(E-Tender No. : (HRC/Build/Tender/2020-21/11)

HANSRAJ COLLEGE

E-Tender Documents
For

REPAIR, STRENGTHENING AND REONVATION OF EXISTING CANTEEN BLOCK, FOR HANSRAJ COLLEGE, DELHI. .

TECHNICAL & PRICE BID
DOWN LOADING OF TENDER : 12-11.2020 to 26.11.2020 before 12.00 Hrs
DATE & TIME OF SUBMISSION: 26.11.2020 before 12.00 Hrs
DATE & TIME OF OPENING: 27.11.2020 on 12.00 Hrs

Caution

Tenderers are requested to submit their Technical Bid & Price Bid on line E-Tender in prescribed format.
Please ensure submission of EMD & Cost of tender with the Technical Bid

Non-compliance of these instructions may lead to the rejection of tender

Prepared by:
Sheltera Consultants,
69, FF, South Pater Nagar Market,
New Delhi – 110 008

Issued by:-
Hansraj College
Hans Raj Marg,
Delhi.

INDEX

Name of work :	REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI.

Issue Letter of E-Tender Document for :	**REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI.**

The set of the tender document containing the number of pages as indicated in the Index Sheet attached is issued to:

Name of Tenderer : ……

……

Address of Tenderer : ……

……

……

……

The fee for this set of E-Tender document is **Rs. 1000/- (Rupees One Thousand only)** non-refundable. The tender document is sold to the above party vide P.O / B.C / D.D. No._____ dated _____.

Note: - Scanned copy of above should be uploaded and physically submitted to College before opening of Tender.

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Yours faithfully,
for & on behalf of
Hansraj College

PRINCIPAL

CHECK LIST FOR SUBMISSION OF OFFER

Name of work	**REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI.**

Tenderers are requested to duly fill-in this check list. The check-list, signed and stamped on each page by the person(s) signing the tender must be submitted along with the Technical & Price Bid of the tender and also ensure that all details/documents have been furnished as called for in this tender.

<table>
<tr><td>Tender document cost
Rs. 1000/- (Rupees One Thousand only)</td><td colspan="2">Amount (Rs.): by way of Demand Draft/ Banker's Cheque/ Pay Order in favour of Principal, Hans Raj College payable at N Delhi. Original to be submitted in College before opening of Bid and Scan copy to be uploading.</td><td>DD/BC/PO No. ..... :
Date ..... :
Issuing Bank ..... :</td></tr>
<tr><td>EMD
Rs. 5,75,000/- (Rupees Five Lakhs Seventy Five Thousand only)</td><td colspan="2">Amount (Rs.) : by way of Demand Draft/ Banker's Cheque/ FDR in favour of Principal, Hans Raj College payable at N Delhi. Original to be submitted in College before opening of Bid and Scan copy to be uploading.</td><td>DD/BC/PO/FDR No. ..... :
Date ..... :
Issuing Bank ..... :</td></tr>
<tr><td rowspan="4">Annual Turnover
(Audited Balance Sheet – Trading, P & L account / TDS for any of the years mentioned herein in accordance with NIT duly audited by chartered accountant</td><td>Year</td><td>Amount (Rs.)</td><td>List of document enclosed</td></tr>
<tr><td>2019-20</td><td></td><td></td></tr>
<tr><td>2018-19</td><td></td><td></td></tr>
<tr><td>2017-18</td><td></td><td></td></tr>
<tr><td rowspan="6">Work Order Value.
(Copies of qualifying similar work orders – executed along with completion certificates or any other proof certifying the executed value of the work as per NIT).

Certifying agency shall not be below the rank of Executive Engineer.</td><td colspan="2">PO / Work Order No.</td><td></td></tr>
<tr><td colspan="2">of M/s</td><td></td></tr>
<tr><td colspan="2">Completion value Rs.</td><td></td></tr>
<tr><td colspan="2">PO / Work Order No.</td><td></td></tr>
<tr><td colspan="2">of M/s</td><td></td></tr>
<tr><td colspan="2">Completion value Rs.</td><td></td></tr>
</table>

DESCRIPTION		YES / NO (In all the Blank space below please fill either Yes or No only)	REMARK
Power of Attorney / Authorization on Company's letter head in favour of person who has signed the offer.			**: Please enclose the self attested document such as Declaration of proprietorship or Partnership deed or power of attorney etc.**
GST Reg. No.	…….		**: Enclose the self attested copy of registration certificate**
PAN No.	…….		**: Enclose the self attested copy of registration certificate**
PF code No.	…….		**: Enclose the self attested copy of registration certificate**
ESI code No.	…….		**: Enclose the self attested copy of registration certificate.**
Whether blacklisted / put on holiday list of any Central /State Department, PSU's and Major Institutional / Industrial establishments			
Any deviation / exception to the tender conditions.			**: Please fill the form on page 36 of SCC**
All the documents furnished are readable / legible.			**: Please ensure filling the tender in readable / legible form.**
Original tender / Bidding document submitted along with addendum / corrigendum, if any.			**: Please submit the complete tender document.**
Proof of assured availability of required Machinery / equipment.			
Validity of offer up to 03 (Three) months from the date of opening of Technical bid.			**: Please certify**
All documents submitted signed on each page by authorized person.			**: Please ensure signing of each page of tender.**
All corrections properly attested by the person signing the bid.			**: Please ensure signing the correction, if any.**
Prices quoted strictly as per the price schedule enclosed with the tender document.			**: Try to fill the price bid without correction / overwriting / repetition in both figure and words.**

For documents submitted in any other language, an English Translation shall also be submitted, in which case, for interpretation of the offer, the English Translation shall govern.

Stamp & Signature of Tenderer

HANSRAJ COLLEGE

(University of Delhi)

NOTICE INVITING E-TENDER

The invites E- tender in Two bid system (Technical & Price Bid) applications from Govt. Registered (CPWD / PWD / MES / DDA / MCD / State Govt./ Contractor working in Delhi University/ Any Institution) and reputed contractor of financial standing of CPWD category –I & above meeting the pre qualifying requirements for the follow work of:

1.	**Tender No.**	**HRC/Build/Tender/2020-21/11**
2.	**Type of Bid**	**DOMESTIC COMPETITIVE BIDDING** Under Two Bid System
3.	**Name of Work**	**REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI.**
4.	**Time Schedule**	12 (Twelve) Months from date of handing over of site or 7th day of date of issue of LOI or whichever is later.
5	**Milestone Dates for Tendering**	
i	**Tender download Schedule**	From 12.11.2020 at 09:00 Hrs to 26.11.2020 up to 12:00 Hrs on e-tender. Tender documents can be downloaded from the website https://eprocure.gov.in/eprocure/app during the above period.
ii	**Last date of submission of Tender & EMD**	26.11.2020 Up to 12:00 Hrs (EMD & Cost of tender should be submitted before opening of Bid in the Principal office, Hans Raj college.
III	**Last day of submitting bidder query**	On 23-11-20 on 11:00 Hrs
iv	**Opening of Technical Bid**	Tender (Technical) shall be opened on **27.11.2020** at 12:00 Hrs or at a later date/time convenient thereafter. Date and time of Priced Bid opening will be communicated only to Technically qualify bidders.
v	**Opening of Financial Bid**	Will be intimated to the bidder online
vi	**Bid Validity**	90 Days from the last date of submission of the bid.
8.	**Earnest Money Deposit (EMD)**	**5,75,000/- (Rs. Five Lakhs Seventy Five Thousand Only)** by way of Demand Draft/ Banker's Cheque/ FDR in favour of Principal, Hansraj College payable at New Delhi
9.	**Pre-qualification Criteria (PQC):**	The intending tenderers shall have to uploaded proof of their prequalification and construction work including retrofitted work experience along with the Part-I (Technical bid).
9.1 A	**Annual Turnover (ATO)**	Minimum Rs. **200 Lakhs**. During any of the three preceding financial years ending 31.03.2020. Proof of ATO shall be submitted in form of Audited Balance Sheet / Audited Profit &

		Loss Account Statement duly audited by chartered accounted.
9.2 A	**Value (SWO) executed by the bidder as main contractor for similar nature of work (during any of the last 5 years) ending on last day of the month immediately previous to the month in which last day of the bid submission falls.**	(i) One completed work having minimum value of Rs. 184 Lakhs with a maximum completion time of 12 Months in the last 5 years. OR (ii) Two completed work having minimum value **Rs. 138 Lakhs** with a maximum completion time of 9 Months in the last 5 years. OR (iii) Three completed work having minimum value **Rs.92 Lakhs** with a maximum completion time of 6 Months in the last 5 years. ***(The above value of completed works is exclusive of GST)***
9.2 B	**Similar nature shall be defined as**	Civil, Strengthening, Finishing, Electrical Works and VRV Air-Conditioning for Building.
10	**Mode of Submission**	Offer must be uploaded on e-tender website https://eprocure.gov.in/eprocure/app in before the last date & time of submission of tender. Offer submitted using any other mode will not be accepted
11	**Other Requirements**	1 PF Code Allotment letter/PF registration. 2 Independent ESI Code or undertaking for Independent ESI code in the Format given as Annexure to ITB. 3 Assessment Order or copy of Income Tax Returns (duly acknowledged by Income Tax Department) for last 3 (three) financial years. 4 Power of Attorney in favour of person authorized to submit the bid. 5 Copy of PAN card. 6 Certificate of Incorporation / Partnership deed / Proprietor ship affidavit. 7 GSTIN registration certificate
12	**Tender Inviting Authority**	Principal, Hans Raj College, Roshanara Road, New Delhi-110 007, Tel. : 011-…… e-mail: …… / ……

13. GENERAL

Bidder to note the following before bidding:

i) Offer from following types of bidder will not be accepted

a) Who are in the Holiday list/ debarred/blacklisted by Govt. Department or Delhi University

b) Who are under liquidation, court receivership or similar proceedings

c) Consultant or their subsidiary Company or companies under the management of consultant for execution of the same project for which they are working as

consultant

ii) Offer from Joint Bidders / Consortium will not be acceptable unless stated otherwise elsewhere in the tender document.

iii) The subject work is indivisible and shall be awarded to single successful bidder unless stated otherwise elsewhere in the tender document.

iv) Experience of only the bidding entity shall be considered. A work executed by a bidder for its own plant/projects shall not be considered as experience for the purpose of meeting requirement of experience criteria of the tender.

v) Detail work order qualifying for similar in nature as described including covering letter and schedule of rates and completion certificate containing executed value of similar nature of work as defined above shall be required. Completed value of work as mentioned in the completion certificate shall be considered for evaluation against single/ multiple work order value required under PQC, however where the executed value is not mentioned in the completion certificate, the copy of certified bill shall also be acceptable for determining value if submitted along with completion certificate. Certifying agency shall be below the rank of Executive engineer.

vi) The offers with incomplete /irrelevant documents or anomalies are liable to be rejected without any communication. Hence, bidders are advised to take utmost care while uploading their prequalification documents.

vii) Relevant supporting documents towards other requirements specified are also to be uploaded along with Technical bid failing which bid is liable for rejection.

viii) The completion certificate, submitted by the bidder shall separately indicate the GST amount included in the value of completed job OR a separate certificate from the respective client, mentioning the service tax amount, if any, included in the value of completed job under consideration should be submitted by the bidder.

ix) In case GST amount/ component is not specified in the submitted completion certificate, then the amount equivalent to rate of applicable service tax for the subject tender shall be deducted from the value of completed work mentioned in the completion certificate to arrive at the value of the completed job without service tax.

x) Hans Raj College reserves the right to reject any or all of the tenders or any parts of the tender so received and may cancel the tender in part or

full, extend the due date of Tender submission etc. without assigning any reason.

xi) Though negotiations with L1 bidder. Or any other bidder are avoidable as per CVC guidelines, considering the public nature of the project being taken up college, if need be in the greater interest of the project, The Principal HansRaj College reserves the right to negotiation with L1 or any other bidder, No objection shall be entertained in case of any negotiation is taken into consideration for appointment of right agency at the right cost.

xii) Financial bid shall be evaluated in terms of lowest over- all offer and the agency Qualifying on this merit shall be treated as L1 bidder. Qualifying as L1 bidder does not grant any right to the bidder. The Principal Hansraj Collage reserves the right to accept /reject any/ all bidders including the L1 bidder.

xiii) Bidders are to quote their most competitive rates. Negotiations will not be conducted with the bidders as a matter of routine. However, Principal HansRaj College reserves the right to conduct negotiations.

xiv) All communication will be made through e-Tendering web site (www.eprocure.gov.in/eprocure/app). However, Hans Raj College reserve the right to take cognizance of the communication made outside e-Tendering Portal under exceptional circumstances.

xv) Bidder cannot make any claim against Hans Raj College towards its expense incurred in connection with the preparation and delivery of their bids, site visit, participating in the discussion and other expenses incurred during bidding process.

xvi) Bidder should make sure that their priced bid (Part-II/BOQ) contains only prices. Rates mentioned elsewhere shall not be taken into cognizance. Offer shall be liable for rejection if any condition directly or implied, recorded in Priced Bid (Part-II/BOQ).

xvii) After opening of the technical bids but before the opening of the price bids, the bids may be rejected for unsatisfactory performance or adverse comments which have come to the notice after the issue of the tender enquiry.

xviii) Offers not meeting statutory requirement are liable for rejection.

xix) Bidders are advised to visit Announcement section/ Information for DSC/ Bidders Manual Kit/ FAQ of e-Tender Portal before bidding.

xx) Notwithstanding any other condition /provision in the tender documents, in case of ambiguity or incomplete documents pertaining to pre-qualification criteria (PQC), bidders shall be given only one opportunity with a fixed

deadline after bid opening to provide complete & unambiguous documents in support of meeting the pre-qualification criteria (PQC). In case the bidder fails to submit any document or submits incomplete documents within the given time, the bidder's tender is liable to be rejected. However, Hans Raj College reserves the right to make any further queries.

xxi) Refer ITB of the tender document /Special Instruction to Bidder (SITB) of e-tender web site for more details.

xxii) Any Addendum/Corrigendum/Sale date extension in respect of above Tender shall be issued on our website: https:// eprocure.gov.in/eprocure/app only and no separate notification shall be issued in the press. Bidders are therefore requested to regularly visit our website to keep themselves updated. Failure of Bidder to submit tender without taking cognizance of Corrigendum / Amendment (if any) issued by Hans Raj College shall make bid liable for rejection.

xxiii) Hans Raj College does not take any responsibility for the correctness of tender documents obtained from any other source. Bidders are advised to visit above mentioned website before submitting their offer for official version of the tender document including any corrigendum / amendment if any, which shall be binding to the bidder.

xxiv) Conditional tender shall not be accepted. The Principal HansRaj College reserves the right to reject any or all of the tender without assigning any reason thereof.

xxv) **TENDER COST & EMD :**

- Scanned copy of Tender cost & EMD must be submitted online by Indian bidders. Tender Cost & EMD in the form of Demand Draft/ Banker's Cheque/ FDR in favour of Principal, Hans Raj College will be accepted only. Tenders without Earnest Money are liable to be rejected.

- Wherever applicable, scanned copy of EMD Instrument (i.e. Demand Draft/ Banker's Cheque/ Pay Order in favour of Principal, Hans Raj College etc.) must be uploaded along with offer & original of EMD format should reach to the office of tender issuing authority in sealed envelope super-scribing tender name, tender number, and date of opening and bidder's name before the deadline of submission.

-Sd-
CONVENER

BUILDING COMMITTEE

-Sd-
PRINCIPAL

HANSRAJ COLLEGE

Instructions for Online Bid Submission

As per the directives of Department of Expenditure, this tender document has been published on the Central Public Procurement Portal (URL:http://eprocure.gov.in/eprocure/app). The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.More information useful for submitting online bids on the CPP Portal may be obtained at: http://eprocure.gov.in/eprocure/app

REGISTRATION

1. Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL:http://eprocure.gov.in/eprocure/app) by clicking on the link "Click here to Enroll". Enrolment on the CPP Portal is free of charge.
2. As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
3. Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
4. Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / TCS / nCode / eMudhra etc.), with their profile.
5. Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse.
6. Bidder then logs in to the site through the secured log-in by entering their user ID / password and the password of the DSC / eToken.

