevailing Rules and procedure for the Electrical work before during and after execution of Electrical works, as directed by the Engineer in charge RGNUL Patiala.

6) The Electrical works shall be carried out and completed simultaneously with civil works. The Electrical materials shall be approved before starting the electrical work by the contractor from the Engineer in charge.

**LIST OF MAKES FOR ELECTRICAL ITEMS**

|  |  |  |
| --- | --- | --- |
| **Sr. No.** | **Brief Description of material** | **Name of approved makes** |
| **1** | **PVC Conduit Pipe and Accessories** | **POLYINDIA/AKG / BEC**  |
| **2** | **MS / GI Conduit Pipe** |  **BEC / AKG / GUPTA /NIC/** |
| **3** | **MS / GI Conduit Pipe Accessories** | **STEEL MARK/ BEC / AKG / GUPTA /NIC.** |
| **4** | **Copper/ Aluminium conductor cables/wires 1100 volts grade.** |  **POLYCAB / R.R KABLE/ HAVELL’S.** |
| **5** | **Wires & cables (flexible cables & Wire), LSFR (Low smoke fire retardant).** | **POLYCAB / R.R KABLE/ HAVELL’S.** |
| **7** | **DB & MCB :** | **SCHNEIDER/ LEGRAND /SEIMENS.** |
| **8** | **ELCB / RCCB** | **SCHNEIDER/ LEGRAND /SEIMENS.** |
| **9** | **Measuring Instruments** | **MECO / RISHAB / SIMCO / INDOTECH / HPL.** |
| **10** | **Switches, Socket, bell push** |  **NORTH WEST (Convex) / LEGERAND (Myrius)** |
| **11** | **Ceiling Fan / Exhaust fan.** | **CROMPTON / HAVELL'S / ORIENT ( ISI Energy saver 5 Star rating fans)** |
| **12** | **CT's** | **AE / KAPPA / NIPPEN / AREVA / L&T** |
| **13** | **INDUSTRIAL SOCKET / JUNCTION BOX** | **NEPTUNE / LEGRAND / HAVELL'S.** |
| **14** | **TAG BLOCK** | **KRONE.** |
| **15** | **Light Fixtures** | **PHILLIPS / WIPRO / CROMPTONS/ HAVELL’S.** |

**NOTE-**

**1 Beside the above Makes / Brands equivalent Quality make can also be used with the prior approval of the Engineer -In-charge in writing.**

**2 Any material/ item having logo of “a quality brand from \_ \_ \_ \_ “is not allowed.**

**NOTE-**

**1 Beside the above Makes / Brands equivalent Quality make can also be used with the priorapproval of the Engineer -In-charge in writing.**

**2 Any material/ item having logo of “a quality brand from \_ \_ \_ \_ “is not allowed.**

**SECTION- VI**

#### SECURITIES AND OTHER FORMS

PERFORMANCE GUARANTEE OF CONTRACTOR

# Bank Guarantee No.:­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_ dated :­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Issuer of Bank Guarantee :**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(*name of the bank*)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (hereinafter referred to as the “Bank”)

**Beneficiary of Bank Guarantee :**

Registrar,

RGNUL.

On behalf of

Employer RGNUL.

**Nature of Bank Guarantee :**

Unconditional and irrevocable Bank Guarantee.

**Context of Bank Guarantee :**

Contract Agreement dated \_\_\_\_\_\_\_\_\_ (hereinafter referred to as the “Agreement”), executed between the Employer acting through the Registrar RGNUL, Patiala (“hereinafter referred to as the “Employer”) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(hereinafter referred to as the “Contractor”) for the construction of “‘**Construction of Construction of Mess First Floor for Boys & Girlsincluding internal & external Public Health & Electrical Services in RGNUL,Campus at village Sidhuwal, Patiala,**Provided however, such context of the Bank Guarantee or reference to the Agreement in this Bank Guarantee shall in no manner be relied upon at any stage to adversely affect or dilute the unconditional and irrevocable nature of this Bank Guarantee. The titles of this Guarantee i.e. “Performance Guarantee” shall in no manner and at no stage be relied upon to adversely affect or dilute the unconditional and irrevocable nature of this Bank Guarantee.

**Operative part of the Bank Guarantee :**

1. At the request of the Contractor, we \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (*name and address of the bank*), (hereinafter referred to as the “Bank”), do hereby unconditionally and irrevocably affirm and undertake that we are the Guarantor and are responsible to the Employer i.e. the beneficiary on behalf of the Contractor, upto a total sum of Rs.\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Lakhs Only), such sum being payable by us to the Employer immediately upon receipt of first written demand from the Employer.