SEARCHING FOR TENDER DOCUMENTS

1. There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender published on the CPP Portal.
2. Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

3. The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

PREPARATION OF BIDS

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

SUBMISSION OF BIDS

1. Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
2. The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
3. A standard BOQ format has been provided with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BOQ file is found to be modified by the bidder, the bid will be rejected.

   OR

   In some cases Financial Bids can be submitted in PDF format as well (in lieu of BOQ).
4. The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the

bidders, opening of bids etc. The bidders should follow this time during bid submission.

5. All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done.
6. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
7. Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
8. Kindly add scanned PDF of all relevant documents in a single PDF file of compliance sheet.

ASSISTANCE TO BIDDERS

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

2) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact number for the helpdesk is 1800 233 7315.

General Instructions to the Bidders

1. The tenders will be received online through portal http://eprocure.gov.in/eprocure/app. In the Technical Bids, the bidders are required to upload all the documents in .pdf format.
2. In financial bid to be submitted in .xls file or PDF as per the file specification given in the tender.
3. Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through https://eprocure.gov.in/eprocure/app. Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site https://eprocure.gov.in/eprocure/appunder the link “Information about DSC”.
4. Tenderer are advised to follow the instructions provided in the ‘Instructions to the Tenderer for the e-submission of the bids online through the Central Public Procurement Portal for e Procurement at https://eprocure.gov.in/eprocure/app.

SPECIAL INSTRUCTIONS TO BIDDERS

SPECIAL INSTRUCTION TO BIDDERS

SCOPE OF WORK:

1.0 The scope of work shall be **REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI.** and shall consist of all the jobs civil, electrical, plumbing, sanitary, electrical work & VRV Air-Conditioning work as per item description in **Schedule of Rates (SOR)** and all other jobs required to complete the work.

The validity period for the rates quoted shall be tree (3) months. On account of exigencies, if the bidder is asked to extend the validity, the same should be without any deviation including no change in the price, failing which their offer will be rejected.

2.0 The venderers shall demolish the canteen Block building including as per the instruction of the Engineer in-charge, dispose off the debris & other unserviceable material to the municipal dumping ground, with due permission of the local authorities, at their own cost.

2.0 The entire work is to be completed in all respects **within 12 months** from the date of handing over the possession of the building. The work shall be commenced within a week from the date of acceptance letter or the date of handing over of site whichever is later. The time is the essence of the contract and shall be strictly observed by the contractor.

3.0 The intending tendered shall visit the site and make himself thoroughly acquainted with the local site condition, nature and requirement of the works, facilities for transport, nature of labour required, access and storage for materials and removal of wastes. The tendered should quote taking into account all the site conditions including traffic restriction for transport etc., for proper execution of the work. The successful tenderer will not be entitled to any claim of compensation for difficulties faced or losses incurred on account of any site condition.

5.0 The Contractor shall conform to the provisions of all local Bye-laws and acts relating to the demolition work and to the regulations etc. of the government and Local authorities including cordoning off the property from neighbouring properties with proper arrangement like zinc sheet barricading to avoid dust, noise to the occupants of the neighbouring buildings etc., The amount should be quoted after taking into account the cost and liabilities for license fees etc if any, in complying the regulations of local authorities.

6.0 The contractor shall ensure the safety requirements laid down by the local authority and/or National Building Code. The contractor shall be responsible and he should indemnify the college for all injury/death to the workmen, to persons, animals, things, or any other damage to the surrounding properties which may arise from the operations, carelessness, accident or neglect of himself or of any of his workmen.

7.0 The contractor should indemnify the College from any claims, damages, losses on account of any accident, death, injuries suffered by his employees, agents, labourers, assignees or any other outside third parties. In the event of any such claims, it should be at sole responsibility of the contractor. The indemnity bond format is enclosed to this document.

The contractor shall comply with the provisions of all labour legislations and shall keep the employer saved harmless and indemnified against any claims.

8.0 If the tender is accepted and the contractor fails to deposit the amount of performance guarantee or to execute the contract within the stipulated period, the earnest money shall be liable to be forfeited.

9.0 In case, the Tenderer alters/modifies /withdraws his bid after opening of the price bid and within the validity period, the tender submitted by the Tenderer shall be liable to be rejected and EMD forfeited.

10.0 The bidder should submit their quotation either on their letter head or by way of return of down loaded tender document duly filled, signed & stamped. If the tender document is attached with any communication or terms & conditions, the same should be on party's letterhead. Any terms submitted by the Tenderer in violation of above will not be accepted and the same is liable to be rejected.

11.0 The offer is liable from rejection if it contains deviations from specified terms & conditions.

12.0 All cuttings & corrections in the bid document should be avoided and if it is unavoidable, it should be kept at bare minimum and it should be neatly cut and re written without overwriting and use of white fluid. All corrections should be duly signed by the contractor. In case the Tenderer resorts to many corrections including usage of white correction fluid in the tender document, the tender shall be liable for rejection.

13.0 The EMD & Tender cost should be submitted in a separate cover in the College The Principal office & scanned copy be uploaded along with the Technical Bid of tender document duly filled in.

14.0 The tendering can be abandoned without assigning any reasons. No compensation is payable for the efforts made by the contractor.

15.0 The subject work is indivisible and shall be awarded to single successful bidder.

16.0 No deviation to the tender conditions shall be accepted. All conditional tenders will be rejected.

17.0 Providing barricade along the demarked periphery of site using MS pipes/posts/ Structural Members and Coloured GI Sheeting up to all heights (7 meters) temporarily with all warning signs and removing the same after the completion of job. Complete including all necessary fitting as per specifications/ instructions of the Engineer-in- charge. (No payment will made for protection & barricade work).

18.0 Providing, erecting, maintaining and removing temporary protective safety screens made out of specified fabric with all necessary fixing arrangement to ensure that it remains in position for the work duration as required by Engineer-in- Charge. Jute cloth/woven PVC cloth/ Geo-textile

19.0 Protection works to electrical equipment meters etc. using suitable plastic cover, tying and securing all complete at all floor levels, including the cost of maintain and removal of all the arrangements.

20.0 For any clarification, if required pre bid meeting can be held if required 3 days before duly Submission of tender.

21.0 All materials including Cement, Brick Aggregate, Stone Aggregate, Sand, Moorum, Consumables, Tools & Tackles etc. necessary to complete the works in all respects shall be supplied by contractor within his quoted rates / price. The material supplied by the contractor shall be approved by the Engineer-in-Charge before being put to work.

19.0 **DETAILS OF BANK ACCOUNT:**

All the payments due to the Tenderer/contractor shall be paid by RTGS/NEFT giving the details of Account Number along with the name of the bank. The Tenderer shall provide details of their bank account, wherein payments are required to be made.

20.0 **SETTLEMENT OF IRRECONCILIABLE CONFLICT:**

In case of an irreconcilable conflict between Indian or other applicable standards, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings and/or Schedule of Rates, the following shall prevail to the extent of such irreconcilable conflict in order of precedence as noted below (For exemplification "a" prevails over "b" to "j", "b' prevails over "c" to "j' and so on).

a) Letter of Acceptance along with statement of agreed variations.

b) Telex/Telegram of Acceptance / e mail.

c) Schedule of Rates as enclosure of letter of acceptance (Lo1).

d) Special Conditions of Contract.

e) CPWD Specification for 2009civil (Vol 1 & 2) & electrical works 2013 with up to date correction slip.

f) General Conditions of Contract.

g) Indian Standards.

h) Sound Engineering practice.

Stamp & Signature of Tenderer

SPECIAL CONDITIONS OF CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT (SCC)

1 GENERAL

1.1 Special Conditions of Contract shall be read in conjunction with General Conditions of Contract 2020(**"CPWD GCC 2020"**) with up to latest correction slip, CPWD Specifications 2009 (Vol. I & II) with up to date correction slip (for Civil works) and CPWD General Specifications for Electrical Works 2013 issued by the Central Public Works Department corrected up to date of execution of work, specifications of work, drawings and any other document forming part of this contract wherever the context so requires. All clauses and notes given in the CPWD GCC 2020 with up to date correction slips shall be applicable the contract.

1.2 Notwithstanding the sub-division of the document into these separate sections and volumes, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.

1.3 Where any portion of the CPWD GCC 2020 is repugnant to or at variance with any provisions of the Special Conditions of Contract, then unless a different intention appears, the provision(s) of the Special Conditions of Contract shall be deemed to override the provision(s) of CPWD GCC 2020 only to the extent that such repugnancy's of variations in the Special Conditions of Contract as are not possible of being reconciled with the provisions of CPWD GCC 2020.

1.4 Whenever it is mentioned in the specification that the Contractor shall perform certain work or provide certain facilities, it is understood that the Contractor shall do at his own cost and the Contract price shall be deemed to have included cost of such performances and provisions, so mentioned.

1.5 The materials, design and workmanship shall satisfy the applicable relevant CPWD specification volume I , II & III Indian Standards, the job specifications contained herein & codes referred to. Where the job specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied. In the absence of any Standard/ Specifications/ Codes of practice for detailed specifications covering any part of the work covered in this Bidding Document, the instruction/ directions of Engineer-in-Charge will be binding on the Contractor.

1.6 In the absence of any Specifications covering any material, design or work(s) the same shall be performed/ supplied/ executed in accordance with standard Engineering practice as per the instructions/ directions of the Principal of college, which will be binding on the CONTRACTOR.

1.7 CPWD GCC 2020 shall be applicable and shall be part of tender. In case of any conflict with SCC and GCC2020 then the SCC OF TENDER SHALL PREVAIL

1.8 CPWD GCC 2020 shall be applicable with modification that word CPWD is substituted with word HansRaj College, Delhi University.

1.9 The word Superintendent Engineer, Chief Engineer of Engineer in Chief shall be read as Principal, HansRaj College.

1.10 The deviation clause stands modified as any deviated quantity in excess of agreement items only shall be payable of agreement rates. For extra items rats are to be derived as per clause 12 of agreement.

2 TENDER DOCUMENT AND CLARIFICATION

2.1 Tender Document

Transfer of tender document issued to one intending bidder is not permissible to another.

2.2 Clarification Requests by Bidder

2.2.1 Although the details presented in this tender document consisting of Conditions of Contract, Scope of Work, Technical Specifications and Drawings have been compiled with all reasonable care, it is the Bidder's responsibility to ensure that the information provided is adequate and clearly understood.

2.2.2 Bidder shall examine the tender document thoroughly in all respects and if any conflict, discrepancy, error or omission is observed, Bidder may request clarification in pre bid meeting. Such clarification requests shall be directed to bid issuing authority. Please note offer should not contain any deviation.

2.2.3 Any failure by Bidder to comply with the aforesaid requirement shall not excuse the Bidder, after subsequent award of contract, from performing the work in accordance with the agreement.

2.2.4 The detail Drawings can be seen in Architect office M/s Sheltera Consultants, 69, South Patel Nagar Market, New Delhi -110008. (Phone no 01125840490, 9873079073) in any working day between 10.00 am to 5.00pm.

2.3 Confidentiality of Document:

Bidder shall treat the tender document and contents thereof as confidential.

3 RATES & TAXES

3.1 The rates given in the schedule of rates are inclusive of octroi, terminal tax, royalty and other taxes & GST@18% as applicable. The rates quoted in the tender are applicable till the completion of the contract.

3.2 The rates are for complete work including cost of all materials, labour, tools and plants etc. unless otherwise specified.

3.3 The College shall provide water and electricity required for the work at one point and contractor shall make his own arrangement for further distribution at his own cost. Hans Raj College will deduct 1% for water & 1% for electricity on the cost of actual work done from vendor bills for the same.

3.4 The Rates of Extra Items shall be paid as per GCC - CPWD work 2019, Clause 12 which is part of the tender & is available on CPWD Website.

3.5 Labour Cess & TDS shall be detected from contractor bill as applicable.

3.6 All extra work not covered in BOQ items shall be executed as per following specification order.

i) As per CPWD specification 2009 Vol I & II with up to date correction slips.
ii) As per latest B.I.S. specification, if any.
iii) As per manufacturer Specification.
iv) As per instruction of Architect/Engineer in charge and best trade practice.

4 TIME SCHEDULE

4.1 The work shall be executed strictly as per time schedule given as parts of this Bidding Document vide **Annexure-I** to SCC.

4.2 The time allowed for carrying out the works as entered in the tender shall be strictly observed by the contractor, and shall be reckoned from the date of handing over of site to commence work is given to the contractor. The work shall throughout the stipulated period of the contract be proceeded with all due diligence (time being deemed to be the essence of the contract on the part of the contractor) and the contractor shall pay as compensation as per Tender clause 4.10.

4.3 In any case in which under any clause or clauses in this contract the contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit (whether paid in one sum or deducted by instalments) the Principal on behalf of the Hans Raj College shall have power to adopt any of the following courses, as he may deem best suited to the interests of Hans Raj College:

a) To rescind the contract, and in which case the security deposit of the contractor shall stand forfeited, and be absolutely at the disposal of Hans Raj College.

b) To employ labour paid by the HANS RAJ COLLEGE and to supply materials to carry out the work, or any part of the work debiting the contractor with the cost of the labour and the price of the materials (of the amount of which cost and price a certification of the Engineer-in-Charge/Architect shall be final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner at the same rates as if it had been carried out by the contractor under the terms of his contract the certificate of the Principal, HansRaj College as to the value of the work done shall be final and conclusive against the contractor.

c) To measure up the work of the contractor, and to take such part thereof as shall be unexecuted out of his hands, and to give to another contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor of the whole work had been executed by him of the amount of which excess the certificate in writing of the Architect/Engineer-in-Charge shall be final and conclusive, shall be borne and paid by the original contractor and may be deducted from any money due to him by Hans Raj College under the contract or otherwise or from his security deposit or the proceeds of sale thereof or sufficient part thereof.

4.4 In the event or any of the above courses being adopted by the Engineer-in-Charge the contractor shall have no claims to compensation for any loss sustained by him by reason of his having purchased or procured any material, or entered into any engagements or made any advances on account of or with a view to the execution of the work or the performance of the contract. And in case the contract shall be rescinded under the provision aforesaid the contractor shall not be entitled to recover or be paid any sum of or for any work therefore actually performed under this contract, unless and until the Engineer-in-Charge will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

4.5 In any case in which any of the powers conferred upon the Engineer-in-Charge shall have become exercisable, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any

future case of default by the contractor for which by any clause or clauses hereof he is declared liable to pay compensation amounting to the whole of his security deposit, and the liability of the contractor for past and future compensation shall remain unaffected. In the event of the Engineer-in-Charge putting in force either of the powers (a) or (c) vested in him under the preceding clause 4.3 he may, if he so desires take possession of all or any tools, plant, material and stores in or upon the works, or the site thereof or belonging to the contractor or procured by him and intended to be used for the execution of the work any part hereof paying or allowing for the same in account at the contract rates, or in case of these not being applicable at current market rates to be certified by the Engineer-in-Charge whose certificate hereof shall be final, otherwise the Engineer-in-Charge may be notice in writing to the contractor or his clerk of the works, foreman or other authorized agent require him to remove such tolls, plant, material or stores form the premises within a time to be specified in such notice, and in the event of the contractor failing to comply with any such requisition, the Engineer-in-Charge may be remove them at the contractor's expenses or sell them by auction or private sale on account of the contractor and at his risk in all respect and the certificate of the Engineer-in-Charge as to the expense or any such removal and the amount of the proceeds and expense of any such sale be final and conclusive against the contractor.

4.6 TIME & EXTENSION FOR DELAY

4.6.1 If the contractor shall desire an extension of the time for completion of the work on the grounds of his having been unavoidably hindered in its execution or on any other ground, he shall apply in writing to the Principal, HansRaj College within 30 days of the date of the hindrance on account of which he desires such extension as aforesaid, and the Principal, HansRaj College shall if in his opinion (which shall be final) reasonable grounds be shown therefore authorize such extension of time, if any as may, in his opinion be necessary or proper. The Principal, HANS RAJ COLLEGE empowered to give the time extension.

4.6.2 If, in the opinion of the Employer/Architect the works be delayed

i. by force majeure, or
ii. by reason of any exceptionally inclement weather, or
iii. by serious loss or damage by fire or
iv. by reason of instruction from the employer in consequence of proceedings taken or threatened
v. by or disputes, with adjoining or neighbouring or
vi. by the works, or delay, of other contractors or tradesmen engaged or nominated by the employer and not referred to in the specification or
vii. by reason of authorized extra and additions or
viii. by civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or
ix. from other cause which the employer may consider are beyond the control of the contractor, the employer at the completion of the time allowed for the contract shall make fair and reasonable extension of the time for completion in respect therefore.

4.6.3 In the event of the employer failing to give possession of the site upon the day specified above, the time of completion shall be extended suitably.

4.7 The contractor shall deliver in the office of the Principal, Hans Raj College on or before the 10th day of every day month during the continuance of the work covered by this

contract a return showing details of any work claimed for as extra, and such return shall also contain the value of such work as claimed by the contractor, which value shall be based upon the rates and prices mentioned in the contractor or in the Schedule of Rates in force in the District for the time being. The contractor shall include in such monthly return particulars of all claims of whatever kind and however arising which at the date thereof he has or may claim to have against the Engineer-in-Charge under or in respect of or in any manner arising out of the execution of work and the contractor shall be deemed to have waived all claims not included in such return and will have no right to any such claims not so included whatsoever be the circumstances.

4.8 Without prejudice to the rights of HANS RAJ COLLEGE under any clause herein after contained on completion of the work, the contractor shall be furnished with a certificate by the Principal, Hans Raj College of such completion; but no such certificate shall be given or shall the work be considered to be completed until the contractor shall have removed from the premises on which the work shall be executed all scaffolding, surplus materials and rubbish, and cleaned off the dirt from all woodwork, door walls, floors, or other parts of any building in/upon or about which the work is to be executed, or of which he may have had possession for the purpose of the execution thereof and the measurements in the said certificate shall be binding and conclusive against the contractor, if the contractor shall fail to comply with the requirements of this clause as to removal of scaffolding, surplus materials and rubbish, and cleaning off dirt on or before the date fixed for the completion of the work, the Principal, HansRaj College may at the expense of the contractor remove such scaffolding, surplus materials and rubbish and cleaning off dirt on or before the date fixed for the completion of the work, Principal, HansRaj College may at the expenses of the contractor remove such scaffolding, surplus materials and rubbish dispose of the same as he think fit and clean off such dirt as aforesaid; and the contractor forthwith pay the amount of all expenses so incurred, and shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.

4.9 Contractor shall give every day a report on category-wise labour and equipment deployed along with the progress of work done on previous day in the Performa prescribed by the Principal, HansRaj College.

4.10 **COMPENSATION FOR DELAY**

4.10.1 Penalty of delay shall be as per clause 2 of GCC 2020 Agreement i.e. with maximum rates of 1% (One Percent) per month of delay to be completed as per day basis based on quantum of damage suffered due to states delay on the part of contractor.

4.11 **ACTION IN CASE WORK NOT DONE AS PER SPECIFCATION OF BAD WORK MAN SHIP**

All works under or in course of execution or executed in pursuance of the contract, shall at all times be open and accessible to the inspection and supervision of the Principal, HansRaj College, his authorized subordinates in charge of the work and all the superior officers, officer of the Quality Assurance Unit of the Department or any organization engaged by the Department for Quality Assurance and of the Chief Technical Examiner's Office, and the contractor shall, at all times, during the usual working hours and at all other times at which reasonable notice of the visit of such officers has been given to the contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing, present for that purpose. Orders given to the

Contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

If it shall appear to the Engineer-in-charge or his authorized subordinates in-charge of the work or to the Principal HRC in charge of Quality Assurance or his subordinate officers or the officers of the organization engaged by the Department for Quality Assurance or to the Chief Technical Examiner or his subordinate officers, that any work has been executed with unsound, imperfect, or unskilful workmanship, or with materials or articles provided by him for the execution of the work which are unsound or of a quality inferior to that contracted or otherwise not in accordance with the contract, the contractor shall, on demand in writing which shall be made within twelve months (six months in the case of work costing Rs. 10 Lac and below except road work) of the completion of the work from the Principal, HansRaj College specifying the work, materials or articles complained of notwithstanding that the same may have been passed, certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost. In the event of the failing to do so within a period specified by the Engineer-in- Charge in his demand aforesaid, then the contractor shall be liable to pay compensation at the same rate as under clause 4.10.1 and clause 2 of GCC 2019 of the contract (for non-completion of the work in time) for this default.

In such case the Principal HRC /Architect may not accept the item of work at the rates applicable under the contract but may accept such items at reduced rates as the authority specified in schedule 'F' may consider reasonable during the preparation of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment and/or get it and other connected and incidental items rectified, or removed and re-executed at the risk and cost of the contractor. Decision of the Principal, HansRaj College to be conveyed in writing in respect of the same will be final and binding on the contractor.

5 WORK TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS, DRAWING ORDERS ETC.

5.1 Work to be executed in accordance with Specifications & Drawing:

The contractor shall execute the whole and every part of the work in the most substantial and work man like manner, and both as regards materials and otherwise in every respect in strict accordance with the specifications. The contractor shall also confirm exactly, fully and faithfully to the designs, drawing and instructions in writing relating to the work signed by the Principal, HansRaj College and lodged in the office, and to which the contractor shall be entitled to have access at such office, or on the site of the work for the purpose of inspection during office hours, and the contractor shall, if he so requires, be entitled at his own expense to make or cause to be made copies of the specifications, and of all such designs, drawings and instructions as aforesaid.

5.2 Removal of employees, workmen and foremen:

5.2.1 The Principal, HansRaj College shall have full powers at the all times to subject to the employment of any workmen, foreman of other employee on the works by the contractor, and if the contractor shall receive notice in writing from the Principal, HansRaj College requesting removal of any such man from the work, the contractor shall comply with the request forthwith.

5.2.2 No such workman, foremen or other employee after his removal from the works by request of the Principal, HansRaj College shall be re-employed or re-instated on the works by the contractor at anytime, except with the previous approval in writing of the Principal, HansRaj College. The contractor shall not be entitled to demand the reason from the Principal, HansRaj College for requiring the removal of any such workmen, foremen or other employee.

5.3 **Alteration in specification and design, do not invalidate contracts**

The Principal, HansRaj College shall have power to make any alterations in or omission from additions, to or substitutions for the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any instructions which may be given to him in writing signed by the Principal, HansRaj College and such alterations, additions, or substitution shall not invalidate the contract; and any altered, additional or substituted work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on same conditions in all respects on which he agreed to do the main work, and at the same rates as are specified in the tender for the main work. The time for the completion of the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract work and the certificate of the Principal, HansRaj College shall be conclusive as to such proportion. And if the altered, additional of substituted work includes any class of work, for which no rates entered in the schedule of rates of the district subject to the same percentage above or below as included in the contract, and if such class of work is no entered in the schedule or rates of the district then the contractor shall within seven days of the date of his receipt of the order to carry out the work inform the Principal, HansRaj College of the rate which it is his intention to charge for such class of work, and if the Architect and Principal do not agree to this rate he shall by notice in writing, be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner as he may consider advisable, provided always that if the contractor shall commence work or incur any expenditure is regard thereto before the rates shall have been determined lastly herein before mentioned, then and in such case he shall be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid to such rate or rates as shall be fixed by the determination of the rate as aforesaid to such rate as shall be fixed by the Architect/Engineer-in-Charge. In the event of dispute the decision of the Principal, HansRaj College will be final.

5.4 No compensation for alteration or restriction work to be carried out

5.4.1 If at any time after the commencement of the work the HANS RAJ COLLEGE shall for any reason whatsoever not require the whole thereof as specified in the tender to be carried out, the Principal, HansRaj College shall give notice in writing of the fetch to the contractor who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage, which he might have derived from execution of the work in full that which he did not derive in consequence of the work not having been carried out neither shall be have any claim for compensation by reasons of any alterations having been made in the original specifications, drawings, designs and instructions which shall involve any curtailment of the work originally contemplated.

5.4.2 The bid and all details submitted by the Bidder subsequently shall be signed & stamped by company's seal on each page in token of acceptance by a person, legally authorized to enter into agreement on behalf of the Bidder. The same person, if any, shall also sign

Corrections/ alternation. Bidder shall submit Power of Attorney in favour of the person who signs the bid & subsequent submissions on behalf of the Bidder.

5.5 Action and compensation payable in case of bad work

As per clause 16 of GCC 2019.

5.6 **Works to be open to inspection:**

All work under or in course of execution or executed in pursuance of the contract shall at all times to open to the inspection and supervision of the Principal/Architect and his subordinates and the contractor shall at all times, during the usual working hours, and at all other times at which reasonable notice of the intention of the Principal or his subordinate to visit the works shall have been given to the contractor, either himself be present for that purpose. Orders given to the contractor's agent shall be considered to have force as if they had been given to the contractor himself.

5.7 **Notice to be given before work is covered up:**

The contractor shall give not less than five days notice in writing to the Principal, HansRaj College or his subordinate-on-charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is so covered up or paled beyond the reach of measurement and shall not cover up or place beyond the reach of measurement, and work without the consent in writing of the Principal, HansRaj College or his subordinate-in-charge of the work and if any work shall be covered up or placed beyond the reach of measurement such notice having been given or consent obtained the same shall be uncovered at the contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

5.8 **Contractor liable for damage done and for imperfections for 1 month after certificate**

If contractor or his work people, or servant shall break, deface, injure or destroy any part of a building, if they may be working on any building, road, fence, enclosure, or grass land, cultivated ground contiguous to the premises on which work or any part of it is being executed, or if any damage shall happen to the work while in progress from any cause whatever or in any imperfections become apparent in it within six months after a certificate final of other its completion shall have been given by Principal, HansRaj College as aforesaid, the contractor shall make the same good at his own expense, or in default the Principal, HansRaj College may cause the same to be made good by other workmen, and deduct the expense (of which the certificate of the Principal, HansRaj College shall be final) from any sums that may be then, or at any time thereafter may become due to the contractor or from his security deposit.

5.9 **Contractor to supply plant ladders, scaffoldings, etc.**

The contractor shall supply at his own cost all materials except such special materials, if any, as may in accordance with the supplied from the Principal, HansRaj College's stores, plants, tools, appliances, implements, ladders, cordage, tackle, scaffolding and temporary works requisite or proper for the proper execution of the work whether original altered or substituted and whether included in the specification or other documents forming part of the contract or referred to in these conditions or not, or which may be necessary for the purpose of satisfying or complying with the requirements of Principal, HansRaj College as to any matte as to which under these conditions he is entitled to be satisfied, or which he is

entitled to require together with carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or materials. Failing his so doing the same may be provided by the Principal, HansRaj College at the expense of the contractor and the expenses may be deducted from any money due to the contractor under the contract or from his security deposit. The contractor shall also provide all necessary fencing and lights required to protect the public from accident and shall be bound to bear the expense of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions, and to pay any damages and cost which may awarded in any such suit, action or proceedings to may such persons or which may with the consent of the contractor be paid to compromise any claim by any such person.

5.10 All Quality Test of material like Wood, Coarse sand, Brick, Reinforcement, Stone Aggregate, Cement, Tile, Granite, Kota, Stainless steel, Aluminium, Structural steel, Paint, Glass etc all bulk item to done by vendor through ISO certified Lab and submitted to college with their running bill. No Extra payment will be made for these test.

6 Labour Employment

6.1 **Age:**

No labour below the legally permissible age shall be employed on the work.

6.2 **Minimum Wages:**

The contractor shall pay not less than fair wages applicable to the totality to labour engaged by him on the work. All other labour laws as applicable in the locality shall be adhered to.

6.3 **Contribution of EPF and ESI:**

The ESI and EPF contributions on the part of employer in respect of this contract shall be paid by the contractor. These contributions on the part of the employer paid by the contractor shall be reimbursed by the Principal, HansRaj College to the contractor on actual basis.

6.4 **Accommodation:**

The contractor shall make his own arrangements for providing accommodation for labour as may be required in accordance with local regulations. The Client shall provide necessary space for making hutments which shall be cleared on completion of work.

In respect of all labour directly or indirectly employed in the work or performance of the contractor's part of this agreement the contractor shall comply with or cause to be complied with regulations for hutting accommodation of local labour laws.

6.5 **Contractor liable for payment of compensations to injured workman, or in case of death**

6.5.1 In every case in which by virtue of the provision of Section 12, sub-section(I) of the Workmen's Compensation Act, 1923, HANS RAJ COLLEGE is obliged to pay compensation to workmen employed by the contractor, in execution of works HANS RAJ COLLEGE will recover from the contractor the amount of the compensation so paid, and without prejudice to the rights of HANS RAJ COLLEGE under Section 12, sub-section (2) of the Act, HANS RAJ COLLEGE shall be liberty to recover such amount of any part thereof by deducting in from the contract or otherwise.

6.5.2 HANS RAJ COLLEGE shall not be bound to contest any claim made against it under Section 12, sub-section (I) of the said Act except on the written request of the contractor

and his upon giving to HANS RAJ COLLEGE full security for all costs for which HANS RAJ COLLEGE might become liable in consequence of contesting claim.

7 WORK NOT TO BE SUBLET

7.1 Contract may be rescinded and security deposit forfeited for subletting.

7.2 The contract shall not be assigned or sublet without the written approval of the Principal and if the contractor shall assign or sublet his contract or attempt to do so, or become insolvent or commence any insolvency proceedings or make any composition with his creditors or attempts to do so, or if any bribe, gratuity, gift, loan requisite reward or advantage, pecuniary or otherwise; shall either directly or indirectly be given promised or offered by the contractor, or any of his servants or agents to any officer or person in the employ of HANS RAJ COLLEGE in any way relating to his office or employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract the Principal may thereupon by notice in writing rescind the contract and the security deposit of the contract shall thereupon by notice in writing rescind the contract and the security deposit of the contract shall thereupon stand forfeited and be absolutely at the disposal of HANS RAJ COLLEGE and the same consequence shall ensure as if the contact had been rescinded under Clause 7.1 thereof .

8 Site Visit:

Bidder is advised to visit and examine the site and its surrounding and shall familiarize himself of the existing facilities and environment, and shall collect all other information which he may require for preparing and submitting the bid and entering into the contract. Claims and objections due to ignorance of existing conditions or inadequacy of information will not be considered after submission of the bid and during implementation.

9 PREPARATION OF BIDS

9.1 Bid Validity:

Bid shall remain valid for acceptance for a period of 90 (Ninety) days from the date of opening of the Bid. The Bidder shall not be entitled during the said period to revoke or cancel his bid or to vary the bid except and to the extent required by Principal, Hans Raj College in writing. In case of Bidder revoking or cancelling his bid or varying any term in regard thereof, the Principal, Hans Raj College shall forfeit the earnest money paid by him along with bid. Bid shall be revalidated for extended period as required by Principal, Hans Raj College in writing. In such cases, unless otherwise specified, it is understood that validity is sought and provided without varying either the quoted price or any other terms & conditions of bid finalized till that time.

9.2 Cost of Bidding:

All direct and indirect costs associated with the preparation and submission of bid (including but not limited to clarification meetings and site visit, if any), shall be to Bidder's account and the Principal Hans Raj College will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

9.3 Applicable Language:

The bid and all correspondence incidentals to and concerning the bid shall be in the English Language. For supporting document and printing literature submitted in any other language, an accurate English Translation shall also be submitted. Responsibility for correctness in translation shall lie with the Bidder.

The bid and all details submitted by the Bidder subsequently shall be signed & stamped by company's seal on each page in token of acceptance by a person, legally authorized to enter into agreement on behalf of the Bidder. The same person, if any, shall also sign Corrections/ alternation. Bidder shall submit Power of Attorney in favour of the person who signs the bid & subsequent submissions on behalf of the Bidder.

9.4 **"Corrections and Alterations"**

9.4.1 Tenderers are required to fill in the tender documents with due care so as to avoid any cutting/ corrections/ alterations in the entries made in the tender papers.

9.4.2 In case any corrections are required, the original writing shall be neatly cut/ penned through and re-written nearby. **No overwriting or eraser of original writing by use of '' white fluid'' or otherwise is permitted,** in case any eraser using white correcting fluid is found, the tender shall be liable to be rejected.

9.4.3 The Tenderer with date shall sign all corrections/cutting/alterations in full. Numerical figure shall be written both in figure as well as words.

10 EARNEST MONEY DEPOSIT

10.1 Original EMD in The form of DD /FDR shall be deposited in HRC before the opening of Technical Bid and Scanned copy up loaded.