2. We unconditionally and irrevocably undertake to pay to the Employer on an immediate basis, upon receipt of first written demand from the Employer and without any cavil or argument or delaying tactics or reference by us to Contractor and without any need for the Employer to convey to us any reasons for invocation of the Guarantee or to prove the failure to perform on the part of the contractor or to show grounds or reasons for the demand or the sum specified therein, the entire sum or sums within the limits of Rs.\_\_\_\_\_\_\_\_ Lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs Only).

3. We hereby waive the necessity of the Employer demanding the said amount from Contractor prior to serving the Demand Notice upon us.

4. We further agree and affirm that no change or addition to or other modification to the terms of the Agreement, shall in any way release us from any liability under this unconditional and irrevocable Guarantee and we hereby waive notice of any such change, addition or modification. We further agree with the Employer that the Employer shall be the sole and the exclusive judge to determine that whether or not any sum or sums are due and payable to him by Contractor, which are recoverable by the Employer by invocation of this Guarantee.

5. This Guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor. We undertake not to withdraw or revoke this Guarantee during its currency/ validity period, except with the previous written consent of the Employer through Registrar, RGNUL, Patiala on behalf of RGNUL, Patiala.

6. We unconditionally and irrevocably undertake to pay to the Employer through Registrar RGNUL, Patiala on behalf of the RGNUL any amount so demanded not exceeding Rs.\_\_\_\_\_\_\_\_ Lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs Only) notwithstanding any dispute or disputes raised by Contractor or anyone else in any suit or proceedings before any dispute review expert, arbitrator, court, tribunal or other authority, our liability under this Guarantee being absolute, unconditional and unequivocal. The payment so made by us under this Guarantee to the Employer, shall be a valid discharge of our liability for payment under this Guarantee and the Contractor shall have no claim against us for making such payment.

7. This unconditional and irrevocable Guarantee shall remain in full force and effect and shall remain valid until \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Notwithstanding any contained herein:

Our liability under this Bank Guarantee shall not exceed Indian Rs.\_\_\_\_\_\_\_ lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs Only).

This unconditional and irrevocable Bank Guarantee shall be valid w.e.f. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_.

We are liable to pay the guaranteed amount or any part thereof under this unconditional and irrevocable Bank Guarantee only and only if the Employer through Registrar, RGNUL, Patiala on behalf of the RGNUL serves upon us a written claim or demand on or before\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Authorized Signatory

*For Bank*

UNCONDITIONAL AND IRREVOCABLE BANK GUARANTEE

# Bank Guarantee No.:­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_ dated :­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Issuer of Bank Guarantee:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(*name of the bank*)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (hereinafter referred to as the “Bank”)

**Beneficiary of Bank Guarantee :**

Registrar,

RGNUL,

On behalf of RGNUL.

**Nature of Bank Guarantee:**

Unconditional and irrevocable Bank Guarantee.

**Context of Bank Guarantee :**

Security for Mobilization Advance in pursuance of Clause 51.1 of the Engineering Procurement and Construction (EPC) Contract Agreement dated \_\_\_\_\_\_\_\_\_ (hereinafter referred to as the “Agreement”), executed between the RGNUL acting through the Registrar, RGNUL (“hereinafter referred to as the “Employer”) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(hereinafter referred to as the “Contractor”) ‘**Construction of Mess First Floor for Boys & Girlsincluding internal & external Public Health & Electrical Services in RGNUL Campus at village Sidhuwal, Patiala,** (hereinafter referred to as the “project”), provided however, such context of the Bank Guarantee or reference to the Agreement in this Bank Guarantee shall in no manner be relied upon at any stage to adversely affect or dilute the unconditional and irrevocable nature of this Bank Guarantee.

Operative part of the Bank Guarantee:

1. At the request of the Contractor, we \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (*name and address of the bank*), (hereinafter referred to as the “Bank”), do hereby unconditionally and irrevocably affirm and undertake that we are the Guarantor and are responsible to the Employer i.e. the beneficiary on behalf of the Contractor, upto a total sum of Rs.\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Lakhs Only), such sum being payable by us to the Employer immediately upon receipt of first written demand from the Employer.

2. We unconditionally and irrevocably undertake to pay to the Employer on an immediate basis, upon receipt of first written demand from the Employer and without any cavil or argument or delaying tactics or reference by us to Contractor and without any need for the Employer to convey to us any reasons for invocation of the Guarantee or to prove the failure on the part of the Contractor to repay the amount of Mobilization Advance or to show grounds or reasons for the demand or the sum specified therein, the entire sum or sums within the limits of Rs.\_\_\_\_\_\_\_\_ Lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs Only).

3. We hereby waive the necessity of the Employer demanding the said amount from Contractor prior to serving the Demand Notice upon us.

4. We further agree and affirm that no change or addition to or other modification to the terms of the Agreement, shall in any way release us from any liability under this unconditional and irrevocable Guarantee and we hereby waive notice of any such change, addition or modification. We further agree with the Employer that the Employer shall be the sole and the exclusive judge to determine that whether or not any sum or sums are due and payable to him by Contractor, which are recoverable by the Employer by invocation of this Guarantee.