10.2 If the Bidder, after submission, revokes his bid or modifies the terms and conditions thereof during the validity of his bid except where the Principal, Hans Raj College has given opportunity to do so, the earnest money shall be liable to be forfeited.

10.3 Principal Hans Raj College may at any time cancel or withdraw the Invitation to Bid without assigning any reason and the earnest money submitted by Bidder will in such case be refunded to him.

10.4 After acceptance of order by successful Bidder, the earnest money will be returned to all unsuccessful bidders. Earnest Money shall be returned to the successful Bidder after he has furnished the Performance Guarantee to the Principal HansRaj College or the same shall be adjusted against Security deposit Amount.

11 SCHEDULE OF RATES

11.1 The Schedule of Rates 2019 shall be read in conjunction with all other sections of tender document.

11.2 The rates quoted by the Bidder shall be firm and fixed for the completion period of the tendered works, unless stated otherwise.

11.3 Rates/ amount must be filled in format for `Schedule of Rates' enclosed as part of tender document. If quoted in separate typed sheets and any variation in item description, unit or quantity is noticed; the bid is liable to be rejected. In any case Bidder shall be presumed to have quoted against the tendered description of work and the same shall be binding on Bidder.

11.4 Bidder shall quote for all the items of Schedule of Rates after careful analysis of cost involved for the performance of the completed item considering all parts of the tender document. In case any activity though specifically not covered in description of item under `Schedule of Rates' but is required to complete the work as per Scope of Work, Scope of Supply, Specifications, Standards, Drawings, Special Condition of Contract or any other part of tender document, the item quoted rate will be deemed to be inclusive of cost incurred for such activity.

11.5 The rate shall include all expenditure incurred towards mobilisation and de-mobilisation including all Taxes & GST.

11.6 All rates set forth in Bidder's quotation shall be in Indian Rupees unless otherwise instructed. Bidder shall quote rates both in figures as well as in words, failing which the bid is liable to be rejected.

11.7 **Compliance to Tender Requirement**

Principal HansRaj College expects Bidder's compliance to requirement of tender document without any deviation. In any case, no exception or deviation shall be accepted to the following clauses of tender document:

i) Earnest Money Deposit
ii) Bid Validity Period
iii) Performance Guarantee / Security Deposit
iv) Defect Liability Period
v) Termination
vi) Scope of Work Supply
vii) Force Majeure
viii) Arbitration
ix) Guarantees
x) Schedule of Rates
xi) Price Reduction
xii) Payment terms

12 SUBMISSION OF TENDER

12.1 **One Bid per Bidder**

Bidder shall submit only one bid either by himself or as a partner in a joint venture. A bidder, who submits or participates in more than one bid, will be disqualified.

13 AWARD OF WORK

13.1 **Award of Work**

The Bidder, whose bid is accepted by Principal HansRaj College, shall be issued Fax of Acceptance / Letter of Acceptance (FOA/LOA) prior to expiry of bid validity. Bidder shall confirm acceptance by returning signed copy of the FOA /LOA as will be intimated to him.

Principal Hans Raj College shall not be obliged to furnish any information/ clarification/ explanation to the unsuccessful bidders as regards non-acceptance of their bids. Except for refund of EMD to unsuccessful bidders, Principal HansRaj College shall correspond only with the successful bidder(s).

13.2 **Contract Document**

13.2.1 The successful Bidder shall be required to execute a formal agreement in accordance within 15 days of Dates to start the work.

13.2.2 Contract Documents to be signed between Principal HansRaj College & selected Bidder shall consist of the following:

i) Agreement on stamp paper of appropriate value
ii) Letter of Acceptance/ Fax of Acceptance

iii) Original tender document along with set of drawings as terms & condition.

iv) CPWD GCC 2014.

13.2.3 Contract agreement shall be made on the non-judicial stamp paper of appropriate value. Cost of stamp paper shall be borne by Contractor.

14 THE SITE LOCATION

14.1 HANS RAJ College is in North Campus of Delhi University on Mahatma Hans Raj Marg near Malka Ganj, Delhi -110007

15 RESPONSIBILITY OF CONTRACTOR

15.1 It shall be the responsibility of the contractor to obtain the approval for any revision and/or modifications decided by the contractor from the Principal HansRaj College / Engineer-in-Charge before implementation. Also such revisions and/or modifications if accepted/ approved by the Principal HansRaj College / Engineer-in-Charge shall be carried out at no extra cost to the Principal HansRaj College . Any change required during functional requirements or for efficient running of system, keeping the basic parameters unchanged and which has not been indicated by the contractor in the data/ drawings furnished along with offer will be carried out by the contractor at no extra cost to the Principal HansRaj College .

15.2 All expenses towards mobilisation at site and de-mobilisation including bringing in equipment, work force, materials, dismantling the equipment, work force, materials dismantling the equipment, clearing the site etc. shall be deemed to be included in the prices quoted and no separate payments on account of such expenses shall be entertained.

15.3 It shall be entirely the contractor's responsibility to provide, operate and maintain all necessary construction equipment, steel scaffoldings and safety gadgets, cranes and other lifting tackles, tools and appliances (as applicable) to perform the work in a workman like and efficient manner and complete all the jobs as per time schedules.

15.4 Preparing approaches and working area for the movement and operation of the cranes, levelling the areas for assembly and erection shall also be responsibility of the contractor. The contractor shall acquaint himself with access availability facilities, such as railway siding, local labour etc., to provide suitable allowances in his quotation.

15.5 The procurement and supply in sequence and at the appropriate time of all materials and consumables shall be entirely the contractor's responsibility and his rates for execution of work will be inclusive of supply of all these items. Contractor shall not use any of the equipment or materials issued to him by Principal HansRaj College for installation purposes for laying temporary lines, manufacturing erection aids etc. Misuse of materials will be seriously viewed and deductions at penal rates will be made from the contractor's bills for such quantities that are misused.

16 SECURITY DEPOSIT

16.1 PERFORMANCE GUARANTEE

16.1.1 The Contractor whose tender is accepted will be required to furnish performance guarantee of 5% (Five Percent) of the tendered amount within the 15 days of award of contract. This guarantee shall be in the form of Bank Draft / FDR / Bank Guarantee on any Scheduled Bank in favour of Principal, HANS RAJ College payable at New Delhi. In case the contractor fails to deposit the said performance guarantee within 15 days the Earnest

Money deposited by the contractor shall be forfeited automatically without any notice to the contractor. The Earnest money deposited at the time of application will become part of Performance Guarantee for Civil component.

16.1.2 The Performance Guarantee shall be initially valid up to the stipulated date of completion plus 60 days beyond that. In case the time for completion of work gets enlarged, the contractor shall get the validity of Performance Guarantee extended to cover such enlarged time for completion of work. After recording of the completion certificate for the work by the competent authority, the performance guarantee shall be returned to the contractor, without any interest after final Bill.

16.1.3 In the event of the contract being determined or rescinded under provision of any of the Clause/Condition of the agreement, the performance guarantee shall stand forfeited in full and shall be absolutely at the disposal of Principal, Hans Raj College.

16.2 SECURITY DEPOSIT

16.2.1 The person/persons whose tender(s) may be accepted (hereinafter called the contractor) shall permit Principal, Hans Raj College at the time of making any payment to him for work done under the contract to deduct a sum at the rate of 5% of the gross amount of each running and final bill.

16.2.2 The CONTRACTOR will be permitted to furnish a Bank Guarantee / FDR on any Scheduled Bank in favour of Principal, HANS RAJ College payable at New Delhi for the full / part Security deposit as specified above of the Total Contract Value, in advance, in which case, and no deductions shall be made from his running bills towards security deposit of equivalent amount drawn valid up to 12 months from the virtual date of completion.

16.2.3 The CONTRACTOR may, at any time and from time to time, during the course of or after completion of the work, with the permission of the PRINCIPAL HANSRAJ COLLEGE, substitute his cash security deposit, including retention money(ies) deducted from his bills and lying with the PRINCIPAL HANSRAJ COLLEGE , by Bank Guarantee(s) in the prescribed performa from a Scheduled Bank in India acceptable to the PRINCIPAL HANSRAJ COLLEGE and withdraw the equivalent cash amount(s).

16.2.4 The Security deposit including the Earnest Money/ Performance Guarantee (ies), and other withheld amounts from the Running Account Bill(s), if any, at any time remaining in the hands of the PRINCIPAL HANSRAJ COLLEGE, shall be free of any liability for payment of any interest to the CONTRACTOR

16.2.5 The Security deposit shall remain valid till the expiry of the maintenance period (i.e. up to 12 month from the date of completion of the work) SD will be uploaded after payment of final bill and expire of date of defect liability period.

17 <u>DRAWINGS</u>

17.1 The drawings accompanying the bidding document are indicative of scope of work and are issued for bidding purpose only. These drawings indicate the general scheme as well as the layout to enable the bidder to make an offer in line with the requirements of the Principal HansRaj College .

17.2 "Good for Construction (GFC)" drawings for major part of the work shall be issued to the contractor after award of work. The minor detailing shall be prepared if required by contractor and shall be got approved by Principal, HansRaj College before execution. Such work shall deem to be included in the quoted rate and no extra payment shall be made on this account.

17.3 Based on the GFC drawings for the work, the contractor shall submit the methodology of the work. COLLEGE may review and offer comments/ suggestion on the execution philosophy prepared by the Contractor and the later shall adhere to such comments/suggestions without any extra cost to the Principal HansRaj College maintaining the original time schedule. Complete correctness/ soundness of the work shall be the sole responsibility of the contractor irrespective of the fact whether COLLEGE has reviewed the same or not. Further review of execution methodology, data & detailing as above shall not absolve the contractor of any of his obligations under the contract. The contractor shall rectify any defect observed during the Defect Liability Period by carrying out all necessary modification without any extra cost to the College.

18 INCOME TAX

18.1 TDS For income Tax at the prevailing rate as applicable from time to time shall be deducted from Contractors bills as per Income Tax Act, and contracted price shall be deemed to include this.

19 GST-CONTRACTOR

19.1.1 The contractor should also summit valid GST Registration & PAN Number.

19.1.2 The Principal HansRaj College on will not pay the GST extra at prevailing rates to the contractor & bidder must quote their rates inclusive of the same. The responsibility of deposition of GST shall be on contractor / Service Provider. at the prevailing rate as applicable from time to time shall be deducted from contractor's bills as per Delhi Govt. Rules and contracted price shall be deemed to include this.

20 PRICE ESCALATION

No Price is payable on any account & in the duration of project up to completion including extension if any (Clause 10C, 10CA & 10CC of GCC 2020 stands deleted)

22 SITE CLEANING

22.1 The Contractor shall clean and keep clean the work site from time to time to the satisfaction of the Principal, HansRaj College for easy access to work site and to ensure safe passage, movement and working.

22.2 Working site should be always kept cleaned up to the entire satisfaction of the Principal, HansRaj College. Before handing over any work to Principal HansRaj College, the Contractor in addition to other formalities to be observed as detailed in the document shall clear the site to the entire satisfaction of Engineer-in-Charge.

23 CONSTRUCTION EQUIPMENT

23.1 The Contractor shall without prejudice to his overall responsibility to execute and complete the work as per specifications and time schedule, progressively deploy adequate equipment and tools & tackles and augment the same as decided by the Engineer-in-Charge depending on the exigencies of the work so as to complete all works within the contracted time schedule and without any additional cost to Principal HansRaj College. The Principal HansRaj College shall supply no Equipment.

24 LEADS

Rates Quote in the Tender shall be for all leads, lift, etc. Rates are applicable uniformly for all floors

24.1 For the various works, in case of contradiction, leads mentioned in the Schedule of Rates shall prevail over those indicated in the Technical Specifications.

25 EXECUTION OF WORK

25.1 Contractor shall observe in addition to Codes specified in respective specification, all national and local laws, ordinances, rules and regulations and requirements pertaining to the work and shall be responsible for extra costs arising from violations of the same.

25.2 Various procedures and method statements to be adopted by Contractor during the construction as required in the respective specifications shall be submitted to Principal Hans Raj College in due time for approval. No such activity shall commence unless approved by Principal Hans Raj College in writing.

25.3 The Contractor shall carry out required supervision as per Quality Assurance Plan and furnish all assistance required by the Principal Hans Raj College in carrying out inspection work. The Principal Hans Raj College will have authorized representatives present who are to have free access to the work at all times. If Principal Hans Raj College's representative notifies the Contractor's representative of any deficiency, the Contractor shall make every effort to carry out such instructions consistent with best industry practice.

26 PROTECTION WORK

Providing barricade along the demarked periphery of site using MS pipes/posts/ Structural Members and Coloured GI Sheeting up to 7.0 M heights temporarily with all warning signs, Supporting M.S Frame, M.S structure and removing the same after the completion of job. Complete including all necessary fitting as per specifications/ instructions of the Principal, HansRaj College. No payment shall be given to vendor for this work.

27 ELECTRICAL WORKS

27.1 Subject to provisions the inspection and tests as required under Indian Electricity Rules-1956 & prescribed in IS.:732 (Part-III)-1982 with upto date amendment, if any shall be conducted.

28 COORDINATION WITH OTHER AGENCIES

28.1 The work shall be carried out in such manner that the work of other agencies operating at the site is not hampered due to any action of the Contractor. The Contractor will be responsible for ensuring proper coordination with other agencies. In the event of any dispute between the Contractor and any other agency employed at the job site arising out of or related to the performance of the work, the decision of the Principal, HansRaj College shall be final and binding on the Contractor.

29 FRONTS FOR WORKS WHERE OTHER AGENCIES ARE ALSO INVOLVED

29.1 The work involved under this contract include such works where other agencies might also be working with the same area and part of the job shall have to be taken up and completed after other agencies have completed their job. The contractor will be required and bound to take up and complete such works as and when the fronts are available for the same and no claim of any nature whatsoever shall be admissible to the contractor on this account

30 SITE ORDER BOOK

31.1 The contractor shall also maintain an order book at the site of each of the works wherein the instructions of the Principal, HansRaj College or his representative about the work shall be recorded. The order book shall be the property of the employee & the instructions

recorded therein shall be deemed to have the same force and effect as if they had been given to the contractor or his representative on the site must sign the book once a day in token of his having perused the orders give therein.

31 MEASUREMENT OF WORK

In addition to the provisions of CPWD Specifications and associated provisions thereof, all the works shall be measured in accordance with relevant Schedule of Rates/ Specifications/ BIS Codes etc. or/and as decided by the Principal, HansRaj College.

32 PAYMENT TERMS

32.1 Whenever bill is due for payment, the contractor would initially submit draft computerized measurement sheets and these measurements would be got checked from the Principal, HansRaj College and/or his authorized representative. The contractor will, thereafter, incorporate such changes as may be done during these checks/test checks in his draft computerized measurements, and submit to the department a computerized measurement book and with its pages machine numbered. The Engineer-in- Charge and/or his authorized representative would thereafter check this MB.

32.2 The Principal, HansRaj College and/or his authorized representative would thereafter check this Measurement Sheet. The contractor shall also submit to the department separately his computerized Abstract of Cost and the bill based on these measurements and its pages machine numbered.

32.3 The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements/levels by the Principal, HansRaj College or his representative.

32.4 The contractor shall give not less than seven days' notice to the Principal, HansRaj College or his authorized representative in charge of the work before covering up or otherwise placing beyond the reach of checking and/or test checking the measurement of any work in order that the same may be checked and/or test checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking and/or test checking measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of the Principal, HansRaj College or his authorized representative in charge of the work who shall within the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of checking and/or test checking measurements without such notice having been given or the Principal, HansRaj College's consent being obtained in writing the same shall be uncovered at the Contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

32.6 For works running account bills shall be submitted by the contractor for the work executed on the basis of such recorded measurements on the format of the Department. The contractor shall not be entitled to be paid any such interim payment if the gross work done together with net payment/ adjustment of advances for material collected, if any, since the last such payment is less than the amount specified in Annexure 'V'.

32.7 All such interim payments shall be regarded as payment by way of advances against final payment only and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be rejected, removed, taken away and reconstructed or re-erected. Any certificate given by the Principal, HansRaj College relating to the work done or materials delivered forming part of such payment, may be modified or corrected by any subsequent such certificate(s) or by the final certificate and shall not by itself be conclusive evidence

that any work or materials to which it relates is/are in accordance with the contract and specifications. Any such interim payment, or any part thereof shall not in any respect conclude, determine or affect in any way powers of the Principal, HansRaj College under the contract or any of such payments be treated as final settlement and adjustment of accounts or in any way vary or affect the contract.

Pending consideration of extension of date of completion, interim payments shall continue to be made as herein provided without prejudice to the right of the department to take action under the terms of this contract for delay in the completion of work, if the extension of date of completion is not granted by the competent authority.

32.8 Within ten days of the completion of the work, the contractor shall give notice of such completion to the Principal, HansRaj College and within thirty days of the receipt of such notice, the Principal, HansRaj College shall inspect the work and if there is no defect in the work, shall furnish the contractor with a final certificate of completion, otherwise a provisional certificate of physical completion indicating defects (a) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates, shall be issued. But no final certificate of completion shall be issued, nor shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall be executed all scaffolding, surplus materials, rubbish and all huts and sanitary arrangements required for his/their work people on the site in connection with the execution of the works as shall have been erected or constructed by the contractor(s) and cleaned off the dirt from all wood work, doors, windows, walls, floor or other parts of the building, in, upon, or about which the work is to be executed or of which he may have had possession for the purpose of the execution; thereof, and not until the work shall have been measured by the Principal, HansRaj College. If the contractor shall fail to comply with the requirements of this Clause as to removal of scaffolding, surplus materials and rubbish and all huts and sanitary arrangements as aforesaid and cleaning off dirt on or before the date fixed for the completion of work, the Principal, HansRaj College may at the expense of the contractor remove such scaffolding, surplus materials and rubbish etc., and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the contractor shall have no claim in respect of scaffolding or surplus materials as aforesaid.

32.9 The final bill shall be submitted by the contractor in the same manner as specified in interim bills within 3months of physical completion of the work or within one month of the date of the final certificate of completion furnished by the Principal, HansRaj College whichever is earlier. No further claims shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payments of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and rates as approved by Principal, HansRaj College, will, as far as possible be made within the period specified herein under, the period being reckoned from the date of receipt of the bill by the Principal, HansRaj College or his authorized Assistant Engineer, complete with account of materials issued by the Department and dismantled materials.

33 ADVANCES

33.1 MOBILISATION ADVANCE

No Mobilisation advance is payable.

a) All the other stipulations hereof in respect of Security Deposit shall apply

b) The CONTRACTOR shall from time to time at the request of the Principal, HansRaj College suitably extend the validity of any Bank Guarantee (whether furnished by way of Performance Guarantee, Security Deposit or Composite Bank Guarantee) or to secure any advance for such period(s) as may from time to time be required by the HansRaj

College failing which, without prejudice to any other right or remedy available to the HansRaj College the HansRaj College shall be entitled to en-cash the Bank Guarantee.

33.2 SECURED ADVANCE

33.2.1 The contractor, on signing an indenture in the form to be specified by the Principal, HansRaj College, shall be entitled to be paid during the progress of the execution of the work up to 75% of the assessed value of any materials which are in the opinion of the Principal, HansRaj College non-perishable, non-fragile and non-combustible as per Annexure V and are in accordance with the contract and which have been brought on the site in connection therewith and are adequately stored and/or protected against damage by weather or other causes but which have not at the time of advance been incorporated in the works. When materials on account of which an advance has been made under this sub-clause are incorporated in the work, the amount of such advance shall be recovered/ deducted from the next payment made under any of the clause or clauses of this contract.

33.2.2 Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Principal, HansRaj College provided the contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Principal, HansRaj College shall be final and binding on the contractor in this matter. No secured advance, shall however, be paid on high-risk materials such as ordinary glass, sand, petrol, diesel etc.

33.2.3 The watch and ward of the material shall be the responsibility of the contractor and in case arrangements to the satisfaction of Principal, HansRaj College are not made by the contractor, the same shall be made by the department at the cost of contractor. Hans Raj College will not own responsibility of any loss of such material on account of their fire or damage otherwise before its actual consumption.

34 <u>DEDUCTIONS FROM CONTRACT PRICE</u>

34.1 All costs, damages or expenses that the Principal (HRC) may have paid, for which under the Contract the Contractor is liable, shall be claimed by Principal (HRC). The Principal HansRaj College shall bill all such claims, regularly as and when they fall due. Such bills shall be supported by appropriate and certified vouchers or explanations, to enable the Contractor to properly identify such claims. Such claims shall be paid by the Contractor within fifteen (15) days of the receipt of corresponding bills and if not paid by the Contractor within the said period, The Principal (HRC) may then deduct the amount, from any amount due or becoming due to the Contractor under the Contract or may be recovered by actions of law or otherwise, if the Contractor fails to satisfy the Principal HansRaj College of such claims.

34.2 Deductions of amount due to Hans Raj College on any account whatsoever to be permissible from sums payable to a contractor.

34.3 Any excess payment made to the contractor inadvertently or other-under this contract or any account whatever and any other sum found to be due to Hans Raj College by the contractor in respect of this contact, or any others contract or work-order or any account whether, may be deducted from any sum whatsoever payable by Hans Raj College to the contractor either in respect of this contract or any work contract or any other account by any other department of the Government.

35 GOVERNING LAW AND SETTLEMENT OF DISPUTES

35.1 This Agreement, including any non-contractual obligations arising out of or in connection with this Agreement, shall be governed by Indian law and the courts at Delhi shall have the exclusive jurisdiction.

36.2 If any dispute, controversy or claim of whatever nature arises under, out of or in connection with this Agreement, including any question regarding its existence, validity or termination or any non-contractual obligations arising out of or in connection with this Agreement (a "Dispute"), the Parties shall use all reasonable endeavours to resolve the matter amicably within a period of 30 (thirty) from the date of notification of any such dispute by one party to another.

36.3 All Disputes, which are unresolved as per CPWD GCC 2020.

36.4 The arbitrator shall have the power to grant any legal or equitable remedy or relief available under law, including injunctive relief (whether interim and/or final) and specific performance and any measures ordered by the arbitrator may be specifically enforced by any court of competent jurisdiction. Each Party retains the right to seek interim or provisional measures, including injunctive relief and including pre-arbitral attachments or injunctions, from any court of competent jurisdiction and any such request shall not be deemed incompatible with the agreement to arbitrate or a waiver of the right to arbitrate.

36.5 If the dispute or difference pertains to the under noted matter (called excepted matters) the decision and in writing of the Employer shall be final conclusion and binding on the parties:

a) Instructions
b) Transactions with local authorities.
c) Proof of quality of materials.
d) Assigning or under letting of the contract.
e) Correction of defects pointed out during the defects liability period.
f) Certificate that the contractor has abandoned the contract.
g) Notice of the determination of the contract by the employer.
h)

36.6 Authority to appoint Arbitrator is Principal(with prior approval of Chairman of Governing Body)

37 CONSTITUTION OF FIRM

37.1 In case of Tenderers make any change in constitution of the firm shall be forthwith notified by the contractor to Principal, HansRaj College for his information. The prior approval in writing of the Principal, HansRaj College shall be obtained before any change is made in the constitution of the firm. If prior approval as aforesaid is not obtained the contract shall be deemed to have been assigned in contravention of relevant clause hereof and same action may be taken and the same consequence shall be ensured as provided in the said clause.

38 HEALTH, SAFETY & ENVIRONMENT

38.1 Contractor shall include in his offer the Health, Safety & Environment policy containing the overall safety management and procedures that is required to be adhered to during the execution of contract. After the award of the contract detailed Health, Safety & Environment policy/ plan to be followed for the execution of contract under various

divisions of works will be mutually discussed and agreed to. It is responsibility of the contractor to ensure adherence of all safety requirements as suggested by Principal HansRaj College during course of execution.

38.2 The contractor shall provide upon the works, to the satisfaction of the Principal, HansRaj College and at such place as he may appoint proper and sufficient live saving, fire fighting and fist aid appliances, which shall at all times be available for use

38.3 Using **personal protective equipment (PPE)** for those on site, setting up designated isolation rooms for those who show **COVID-19** symptoms and leaving any new building material untouched for three days before use

38.4 Regular thermal scanning to check for fever would be done on all those entering or exiting the work site,

38.5 Hand-washing or sanitising and "mandatory use of PPE (face mask, hand gloves and other as applicable)" by everyone entering the site was recommended.

38.6 Staggered start timings and social distancing during training and lunch would be followed,

38.7 Not more than 2/4 persons [depending on size] will be allowed to travel in lifts or hoists. Use of staircase for climbing should be encouraged,"

38.9 All machines or vehicles should be disinfected regularly and all construction material arriving at the site should be left untouched for three days "to ensure safe usage"

38.10 Apart from supervisors, sites should also have a site safety representative

38.11 Anyone who comes to work without a mask is sent back. Every worker must wear a mask,

(STAMP & SIGNATURE OF BIDDER)

ANNEXURE-I

TIME SCHEDULE

Name of Work	Time of Completion
REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI.	**12 Months from the date of handing over of site**

S. No.	Description of mile stone	Period for completion from date of start in days/months.
1	$1/4^{th}$ (financial) (of whole work)	$1/4^{th}$ (of whole work)
2	$1/2^{th}$ (financial) (of whole work)	1/2 (of whole work)
3	$3/4^{th}$ (financial) (of whole work)	$3/4^{th}$ (of whole work)
4	Full	Full

NOTES:

a) The time of completion shall be reckoned from date of handing over of site.

b) The time indicated is for completing all the works in all respects as per specifications, codes, drawings and instructions of Principal, HansRaj College.

c) It should be noted that the period of construction given above includes preparation of drawings, if required, procurement, mobilisation at site, fabrication, laying, inspection, testing, rectifications, if any, re-testing etc. complete in all respects to the entire satisfaction of Principal HansRaj College / EIC.

d) **The work front may be given in phases and no compensation whatsoever will be given on this account except for as mentioned in clause no. 21. However, where work front is given in phases, the aforesaid period of completion shall be computed separately for each such phase.**

(STAMP & SIGNATURE OF BIDDER)

ANNEXURE - II

FORMAT FOR TENDERER'S EXCEPTIONS / DEVIATIONS

Tender No.:

S. No.	Ref Page No.	Tender Document		Subject	Deviation / Exception/ Clarification/ Assumption
		Clause No.	Para No.		
1	2	3	4	5	6

(SEAL & SIGNATURE OF THE TENDERER)

ANNEXURE - III

APPENDIX SHOWING IMPORTANT SCHEDULES

1	SIGNING THE AGREEMENT		Within 15 Days after issue of letter of intent / order
2	DATE OF COMMENCEMENT OF WORK		Within 7 days of issue of letter of intent / order or the date on which the Contactor is given the site whichever is later
3	PERIOD OF COMPLETION		12Months from the date of commencement of work
4	LIQUIDATED DAMAGES		As per clause 2 of GCC 2020 agreement with Maximum Rates of 1 %per month of Delay to be computed on per day based on quantum of damage suffered due to states delay on the part of cantractor.
5	ADVANCES		Secured Advance & 50% of Advance against running bill.
6	PERIOD AND VALUE OF RUNNING / ON ACCOUNT BILL		Monthly Bill
7	PERFORMANCE GUARANTEE		As per clause no. 16.1
8	SECURITY DEPOSIT		As per clause no. 16.2 It may be noted that the Security Deposit shall not be refunded/ released prior to passing of final bill. The Security deposit shall remain valid till the expiry of the maintenance period (i.e. up to 1 Year from the date of completion of the work and handling over the site) Details are at Clause no. 16 of SCC
9	PAYMENT TERMS		As per clause no. 31
10	INCOME TAX(TDS)		As per prevailing rate for each bill
11	DEFECTS LIABILITY PERIOD		12 Months after completion of work.

(SEAL & SIGNATURE OF THE TENDERER)

ANNEXURE – IV

ITEMS QUALIFYING FOR SECURED ADVANCE

CATEGORY A	
1	Bricks
2	Cement
3	Stone and Brick Aggregate
4	Finished products of brass, iron or steel
5	Doors and window frames, wire mesh, gate, G.I. Sheets
6	Precast R.C.C. product such as pipes & fittings, jali, water storage tanks
7	Doors and windows fittings
8	Pipes and sanitary fittings of G.I., C.I... SCI and HCL
9	Metallic doors/windows
10	M.S. Gratings
11	Reinforcement bars
12	Hydraulic door closures
13	Structural steel
14	C.I. Valves, sluice gates etc.
15	Fencing materials-Chain link/ Barbed wire etc.
16	Anchor bolts
17	Construction Chemicals – Micro Concrete & Others

ANNEXURE - V

AGREEMENT

AN AGREEMENT is made this..... Day of .....two thousand ..... between the Hans Raj College, a institute and with its at Malka Ganj, Delhi – 110007, which expression shall include its successor, unless repugnant to or excluded by the contract here of and assignees of and represented by its Principal, Hans Raj College the first party (hereinafter called the Principal) and by its sole Proprietor/Partner/Managing Director..... Residence of..... (which expression shall be including his/its successor's heirs, executors, representatives and or assignees of the second party (hereinafter called the contractor).

WHEREAS the Hans Raj College had, under Notification .....dated ..... invited tenders for the work of **REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI.**

WHEREAS the contractor has submitted tender for carrying out the work of **REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI** as per the tender documents page 1 to page ..... and has represented that in conformity with his/its obligation contained in the tender including modifications / correction slips / corrigendum contained if any shall carryout the same truly, faithfully and honestly.

THE SAME has been accepted by both the parties on the terms and conditions, corrections, corrigendum contained in the tender as modified as well as the letter of acceptance issued party No.1 annexed here to as.

The same shall be binding on both the parties.

IN WITNESS WHEREOF, the parties have signed the deed of agreement on the date month and year referred to above.

Date:

At New Delhi

WITNESS:

Party No.1

Party No.2

ANNEXURE - VI

FORM OF PERFORMANCE SECURITY (GUARANTEE)

BANK GUARANTEE BOND

In consideration of the **PRINCIPAL, HANS RAJ COLLEGE** (hereinafter called "the Principal") having offered to accept the terms and conditions of the proposed agreement between **PRINCIPAL, HANS RAJ COLLEGE** (hereinafter called "the Principal") and …….....…… (hereinafter called "the said Contractor(s)") for the work **REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI** hereinafter called "the said agreement") having agreed to production of an irrevocable Bank Guarantee for Rs. ……. (Rupees

…… only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We, ……. (hereinafter referred to as "the Bank") hereby undertake to pay to the Principal an amount not exceeding Rs. …….. (Rupees……. Only) on demand by the Government.

2. We, …….(indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demure, merely on a demand from the Principal stating that the amount claimed as required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. …….. (Rupees …….only)

3. We, the said bank further undertake to pay the Principal any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Contractor(s) shall have no claim against us for making such payment.

4. We, ……. (indicate the name of the Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Principal under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till representative on behalf of the Principal certified that the terms and conditions of the said agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. We, ……. (indicate the name of the Bank) further agree with the Principal that the Principal shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Principal against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of the Principal or any indulgence by the Principal to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

7. We, ……. (indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Principal in writing.

8. This guarantee shall be valid up to ……unless extended on demand by the Principal.

Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs. …… (Rupees ……..) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated the ……..day of …… for ……. (indicate the name of the Bank)

ANNEXURE – VII

MEASUREMENT OF WORKS

1.0 **GENERAL**

The measurement of the works executed shall be as per IS-1200 (latest) or as given in the tender documents.

1.1 The following Methodology shall be applied in order of precedence:

a. Measurement of works shall be in accordance with item description of relevant item mentioned in Schedule of Rates.

b. Measurement of works as mentioned in Standard Specification/ Job Specification.

c. In case the clarity is not in the above documents, then it shall be as per BIS and if it does not exist in BIS also, then Measurement of works shall be as decided by Architect .

1.2 Actual quantities of completed measured and accepted work shall only be paid. Payment will be made on the basis of joint measurements taken by Contractor and certified by Principal, HansRaj College. Measurement shall be based on "Approved for Construction" drawings, to the extent that the work conforms to the drawings and details are adequate.

1.3 The deviation clause stands modified as any deviated quantity in excess of agreement items only shall be payable of agreement rates. For extra items rats are to be derived as per clause 12 of agreement.