5. This Guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor. We undertake not to withdraw or revoke this Guarantee during its currency/ validity period, except with the previous written consent of the Employer (i.e. Registrar, RGNUL, Patiala on behalf of the Vice Chancellor, RGNUL, Patiala.

6. We unconditionally and irrevocably undertake to pay to the Employer (i.e. Registrar, RGNUL, Patiala on behalf of the Vice Chancellor, RGNUL, Patiala any amount so demanded not exceeding Rs.\_\_\_\_\_\_\_\_ Lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs Only) notwithstanding any dispute or disputes raised by Contractor or anyone else in any suit or proceedings before any dispute review expert, arbitrator, court, tribunal or other authority, our liability under this Guarantee being absolute, unconditional and unequivocal. The payment so made by us under this Guarantee to the Employer, shall be a valid discharge of our liability for payment under this Guarantee and the Contractor shall have no claim against us for making such payment.

7. This unconditional and irrevocable Guarantee shall remain in full force and effect and shall remain valid until \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Notwithstanding any contained herein:

Our liability under this Bank Guarantee shall not exceed Indian Rs.\_\_\_\_\_\_\_ lakhs (Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lakhs Only).

This unconditional and irrevocable Bank Guarantee shall be valid w.e.f. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_.

iii) We are liable to pay the guaranteed amount or any part thereof under this unconditional and irrevocable Bank Guarantee only and only if the Employer (i.e Registrar, RGNUL, Patiala on behalf of the Vice Chancellor, RGNUL, Patiala serves upon us a written claim or demand on or before\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Authorized Signatory

 *For Bank*

 INDENTURE FOR SECURED ADVANCES

 FORM 31

(for use in cases in which the contract is for finished work and the contractor has entered into an agreement for the execution of a certain specified quantity of work in a given time)

 This indenture made the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_day of \_\_\_\_\_\_\_\_\_\_\_\_\_\_
20 \_\_\_\_BETWEEN \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (hereinafter called the contractor which expression shall were the context so admits or implies be deemed to include his executors, administration and assigns) or the one part and the Employer of the other part.

 Whereas by an agreement dated\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(hereinafter called the said agreement) the contractor has agreed.

 AND WHEREAS the contractor has applied to the Employer that he may be allowed advance on the security of materials absolutely belonging to him and brought by him to the site of the works the subject of the said agreement for use in the construction of such of the works as he has undertaken to executive at rates fixed for the finished work (inclusive of the cost of materials and Labour and other charges).

 AND WHEREAS the Employer has agreed to advance to the Contractor the sum of Rupees\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the security of materials the quantities and other particulars of which are detailed in Accounts of Secured Advances attached to the Running Account bill for the said works signed by the Contractor on \_\_\_\_\_\_\_\_\_\_\_\_and the Employer has reserved to himself the option of making any further advance or advances on the security of other materials brought by the Contractor to the site of the said works.

 NOW THIS INDENTURE WITNESSETH that in pursuance of the said agreement and in consideration of the sum of Rupees\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on or before the execution of these presents paid to the Contractor by the Employer (the receipt where of the Contractor doth hereby acknowledge) and of such further advances (if any) as may be made to him as a for said the contractor doth hereby covenant and agree with the Governor and declare as follows:

(1) That the said sum of Rupees\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so advanced by the Employer to the Contractor as aforesaid and all or any further sum of sums advanced as aforesaid shall be employed by the Contractor in or towards expending the execution of the said works and for not other purpose whatsoever.

(2) That the materials details in the said Account of Secured Advances which have been offered to and accepted by the Employer as security are absolutely the Contractor’s own property and free from encumbrances of any kind and the contractor will not make any application for or receive a further advance on the security of materials which are not absolutely his own property and free from encumbrances of any kind and the contractor indemnified the Employer against all claims to any materials in respect of which an advance has been made to him as aforesaid.

(3) That the materials detailed in the said account of Secured Advances and all other materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereafter called the said materials) shall be used by the Contractor solely in the execution of the said works in accordance with the directions of the Engineer.

(4) That the Contractor shall make at his own cost all necessary and adequate arrangements for the proper watch, safe custody and protection against all risks of the said materials and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the Contractor’s custody and on his own responsibility by him. In the event of the said materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in a greater degree than is due to reasonable use and wear thereof the Contractor will forthwith replace the same with other materials of like quality or repair and make good the same required by the Engineer.

(5) That the said materials shall not be any account be removed from the site of the said works except with the written permission of the Engineer or an officer authorized by him on that behalf.

(6) That the advances shall be repayable in full when or before the Contractor receives payment from the Employer of the price payable to him for the said works under the terms and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done than on the occasion of each such payment the Employer will be at liberty to make a recovery from the Contractor’s bill for such payment by deducting there from the value of the said materials than actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amounts of the advances made under these presents were calculated.