1.2 Amount of the work may be increased/ decreased and any item omitted or substituted in accordance with the requirement of the Hans Raj College and no claim on this account shall be entertained

1.1 Wherever work is executed based on instructions of Architect/Engineer or details are not adequate in the drawings, Contractor shall take physical measurements in the presence of College Architect & Engineer.

1.2 No other payment either for temporary works connected with this Contract or for any other item such as weld, shims, packing plates etc. shall be made. Such items shall be deemed to have included for in the rates quoted.

1.5 Measurements will be made for various items under schedule of rates on the following basis as indicated in the unit column (column 3 of schedule of rates):

i)	Weights	MT or Kg	iv)	Volume	Cu.M.
ii)	Length	M (Meter)	v)	Area	Sq.M.
iii)	Number	No.			

1.6 Wherever the unit of items has been indicated as lump sum, the payment shall be made on lump sum basis on completion and no mode of measurement shall be applicable.

1.7 All further mode of measurements not covered in above clauses shall be measured in accordance with relevant Schedule of Rates/ Specifications/ BIS Codes etc. and/or as decided by the Architect.

1.8 **The contractor shall submit his running / final bill for the works measurement jointly recorded between the Contractor, Architect's Engineer and the Hans Raj College. The payment of final bill shall be made after affecting the due recoveries. The architect's certificate is final in this regard.**

(STAMP & SIGNATURE OF BIDDER)

ANNEXURE - VIII

INDEMNITY BOND FORMAT

REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI

THIS DEED OF INDEMNITY BOND is made on this _____ day of _____ month of year two thousand nine **(**_____**)** By M/s _____ duly represented by proprietor / one of its partners Sri _____, aged _____ years, son of Sri _____, residing at _____..

Where I am the authorized partner of M/s _____, and in response to the news paper advertisement, I had applied for the tender for the work of **REPAIR, STRENGTHENING & RENOVATION OF EXISTING CANTEEN BLOCK FOR HANSRAJ COLLEGE, DELHI**

Whereas My company became successful in securing the subject work through competitive e-tendering and the work of Enabling works for Augumentation of Canteen Block, For HansRaj College, Delhi has been awarded in our favour by Hans Raj College, Delhi.

And whereas for undertaking the Construction work & Demolition work, my company has entered into contract agreement on _____.

Now this Deed Witnessed that in pursuance of the aforesaid contract agreement **Dt.**_____ and in consideration of Hans Raj College having agreed to make payments on the running bills claimed by my company based on the works completed by my company in respect of Enabling works for Augumentation of Canteen Block , For HansRaj College, Delhi and referred to above, **I hereby undertake to indemnify and keep harmless the Principal, Hans Raj College & its project Architect from any damages, prosecution, other legal suits and claims arising out of any mishaps occurring at the site due to faulty work, faulty demolition and for violating rules and regulations for which I shall be solely responsible.**

Signature of Contractor
With seal

Technical Specification for AIR CONDITIONING work

1. GENERAL:
The system design, basis of design, estimated requirements and other relevant data are outlined in this section. The detailed specifications and specific requirements are outlined in the subsequent sections.

2. LOCATION:
Canteen Block of Hans Raj College located at North Campus of Delhi University on Mahatma Hans Raj Marg Near Malka Ganj, Delhi-110007.

3. SCOPE OF WORK:
The scope comprises supply, installation, testing commissioning of air-conditioning by VRV/ VRF system. The system to facilitate the operation & control of individual room. The system shall be able to cater the partial load which can be as low as 10% of the total load. Thereby the operation of indoor & outdoor units is minimized. The Inverter based Scroll/Rotory compressor which has higher EER are employed in the VRV/VRF systems ensure trouble free operation. The drain point of each unit shall be connected to the common drain point. Proposed AC system will be microprocessor controlled inclusive of safety factor & gadgets.

The condensing units should be capable of providing cooling within ambient range of -5 degree C to 48 degree C DBT & heating is the range of -20 degree C to 15 degree DBT. The Outdoor Unit should be TOP Discharge DC Current Operated Fan Motor. All the Indoor Units to have a EEV built in system and no where the EEV to be placed outside separately. All expose pipe to be covered with race way or heavy duty flexible pipe for protection. Special precaution to be taken while, installing of the drain piping. The contractor shall be responsible for any leakage / seepage due to poor installation of HVAC drain till the guarantee period. Drain point to be tested for 24 hours after blocking one end. Drain piping will be plugged at both ends by appropriate method after completing the drain test to avoid chocking due to foreign material.

4. PRICE:
The quoted price shall include supply, installation, testing, commissioning & handing over of the equipments at **above site**. The prices shall include all material, packing, crating, insurance, freight, handling, octoroi, labor, electricity for welding, tools, tackles, lifts, leads and all other charges if any for the equipment at the above site.

5. SCHEDULE & MANNER OF OPERATION
The work shall be completed within the period as decided by Architect or Engineer-in-charge.

Time being essence of this contract, the contractor shall make available all labor and material in adequate quantities as and when required, expedite and schedule the work as required and also manage the operation in such a manner that the work will be completed within the stipulated time as per the contract.

In addition to providing a detailed time and progress schedule, the contractor shall submit the plan of action to meet the specified dead line for project completion to the Principal, HansRaj College and also prepare and submit a bar chart in consultation with Architect & college Engineer and shall strictly adhere to the same. If the contactor fails to meet the time line as per the bar chart agreed by the contractor than the owner has the right to depute other agencies at his own risk and cost. The contractor shall be responsible to handover the system to the owner with complete satisfaction.

Total work shall be carries out in three phases:

Phase – 1: Drain piping, copper piping and base plate fixing, testing of drain piping and Nitrogen test of Cu piping .

Phase – 2: Outdoor installation, copper pipe connection and IDU installation, testing, and flushing and gas charging.

Phase – 3: Gas Charging, Leak Testing and commissioning of equipment.

6. PERFORMANCE BOND CONTRACT:
The contract shall be performance bond contract and therefore the Contractor shall make their independent checks for heat loads, selection of equipments and allied works thereof and shall be fully responsible for the conditions as per design criteria.

7. DRAWING / DESIGN APPROVAL:
The contractor shall prepare and furnish all relevant shop drawings along with the sections after inspection at the site for approval to the Architect or College Engineer. The execution work shall commence only after the shop drawings/design are approved by the Architect or College Engineer and also responsible for the fitment of equipment and accessories. the contractor will submit shop drawing/ design to the architect M/S SHELTERA CONULTANTS , within 7 DAYS after getting LOI for approval
The list of shop drawings shall be as follows:

a. Detail plans for each area.
b. Refrigerant piping routes with sections.
c. Condenser / Evaporative unit location along with the location of MCB.
d. Electrical panel and control scheme.
e. Mounting stand & foundation details. (to be designed by structural engineer employed by the contractor and approved by owner).
f. Any other detailed drawing required for the system.
g. Drain piping layout with section.
h. Control cabling detail along with sizes.
i. Power cable sizes and earthing wire sizes.
j. Cu pipe support details.
k. Drain line clamp details.

8. GAURANTEE:
The contractor shall guarantee the equipment against all defects of materials and workmanship for the period of twelve months from the date of commissioning & handing-over of the equipment to the owner as certified by the Principal, HansRaj College. However, compressor will have the warranty of five years. Any defects arising during the guarantee period shall be rectified and made good by the vendor at his own risk & cost to the satisfaction owner.

9. INSPECTION:
Routine performance testing of equipment shall be carried out at works in the presence of the Capital Project Administration / consultant / representatives**.**

10. SUPERVISION
Contractor shall depute their team of engineer for the supervision of installation, testing, commissioning & handling over at site of work.

11. SECURITY

The contractor is responsible for all the equipments, piping, wiring and all related accessories till the time of handing over to the customer.

12. TEST

The contractor will perform summer or monsoon and winter test and confirm the performance of units as specified in the design data.

13. MAINTANENCE

The contractor will provide sufficient no. of service/ operator team (available 12 hours) along with the service spares during the guarantee (defect) period at site. Capital project Administration / NIREH will provide necessary office space for the service team. Any defects, including drain, arising during warranty period will be attended within 24 hours.

14. CIVIL WORK

14.1 - Chasing, cutting and semi-finishing with chicken wire mesh of the brick work or floor for laying the drain pipe and copper pipe to be in contractor scope.

14.2 – Chasing, cutting will be carried out only by chase cutting machine. Chisel and hammer shall not be allowed.

15. Design & Route

The air condition Design & Route plan must got approved from the College Architect.

TECHNICAL SPECIFICATION

SCOPE

The scope of this section comprises the supply, erection testing and commissioning of all **inverter based** Variable Refrigerant Volume/Flow System with **Scroll Compressor / Rotary** conforming to these specifications and in accordance with the requirements of Drawing and Schedule of Quantities

TYPE

Units shall be air cooled, variable refrigerant volume/flow air conditioner of **R410A** gas based consisting of one outdoor unit and multiple indoor units. Each indoor units having capability to cool or heat independently for the requirement of the rooms.

It shall be possible to connect minimum 10 indoor units on one refrigerant circuit. The indoor units on any circuit can be of different type and also controlled individually. Following type of indoor units shall be connected to the system:

- Ceiling mounted round flow cassette type
- Ceiling mounted Ductable (HS/LS) type
- Ceiling suspended type
- Wall mounted type
- Floor standing type
- Floor standing Duct Type

All the compressors installed in outdoor unit shall be Inverter scroll / Rotary compressor. The modules from 6 HP to 12 HP shall be with single inverter driven compressor. The outdoor units shall be available with 2HP incremental capacity with maximum available combined capacity of 54HP to suit various requirements.

Outdoor unit shall be suitable for mix match connection of all type of indoor units.
The refrigerant piping between indoor units and outdoor unit shall be extended up to **165m with maximum 90m** level difference **without any oil traps and total piping length with 1000m.**

Outdoor units shall be factory assembled, tested and filled with first charge of refrigerant before delivering at site.

1. OUTDOOR UNIT WITH HEAT PUMP

- All outdoor units above 12 HP shall have minimum two scroll compressors and be able to operate even in case one of compressor is out of order.
- The COP of systems mentioned below shall be 5.65 at 50% **load, 35 °C DBT ambient temperature & at 27 °C DBT/ 19 °C WBT** inside temperature.
- The proposed system shall able to operate up to outside ambient temperature of 48 °C.

- In case of outdoor units above 24HP, the outdoor unit shall have at least 3 inverter compressors so that the operation is not disrupted with failure of any compressor.
- All outdoor units must be equipped with optimized e-pass heat exchanger.
- All outdoor units must be equipped with night time quite operation function which results in less sound level in night time operations of the outdoors.
- It should also be provided with duty cycling for switching starting sequence of multiple outdoor units.
- The noise level shall not be more than 69 dB (A) at anechoic chamber conversion value, measured horizontally 1m away and 1.5m above ground level.
- The outdoor unit shall be modular in design and should be allowed for side by side installation
- The unit shall be provided with its own microprocessor control panel.
- The outdoor units shall be provided with refrigerant cooled inverter circuit which provides more efficient and reliable operation of the system.
- The outdoor units shall have a unique feature of auto sequencing which is automatically enabled to ensure balanced operation of each outdoor unit to improve longevity of equipment and stable operation.
- The outdoor unit should be fitted with low noise, aero spiral design fan with large airflow. The fan motor should be BLDC type and should have the capability of modulating the speed with reference to the load. The unit should also be capable to deliver 70 Pa external static pressure to meet long exhaust duct connection requirement.

A. COMPRESSOR :

The compressor shall **be highly efficient Inverter Scroll / Rotary** with high tensile strength (>550 Mpa) to the walls of Scroll and enables increase in compression chamber volume by using thin spiral design.

- The inverter shall be IGBT type for efficient and quiet operation.
- All outdoor units shall have at least 10 steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed.
- Oil heater shall be provided in the compressor casing.
- The inverter compressor motors shall be six pole motor with stronger magnetic force and higher rotation efficiency of motor.

B. HEAT EXCHANGER

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminum fins to form a cross fin coal.

- The aluminum fins shall be covered **by anti-corrosion resin** film.
- The fins shall be waffle type for increased surface area within same space.
- The units shall be equipped with four face condenser which results in increase in heat exchange surface area and hence in unit efficiency.
- The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

C. REFRIGERANT CIRCUIT

The refrigerant circuit shall include liquid & gas shut-off valves and a solenoid valves at condenser end.

All necessary safety devices shall be provided to ensure the safely operation of the system.

D. SAFETY DEVICES

All necessary safety devices shall be provided to ensure safe operation of the system. Following safety devices shall be part of outdoor unit:

- High pressure switch
- Fan driver overload protector
- Over current relay
- Inverter overload protector
- Over voltage protector

E. OIL RECOVERY SYSTEM

Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths.

2. INDOOR UNIT

This section deals with supply, installation, testing, commissioning of various type of indoor units confirming to general specification and suitable for the duty selected. The type, capacity and size of indoor units shall be as specified in detailed Bill of Quantities

GENERAL

Indoor units shall be either ceiling mounted cassette type, or ceiling mounted ductable type or floor standing duct type or wall mounted type or other as specified in BOQ. These units shall have electronic control valve to control refrigerant flow rate respond to lead variations of the room.

- The address of the indoor unit shall be set automatically in case of individual and group control
- In case of centralized control, it shall be set by liquid crystal remote controller
- The fan shall be dual suction, aerodynamically designed turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on motor shaft having supported from housing.
- The cooling coil shall be made out of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested at 21kg/sqm air pressure under water.
- Unit shall have cleanable type filter fixed to an integrally moulded plastic frame. The filter shall be slide away type and neatly inserted.
- Each indoor unit shall have computerized PID control for maintaining design room temperature. Each unit shall be provided with microprocessor thermostat for cooling and heating.
- Each unit shall be with wired/Wireless LCD type remote controller. The remote controller shall memorize the latest malfunction code for easy maintenance. The controller shall have self-diagnostic features for easy and quick maintenance and service. The controller shall be able to change fan speed and angle of swing flat individually as per requirement.

A. CEILING MOUNTED CASSETTE TYPE UNIT

The unit shall be **4 ways ceiling mounted type with wired remote**. The unit shall include pre-filter, fan section and DX-coil section. The housing of the unit shall be powder coated galvanized steel. The body shall be light in weight and shall be able to suspend from four corners.

Unit shall have an external attractive panel for supply and return air which should be treated with a dirt repellant coating. Unit shall have round way supply air grilles on sides and return air grille in center.

Each unit shall have high lift drain pump (850 mm), fresh air intake provision (if specified) and very low operating sound.

The drain pan of the units shall have an antibacterial treatment that uses silver ions and prevents the growth of slime, mould and bacteria that causes blockage and odours. The units shall have air filters which has anti mould and anti-bacterial treatment that prevents the growth of mould generated from dust or moisture that may adhere to filter. All the indoor units regardless of their difference in capacity should have **same decorative panel size** for harmonious aesthetic point of view. It should have provision of connecting branch ducts.

B. CEILING MOUNTED DUCTABLE TYPE UNIT

Unit shall be suitable for ceiling mounted type with wired remote. The unit shall include pre filter, fan section & DX coil section .The housing of unit shall be light weight powder coated galvanized steel. The unit shall have high static fan with DC motor.

External static pressure can be easily adjusted using a change over switch inside the electrical box to meet the resistance in the duct system. The units shall have high cfm. The unit shall be equipped with a drain pump as standard with 700 mm lift.

The drain pan of the units shall have an antibacterial treatment that uses silver ions and prevents the growth of slime, mould and bacteria that causes blockage and odors.

C. CEILING SUSPENDED TYPE

Unit shall be suitable for ceiling suspended arrangement below false ceiling.
The unit includes pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel.

The unit shall be with wide air discharge openings which produce a spreading 100^{0} air flow and have a drain pump kit available as option.

The unit shall use the quiet stream fan.

D. HIGH WALL MOUNTED UNITS

The units shall be wall-mounted type with wired remote. The unit includes pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel.

Unit shall have an attractive external casing for supply and return air.
The drain pan and air filter of the unit should be kept clean by mould proof polystyrene.
The unit should have five discharge angles which can be set by the remote. The discharge angle shall be set at the same angle when restarting.

3. REFRIGERANT PIPING

All refrigerant piping for the air conditioning system shall be constructed from soft seamless upto 19.1mm and hard drawn copper refrigerant pipes for above 19.1mm with copper fittings and silver-soldered joints. The refrigerant piping arrangements shall be in accordance with good practice within the air conditioning industry, and are to include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits.
All joints in copper piping shall be sweat joints using low temperature brazing and or silver solder. Before joining any copper pipe or fittings, its interiors shall be thoroughly cleaned by passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently, it shall be thoroughly blown out using nitrogen.

After the refrigerant piping installation has been completed, the refrigerant piping system shall be pressure tested using nitrogen at pressure of 550 PSIG. Pressure shall be maintained in the system for 24 hours. The system shall then be evacuated to minimum vacuum if 700mm hg and held for 24 hours.
The air-conditioning system supplier shall be design sizes and erect proper interconnections of the complete refrigerant circuit.

The thickness of copper piping shall not be less than mentioned below:

Pipe Size in mm(OD)	Wall Thickness in mm
a) 41.3	1.4
b) 38.1	1.3
c) 34.9	1.2
d) 31.8	1.1
e) 28.6	1.0
f) 25.4	1.0
g) 22.2	1.0
h) 19.1	0.8
i) 15.9	1.0
j) 12.7	0.8
k) 9.5	0.8
l) 6.4	0.8

The suction line pipe size and the liquid line pipe size shall be selected according to the manufacturers specified outside diameter. All refrigerant pipes shall be properly supported and anchored to the building structure using steel hangers, anchors, brackets and supports which shall be fixed to the building structure by means of inserts or expansion shields of adequate size and number to support the load imposed thereon.

8. PIPE INSULATION

a. Refrigerant Pipe Insulation

The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm /13 mm thick elastomeric nitrile rubber/Polyethelene of class 'O 'as specified in BOQ.

b. Drain Pipe Insulation

Drain pipes carrying condensate water shall be insulated with 6 mm thick elastomeric nitrile rubber insulation.

For proper drainage of condensate, U Trap shall be provided in the drain piping (wherever required). All pipe supports shall be of pre fabricated & pre painted slotted angle supports, properly installed with clamps etc.

9. DRAIN PIPING

1- Shall be UPVC.

2- The IDU shall be connected to the drain pipe made of rigid heavy duty UPVC, density 15 KG/sqcm min 25/32 MM dia meter. The pipe under floor should be 20 Kg/sqcm

3- The pipe shall be laid in proper slope for efficient draining of the condensate water.

10. PIPE INSULATION

1- Refrigerant Pipe Insulation:

(a). The whole of the suction and liquid line including all fitting , valves and strainers bodies etc. shall be insulated with 19 MM/ 13 MM respectively thick class 'o' Electrometric Nitrile Rubber /polyethelene sleeve as per BOQ.

(b). The joint shall be properly sealed with R242 adhesive of polychloroprene to ensure proper bonding at the ends.

(c). Insulation of cold lines shall be carried out with Armaflex/K-flex insulation sheets and tubes of appropriate thickness so that condensation does not occur.

2- Drain Pipe Insulation

(a). Drain pipe carrying condensate water shall be insulated 6 MM thick Nitrile/Polyethelene.

(b). The joint shall be properly sealed with R242 adhesive of polychloroprene to ensure proper bonding at the ends.

(c). For proper drainage of condensate U-trap shall be provided in the drain piping (wherever required).

(d.) All pipe supports shall be of pre-fabricated and pre-painted slotted angle supports properly installed with clamps.

TECHNICAL SPECIFICATIONS – GENERAL CIVIL WORKS

1.0.0 **GENERAL:**

1.1.0 The scope of these specifications includes all civil works connected with the construction of buildings and other facilities described in the scope of work under special conditions of contract CPWD specifications and relevant code may be followed for any work not covered under these specifications.

1.2.0 All materials which may be used in the work shall be of standard quality manufactured by renowned concerns conforming to Indian Standard Specifications (Latest Edition) or equivalent and shall bear I.S.I. mark as far as possible unless otherwise approved by the Architect or college Engineer-in-Charge.

1.2.1 The contractor shall get all materials approved by the Principal, HansRaj College prior to procurement of the same in bulk and also before using in the works. For all major items/ materials used in the works (irrespective of the brand of material or proven source) necessary laboratory tests shall be conducted/or test certificates from the manufacturer shall be furnished by the contractor to ensure conformation of the material to specifications. The tests shall be conducted as directed by Principal, HansRaj College and in approved laboratory(s). The costs of all tests shall be borne by contractor.
Additionally, for testing of materials like concrete, bricks, aggregates etc. which require continuous testing, contractor at his own cost and initiative, shall arrange for facilities for testing at site itself to ensure proper quality control at work site. Frequency of these testing shall be as per standard practice being followed in C.P.W.D. or as directed by Engineer-in-Charge. A separate register shall be maintained indicating the details of tests conducted/reports from laboratories and tests conducted/ result at work site.

1.2.2 The Principal, HansRaj College shall have the right to determine whether all or any of the materials are suitable for incorporation in the work. Any material procured or brought to site and not conforming to specifications and not up to the satisfaction of the Principal, HansRaj College shall be rejected and the contractor shall have to remove the same immediately from site at his own expenses and without any claim for compensation due to such rejection.

1.2.3 The contractor shall keep a proper register at work site indicating the details of materials brought in & the consumption details on day to day basis. The register shall be submitted to Site Engineer/Engineer -in-charge. The contractor shall also keep, readily available at site, a copy of all Delivery Challan and Invoices of materials being brought to site for incorporation in the works and shall produce the same on demand by Site Engineer.

1.3.0 Method of measurement for different items of works unless otherwise specified herein shall be as per IS: 1200 (latest edition).

1.4.0 Prior to commencement of work, the contractor shall set up, at no extra cost to PRINCIPAL HANSRAJ COLLEGE , a Quality Control lab at site and shall have the following minimum test equipment(s) along with all relevant BIS codes, CPWD specifications 2009 Vol. I & vol. II and other standards:-

- Cube testing machine
- Cube moulds
- IS sieves for sieve analysis of aggregates
- Slump cone
- Rebound hammer test equipment
- Weigh balance with weights
- Temperature controlled oven
- Measuring jar, Proctor density, core cutter, screw gauge
- Any other equipment as advised by Engineer-in-Charge.

2.0.0 **MATERIALS:**

2.1.0 **BRICKS:**

2.1.1 The bricks shall be free from cracks, flaws, bends, organic matter and nodules of free lime. Bricks shall conform to IS: 1077-1992 in general unless otherwise specified & shall generally conform to the following classification.

2.1.2 The common burnt clay bricks shall be classified on the basis of their average compressive strength as given in Table-1.

TABLE – 1

CLASSIFICATION OF BRICKS		
Class Designation	Average Compressive strength (kg/ square cm) not less than	Not more than (kg/ square cm)
7.5	**75**	**100**
5	**50**	**75**
3.5	**35**	**50**

2.1.3 Bricks shall be hand moulded common burnt clay bricks of best quality, locally available within a radius of 60 km and shall have a minimum average crushing strength of 50 Kg/Cm2 (Class 50) or as specified in the relevant item of schedule of rates. It shall be sound, hard, of homogeneous texture and of regular shape with frog and shall emit a clear ringing sound on being struck. The bricks shall have uniform colour, smooth rectangular faces and sharp corners.

2.1.4 Nominal size of bricks shall be 22.9 x 11.4 x 7 Cm with permissible tolerances on dimension up to + /- 3%. However, in Eastern parts of our country, nominal size of bricks shall be 25 x 11.4 x 7 CM with permissible tolerances on dimension up to + /- 3%.

2.1.5 Bricks shall not absorb more than 20% of water by weight when immersed in water for 24 hours.

2.1.6 The rating of efflorescence shall not be more than “moderate”.

2.2.0 **AGGREGATES FOR CEMENT CONCRETE:**

2.2.1 General: Aggregate most of which is retained on 4.75 mm IS sieve & contains only as much fine materials as permitted in IS 383-1970 for various sizes & grading is known as coarse aggregate. Coarse aggregate (stone) shall consist of naturally occurring (crushed, broken or uncrushed) stones. It shall be hard, strong, dense, durable, chemically inert, clean and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances. As far as possible flaky, scoriaceous and elongated pieces should be avoided. Aggregate shall conform to IS: 383 - 1970, unless otherwise specified.
Aggregate most of which passes through 4.75 mm IS sieve is known as fine aggregate. Fine aggregate shall consist of natural sand. It shall be hard, durable, chemically inert, clean and free from adherent coatings, organic matter etc and shall not contain any appreciable amount of clay balls or pellets & harmful impurities e.g. salts, coal, mica, shale, iron pyrites & organic impurities.

2.2.2 Deleterious Materials - Aggregates shall not contain any harmful material, such as pyrites, coal, lignite, mica, shale or similar laminated material, clay, alkali, soft fragments, seashells and organic impurities in such quantity as to affect the strength or durability of the concrete. Aggregates to be used for reinforced concrete shall not contain any material liable to attack the steel reinforcement.
Aggregates which are chemically reactive with alkalis of cement are harmful as cracking of concrete may take place and thus shall not be used. The maximum quantity of deleterious material

shall not be more than 5% by weight of aggregate when tested in accordance with IS: 2386-1963 (Part- II).Test shall be conducted as directed by Engineer-in-charge.

Note: The presence of the chlorides and sulphates may lead to corrosion of steel reinforcement. A minimum value as low as 700 ppm of chloride content in concrete can start the chemical process leading to the corrosion. Critical permissible limit for sulphate content is generally taken as 1500 ppm.

2.2.3 **Size and Grading of Aggregate:**

2.2.3.1 Single-sized coarse aggregate - Coarse aggregates shall be supplied in the nominal sizes given in Table - 2. For any one of the nominal sizes, the proportion of other sizes (as determined by the method described in IS: 2386 (Part-I) -1963) shall also be in accordance with Table 2.

2.2.3.2 Fine Aggregate - The grading of fine aggregates, when determined as described in IS: 2386 (Part-I) - 1963 shall be within the limits given in (Table 3) and shall be described as fine aggregates, Grading Zones I, II, III & IV. When the grading falls outside the limits of any particular grading zone of sieves other than 600- micron IS Sieve by a total amount not exceeding 5 percent, it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron IS Sieve or to percentage passing any other sieve size on the coarse limit of Grading Zone IV.

2.2.3.3 Fine Sand: Its grading shall be within the limits of grading zone IV. Maximum quantity of silt shall not exceed 8 %.

2.2.3.4 Coarse Sand: Its grading shall be within the limits of Grading Zone II. The maximum quantity of silt shall not exceed 8 %.

2.2.4 **Sampling and Testing:**

2.2.4.1 Sampling - The method of sampling shall be in accordance with IS: 2430-1969. The amount of material required for each test & the test procedure shall be as specified in the relevant method of test given in IS: 2386 (Part-I) -1963 to IS: 2386 (Part - VIII) -1963.

TABLE - 2 COARSE AGGREGATES

IS Sieve	**Percentage passing by weight for single sizes (ungraded) Aggregate of Nominal size**						**Percentage passing by weight for graded Aggregate of Nominal size**			
	63 mm	**40 mm**	**20 mm**	**16 mm**	**12.5 mm**	**10 mm**	**40 mm**	**20 mm**	**16 mm**	**12.5 mm**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**
75 mm	100	-	-	-	-	-	100	-	-	-
63 mm	85 to 100	100	-	-	-	-	-	-	-	-
37.5 mm	0 to 30	85 to 100	100	-	-	-	95 to 100	100	-	-
19 mm	0 to 5	0 to 20	85 to 100	100	-	-	30 to 70	95 to 100	100	-
16 mm	-	-	-	85 to 100	100	-	-	-	90 to 100	-
11.2 Mm	-	-	-	-	85 to 100	100	-	-	-	90 to 100
9.5 mm	-	0 to 5	0 to 20	0 to 30	0 to 45	85 to 100	10 to 35	25 to 55	30 to 70	40 to 85
4.75 mm	-	-	0 to 5	0 to 5	0 to 10	0 to 20	0 to 5	0 to 10	0 to 10	0 to 10

2.36 mm	-	-	-	-	-	0 to 5	-	-	-	-

TABLE - 3 FINE AGGREGATES

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

NOTE: It is recommended that fine aggregate conforming to Grading Zone IV should not be used in reinforced concrete unless tests have been made to ascertain the suitability of proposed mix proportions.

2.3.0 **CEMENT:**

2.3.1 Unless otherwise specified, **cement shall be ordinary Portland cement conforming either to IS: 269 (OPC 33 Grade) or IS: 8112 (OPC 43 Grade) latest edition. However, Portland slag cements conforming to IS: 455 or Portland Pozzolana Cement conforming to IS: 1489 (part1) latest edition may be used as per instructions/ approval of Engineer-in-charge.**
Contractor shall make proper storage arrangement for cement at the site of works to the satisfaction of the Engineer-in-Charge. Cement should always be stored in such manner as to be easily accessible for proper inspection and in a suitable watertight building or storage shed to protect the cement from dampness. Cement not acceptable to Engineer-in-Charge or his authorized representative being not in conformity with relevant IS standard and/or being deteriorated due to dampness shall be rejected.

2.3.2 **Sulphate Resistant cement** wherever specified for use shall conform to IS 12330-1988. Contractor shall make proper storage arrangement for cement at the site of works to the satisfaction of the Engineer-in-Charge. Cement should always be stored in such manner as to be easily accessible for proper inspection and in a suitable watertight building or storage shed to protect the cement from dampness. Cement not acceptable to Engineer-in-Charge or his authorized representative being not in conformity with relevant IS standard and/or being deteriorated due to dampness shall be rejected.

2.4.0 **STEEL:**

2.4.1 Mild steel reinforcement for cement concrete work shall conform to IS -432 Grade I (latest edition) and cold twisted deformed bars shall conform to IS-1786 (latest edition) and relevant parts of IS-456. It shall have a minimum yield stress of 415 N/mm2 and tensile strength of 485 N/mm2.

2.4.2 **TMT Bars:**
TMT bars (Thermo Mechanically Treated bars) shall conform to IS: 1786 latest edition and shall be of grade Fe500/415 as mentioned in the item description. The bars shall be procured from reputed/ established rolling mills such as Tata Steel, SAIL, RINL or any other equivalent approved supplier.

2.4.3 **HCR/CRS Bars:**
HCR (high corrosion resistant)/Corrosion resistant bars shall conform to IS-1786 latest edition and shall have a grade of Fe 500. The bars shall be procured from reputed/established rolling mills such as SAIL, RINL, and TATA.

2.4.4 **Structural Steel:**

Structural steel sections & plates shall conform to **Grade A** of IS 2062 (latest edition). Steel shall be free from all grease, oil, paint, loose mill scale and rust and shall be free from all defects mentioned in IS 2062 and shall have a smooth uniform finished surface.

2.4.5 Contractor shall invariably produce test certificate from the manufacturer certifying the quality and strength of the steel to conform to the requirement of the aforesaid Indian Standards. In absence of such test certificate from the manufacturer, test shall be carried out in a test House/ Laboratory or University as approved by the Engineer-in-Charge and cost of such tests shall be borne by the contractor. Tests shall be carried out as per IS: 1599, 1608 and 1786 (latest edition).

2.4.6 All reinforcement bars shall be clean and free from dirt, oil, paints, grease, mill scales and loose rust. Bars available in coils shall be uncoiled and properly straightened to the satisfaction of the Engineer-in-Charge at no extra cost to the Principal HansRaj College .

2.5.0 **WATER:**

2.5.1 Water shall conform to requirements given in IS: 456- 2000. It shall be clean and free from injurious quantities of oils, acids, alkalis, salts, sugar, organic materials, vegetable matter or other substances that may be deleterious to brick, stone, concrete or steel. Potable water is generally considered satisfactory for mixing concrete.

2.5.2 Permissible limits for solids when tested in accordance with IS: 3025-1964 shall be as given in Table 4

TABLE - 4 PERMISSIBLE LIMITS FOR SOLIDS

		Max Permissible limit
Organic	:	200 mg/l
Inorganic	:	3000 mg/l
Sulphates (as SO_3)	:	400 mg/l
Chlorides (as Cl)	:	2000 mg/l for concrete not containing embedded steel and 500 mg/1 for reinforced concrete work
Suspended matter	:	2000 mg/l

2.5.3 The pH valve of water shall not be less than 6. Generally PH value shall be between 6 and 8.

2.5.4 Water found satisfactory for mixing is also suitable for curing concrete. However, water used for curing should not produce any objectionable stain or unsightly deposit on the concrete surface. The presence of tannic acid or iron compounds is objectionable.