(7) That if the Contractor shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing of the Employer shall immediately on the happening of such default be repayable by the Contractor to be the Employer together with interest thereon at twelve per cent per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the **Employer** in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default of the Contractor and the Contractor hereby covenants and agrees with the **Employer** to reply and pay the same respectively to him accordingly.

(8) That the Contractor hereby charges all the said materials with the repayment to the Employer of the said sum of Rupees\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and any further sum of sums advanced as aforesaid and all costs, charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the power contained therein if and whenever the covenant for payment and repayment here-in-before contained shall become enforceable and the money owing shall not be paid in accordance there with the **Employer** may at any time thereafter adopt all or any of the following course as he may deem best :

 (a) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the contractor in accordance with the provisions in that behalf contained in the said agreement debiting the contractor with the actual cost of effecting such completion and the amount due to the contractor with the value of work done as if he had carried it out in accordance with the said agreement and at the rates hereby provided. If the balance is against the Contractor, he is to pay same to the **Employer** on demand.

 (b) Remove and sell by publication the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable or payable to the **Employer** under these present and pay over the surplus (if any) to the contractor.

 (c) Deduct all or any part of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.

(9) That except in the event of such default on the part of the contractor as aforesaid interest on the said advance shall not be payable.

(10) That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been here-in-before expressly provided for the same shall be referred to the Employer whose decision shall be final and the provision of the Indian Arbitration and Reconciliation Act for the time being in force shall apply to any such reference.

**LETTER OF ACCEPTANCE**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Date)

To

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ [Name and address of the Contractor]

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dear Sirs,

 This is to notify you that your Bid dated \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for execution of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name of the contract and identification number, as given in the Instructions to Bidders) for the Contract Price of Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) (amount in words and figures), as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our agency.

 We accept/do not accept that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ be appointed as the Adjudicator2. You are hereby requested to furnish Performance Security, in the form detailed in Para 34.1 of ITB for an amount equivalent to
Rs. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ within 21 days of the receipt of this letter of acceptance valid upto 28 days from the date of expiry of defect liability period i.e. upto\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and sign the contract, failing which action as stated in Para 34.3 of ITB will be taken.

Yours faithfully.

 Authorized Signature

Name of title of Signatory

Name of agency

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Delete “corrected and” or “and modified” if only one of these actions applies. Delete as corrected and modified in accordance with the Instructions to Bidders. If corrections or modifications have not been affected.

2. To be used only if the Contractor disagrees in his Bid with the Adjudicator proposed by the Employer in the “Instructions of Bidders”

**ISSUE OF NOTICE TO PROCEED WITH THE WORK**

**Note:** No Separate notice to proceed with the work shall be issued. However the detailed acceptance letter sent by this office with intended date of start shall also be considered notice to proceed with the work.

**AGREEMENT FORM**

Agreement

 This agreement, made the \_\_\_\_\_\_\_ day of \_\_\_\_\_\_\_\_\_ between \_\_\_\_\_\_\_\_\_ (name and address of employer) [hereinafter called “the Employer] and

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name and address of contractor) hereinafter called “the Contractor” of the other part.

 Whereas the Employer is desirous that the contractor execute

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Name and identification number of Contract) (Hereinafter called “the works”) and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a cost of
Rs. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the conditions of contract hereinafter referred to and they shall be deemed to form and be read and construed as part of this Agreement.

2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy and defects therein in conformity in all aspects with the provisions of the contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the Execution and completion of the Works and the remedying the defects wherein Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be ready and construed as part of this Agreement viz.

 i) Letter of Acceptance

 ii) Notice to proceed with the works;

 iii) Contractor’s Bid

 iv) Condition of Contract: General and Special

 v) Contract Data

 vi) Additional condition

 vii) Drawings

 viii) Bill of quantities and

 ix) Any other documents listed in the Contract Data as forming part of the contract.

In witnessed whereof the parties there to have caused this Agreement to be executed the day and year first before written.

 The Common Seal of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was hereunto affixed in the presence of:

 Signed, Sealed and Delivered by the said

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 In the presence of :

Binding Signature of Employer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Binding signature of Contractor \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**UNDERTAKING**

I, the undertaking do hereby undertake that our firm M/s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_agree to abide by this bid for a period \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_days for the date fixed for receiving the same it shall be binding on us and may be accepted at any time before the expiration of that period.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

(Signed by the Authorized Officer of the Firm)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Title of the Officer

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Firm

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DATE

**SECTION – VII**

**DRAWINGS**

**(DRAWINGS CAN SEEN/ OBTAINED FROM OFFICE OF THE**

 **UNIVERSITY ENGINEER, RGNUL, SIDHWAL, PATIALA**