2.6.0 **MARBLE STONE:**

Marble stone shall be Makrana second quality / Raj Nagar white marble as specified. It shall be hard, sound, dense and homogenous in texture with crystalline texture as far as possible. It shall be uniform in colour and free from stains, cracks, decay and weathering. Marble tiles shall be square cut to linear dimensions in multiple of 10 cm. The tolerance limits in linear dimension and thickness shall be 3% and 1% respectively. Marble shall be tested for water absorption as per IS provision. Before starting the work, the contractor shall get samples of marbles approved by the Engineer-in-Charge.

2.7.0 **PAINTS:**

2.7.1 Paints, oils, varnish spirit etc, of brand with ISI mark as approved by the Site Engineer shall be used. Paints manufactured by M/s Berger, Asian Paints, ICI, Nerolac shall be used. Primer and thinners used shall also be of same manufacture and brand. Ready mixed paints as received from the manufacturer without any admixtures shall be used as per manufacturer's instruction. If, for any

reason thinning is necessary (in case of ready mixed Paint) the brand of thinner recommended by the manufacturer or as instructed by the Site Engineer shall be used.

2.8.0 **SANITARY FITTINGS:**

2.8.1 All glazed earthenware shall be of "Hindustan", "Cera" and "Parry" or "Neycer" make. All wall fittings shall be fixed with wooden cleats, screw and necessary fixtures and fittings whether specifically mentioned in the schedule of rates or not. All metallic fixtures and fittings shall be of CP brass heavy quality of approved make.

3.0.0 **EARTH WORK:**

3.1.0 **Classification of soils:**

3.1.1 The earth work shall be classified under the following categories and measured separately for each of the category.

3.1.2 All kinds of soil:

a) Sand, gravel, loam, clay, mud, black cotton soil

b) Vegetable or organic soil, turf, peats, soft shale or loose moorum.

c) Lime concrete, Mud concrete and their mixtures.

d) Stiff heavy clay, hard shale or compact moorum requiring grafting tool and/or pick and shovel.

e) Shingle and river or nallah bed boulders.

f) Soiling of roads, paths etc. and hard core.

g) Macadam surface of any description.

h) Any mixture of soil mentioned above.

3.1.3 **Ordinary rock (not requiring blasting, wedging or similar means):**
Generally any rock, which can be excavated by splitting with crowbars or picks & does not require blasting, wedging or similar means for excavation such as lime stone, sand stone, hard laterite, hard conglomerate and un-reinforced cement concrete below ground level. If required, light blasting may be resorted to for loosening the materials but this will not in any way entitle the material to be classified as "Hard rock".

3.1.4 **Hard rock (requiring blasting):**
Any rock or boulder for the excavation of which blasting is required such as quartzite stone, granite, basalt, reinforced cement concrete below ground level and the like.

3.1.5 The decision of the Principal, HansRaj College as to the classification of the type of earth work as above shall be final and binding upon the contractor.

3.1.6 Rock blasting work shall be taken up with specific instruction from Principal, HansRaj College & after obtaining necessary statutory permission from Govt. authorities and as per approved procedure.

3.2.0 **Antiquities and Useful Materials:**

3.2.1 Any finds such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the Principal, HansRaj College and shall be the property of the Government

3.2.2 Any useful material obtained from the excavation shall be stacked separately in regular stacks as directed by the Principal, HansRaj College and shall remain the property of the Principal HansRaj College .

3.2.3 **Rate:**

The rate includes the cost involved in all the operations described above. The contract unit rate for cutting trees shall include removal of stumps as well.

3.3.0 **Setting out and Making profiles:**

3.3.1 Masonry pillar will be erected at suitable points in the area, which is visible from the largest area to serve as Bench Mark for the execution of the work. Necessary profiles with pegs, bamboo and strings or "Burjis" shall be made to show the correct formation levels before the work is started. The Contractor shall supply labour and materials for these operations at his own cost. The profiles shall be maintained during the progress of the work where so required by the Principal, HansRaj College.

3.3.2 The ground levels shall be taken at 5 to 15 metres interval (as directed by the Principal, HansRaj College / Site Engineer) in uniformly sloping ground and closer intervals where mounds, pits and undulations are met. The ground levels shall be recorded in field books and plotted on plans with suitable scale. North direction line and position of bench mark shall invariably be shown on the plans. These plans shall be signed by the Contractor and the Principal, HansRaj College or their authorised representatives before the earth work is started. The labour required for taking levels shall be supplied by the Contractor at his own cost.

3.4.0 **Earth Work in Excavation in All Kinds of Soils for Foundation Trenches of Buildings, Wall/ Columns, Blocks, Drains, Pits, Basements etc. including Backfilling:**

3.4.1 Excavation shall be carried out at site to the lines, levels, slope, shape, pattern and contour shown on the detailed drawings or as directed by the Principal, HansRaj College. Only the excavation shown in the drawing or as required by the Principal, HansRaj College shall be measured and recorded for payment.

3.4.2 During excavation, the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or undercutting shall not be done.

3.4.3 The Contractor shall remove all excavated material to soil heaps on site or transport for use as filling, or for use by other contractors engaged at site as directed by the Site Engineer. Excavated material shall not be deposited within 1.5 metres form the top edge of the excavation

For greater depth, the excavation profile shall be widened by allowing steps of 50 cm on either side after every 2 metres depth from the bottom, so as to give virtual side slopes of 1:4 (1 horizontal: 4 vertical). Where the soil is soft, loose or slushy, the width of steps shall be suitably increased, or the sides sloped or the soil shored up as directed by Principal, HansRaj College. The contractor shall take complete instruction from the Site Engineer regarding the stepping, sloping or shoring to be done for excavation deeper than 2 metres.

3.4.8 Where excavations are made wider than required, the contractor shall at his own cost refill it with earth duly watered, consolidated and rammed.

3.4.9 Where the excavations are made deeper than required, it shall be brought to the required level by the Contractor at his own cost by filling in with earth duly watered, consolidated and rammed or with lean concrete as per directions of Principal, HansRaj College.

3.4.10 The Contractor shall not undertake any concreting in foundation until the excavation pit is approved by the Site Engineer.

3.4.11 Refilling the excavated earth in trenches, foundation & plinth etc.

3.4.11.1 Normally earth obtained from excavation of foundation trenches, drains etc. shall be used for refilling the trenches and plinth under floors and balance earth shall be used for filling low lying areas/ elevating the existing area/ specific areas identified by Principal, HansRaj College including levelling to grade/ slope, all complete as specified in the Schedule of Rates and as directed by Principal, HansRaj College. Salt-peter earth, black cotton soil/ expansive type of soil etc. if encountered shall not be used for backfilling.

3.4.11.2 All clods of earth shall be broken or removed. No extra payment shall be made for lead and lift and transportation of earth involved. The earth used for filling shall be free from all vegetation, grass, roots, shrubs, trees, saplings, rubbish and salts harmful to foundations, organic and other foreign
matter.

3.4.11.3 Filling of trenches for pipes and drains shall be commenced as soon as the joints of the pipes and drains have been tested and passed. Filling shall be done with earth on the sides and top of the pipe in layers not exceeding 20 cm in thickness, watered, rammed and consolidated taking care that no damage is caused to the pipe below. All clods and lumps of earth exceeding 8 cm in any direction shall be broken or removed before filling.

3.4.11.4 As soon as the works in foundation have been measured, the spaces around foundation and drains in trenches shall be cleared of all debris, brick bats, mortar dropping etc, and filled with earth in layers, each layer not exceeding 20 cm in depth, watered, rammed and consolidated before the succeeding one is laid. Earth shall be rammed with iron rammers where possible and with the butt ends of crowbars where rammer cannot be used.

3.4.11.5 Plinth under floor shall be filled with earth in layers, each layer not exceeding 20 cm in thickness, watered and consolidated by ramming. The surface shall be flooded with water for at least 24 hours, and allowed to dry and then refilled, rammed and consolidated in order to avoid settlement at a later stage. The finished level of filling shall be kept to slope as indicated in drawing and/or as directed at site.

3.4.12 **Measurement & Payment:**

3.4.12.1 Payment will be made on the cubic content of earth work excavated which shall be computed by measurement of length, width and depth of excavation made as per specifications given herein and the dimensions shown in the approved for construction drawings. Quantity calculation shall be done on the basis of level difference between jointly measured original ground level and the final excavated ground level. The cubical content thus calculated shall be rounded up to two decimal places for the purpose of payment. Excavation made in excess of specified requirement shall not be paid for.

3.4.13 **Rates:**

3.4.13.1 Rates quoted are deemed to include all the activities stated above. It shall cover the following.

a) Excavation in all kinds of soil, getting out and deposition of excavated earth as specified, backfilling in the sides of trenches & in plinth and spreading the balance earth in low lying areas as specified here-in-above.

b) Setting out of work, making profiles etc.

c) Bailing out of water wherever required.

d) Protection to existing structure, if any.

e) Form work, shoring, strutting, stepping & sloping etc.

f) Removal of slips during excavation.

g) Fencing and protection against risk of accident due to open excavation.

h) Excavation for insertion of planking and strutting.

i) All lead and lift as specified in the Schedule of Rates.

j) Handling of antiquities and useful materials as specified.

3.5.0 Earth Work in Excavation in All Kinds of Soil for Foundation Trenches of Storage Tanks, Fire Water Pond Etc.

3.5.1 The specifications as enumerated at clauses 4.4.1 to 4.4.10 are also applicable.

3.5.2 Normally earth obtained from excavation of foundation trenches, of tanks etc. shall be used for filling low lying areas in station including levelling of the same. Filling shall be done in layers not exceeding 20 cm. thick. Clods/lumps etc. shall be broken to dust. As the earth filling and rolling work proceeds, the entire area shall be wetted by sprinkling water to the extent of calculated optimum moisture content or to the moisture content required to achieve field density of 90% of laboratory Proctor density and rolled with vibratory roller/ vibro-rammer/ vibrators/power/hand roller of capacity 8 to 10 ton. During the course of earth filling, field Proctor density of the compacted earth shall be checked and recorded for every 60 cm. depth of filling or part thereof.

Samples of field Proctor density shall be taken at random for at least one for every 1000 sq. m. area of filling. The field Proctor density shall not be less than 90% of the laboratory Proctor density of the fill material. Records of all test results shall be maintained in a register. However in case of fill material being predominantly sand, the above specified compaction shall achieve relative density of minimum 90%.

3.5.3 Where excavated material is mostly rock, the boulders shall be broken to pieces not bigger than 75 mm size in any direction.

3.5.4 The area to be excavated shall be earmarked on ground jointly with Site Engineer. Levels of the area shall be taken on a grid of 10 m. x 10 m. The grid level shall be plotted on a drawing with benchmark reference and signed jointly by the contractor and Site Engineer. The Site Engineer shall decide the level up to which excavation is to be made. Accordingly brick machinery pillars of size 230 mm x 230 mm shall be erected at suitable locations. After the excavation is over, levels shall once again be taken along the earlier established grid.

3.5.5 **Measurement & Payment:**

3.5.5.1 Payment will be made on the basis of quantity of excavation as per the dimensions indicated in the approved construction drawing(s). Volume calculation shall be done on the basis of level difference between jointly measured original ground level and the final excavated ground level taken on the already established grid of 10 m x 10 m. The cubical content thus calculated shall be rounded up to two decimal places for the purpose of payment. Excavation made in excess of specified requirement
shall not be paid for.

3.5.6 **Rate:**

3.5.6.1 Rates quoted are deemed to include all the activities stated above. It shall cover the following.

a) Excavation in all kinds of soil, getting out and deposition of excavated earth including levelling to slope as specified here-in-above.

b) Setting out of work, profiles etc.

c) Bailing out of water wherever required.

d) Protection to existing structure, if any.

e) Form work, shoring, strutting, stepping & sloping, etc.

f) Removal of slips during excavation.

g) Fencing and protection against risk of accident due to open excavation.

3.6.0 Excavation in Ordinary Rock (Not Requiring Blasting):

3.6.1 Where ordinary rock is met during the course of excavation which requires excavation by crowbars, pickaxes or pneumatic drills, the contractor shall intimate the Engineer-in- Charge before commencement of rock excavation. Thereafter the cross sectional dimensions of the rock shall be measured.

3.6.2 Contractor shall be responsible for any accident to workmen, public or property damage due to rock excavation operations.

3.6.3 **Measurement:**
The net quantity of ordinary rock shall be worked out by means of cross-sectional measurements.

3.6.4 **Rates:**
The rates quoted are deemed to include all the activities stated above including all labour, materials, tools, tackles etc...

3.7.0 Excavation in Hard Rock (Requiring Blasting):

3.7.1 Where hard rock is met during the course of excavation & which requires blasting operations, contractor shall intimate and obtain the approval of the Engineer-in- Charge well before actual blasting is undertaken. Prior to blasting the cross sectional dimensions of the rock shall be measured.

3.7.2 Contractor shall obtain license from the District Authorities for undertaking blasting operations as well as for obtaining and storing the explosive as per explosives Acts/Rules corrected up to date. Explosive, fuses, detonators etc. shall be purchased from a licensed dealer. Contractor shall be responsible for safe custody and proper accounting of explosive materials. Fuses and detonators shall be stored separately and away from explosives. Engineer-in-Charge shall have an access to check the contractor's store of explosives and his account.

3.7.3 Blasting operations shall be carried out under the supervision of a responsible authorised agent of the contractor, during specified hours as approved by Engineer-in-Charge. The agent shall be conversant with the rules of blasting. The charge per blast shall be as approved by the Engineer-in-Charge.

3.7.4 In case where explosives are required to be transported and stored at site, relevant clauses of explosive rules shall apply.

3.7.5 Contractor shall be responsible for any accident to workmen, public or property damage due to blasting operations.

3.7.6 Where excavated material is mostly rock, the boulders shall be broken to pieces not bigger than 75 mm size in any direction and mixed with fine material consisting of decomposed rock, moorum or earth as available so as to fill up the voids as far as possible and the mixture shall used for filling. Back filling in the sides of trench shall be as instructed by Engineer-in charge.

3.7.7 Where trenches are excavated in rock, the filling up to a depth of 30 cm above the crown of the pipe shall be done with fine material such as earth, moorum etc. and remaining fill shall be done with rock filling of boulders of size not exceeding 75 mm mixed with fine material as available to fill up the voids, watered, rammed and consolidated in layers not exceeding 30 cm. Excavated material containing deleterious material shall not be used.

3.7.8 **Measurement:**
The quantity of hard rock shall be worked out by means of cross-sectional measurements.

3.7.9 **Rates:**
Rates quoted are deemed to include all the activities stated above including all labour, materials, tools, tackles etc.

3.8.0 Earth Work for Compound Levelling (Cutting & Filling)

3.8.1 Excavation and filling for surface levelling are described as compound levelling.

3.8.2 **Setting out and making profiles:**
Setting out and making necessary profiles shall be as specified vide clause No.4.3.0 and its sub-clauses.

3.8.3 **Cutting and Filling:**
Cutting shall be done from top to bottom. Under no circumstances shall under mining or under cutting be allowed. The earth from cutting higher elevations shall be directly used for filling low lying areas and no claim for double handling of earth shall be entertained. Filling shall be done in regular horizontal layers, not exceeding 20 cm in depth. The earth shall be free from all roots, grass and rubbish and all lumps and clods exceeding 8 cm in any direction shall be broken. Each layer shall be consolidated by breaking clods and compacting by usage of rollers 8 to 10 tonne capacity. Watering shall be done as directed by the Site Engineer. Degree of compaction obtained shall not be less than 90% proctor density.

3.8.4 All cutting shall be done to the required levels and should the cutting be taken deeper, it shall be brought to the required level by filling in with earth duly consolidated at the Contractor's cost.

3.8.5 The finished formation levels in the case of filling shall be kept higher than the required levels by making an allowance of 5% for consolidated fills, if so instructed by Site Engineer.

3.8.6 During excavation, the natural drainage of the area hall is to be maintained by contractor.

3.8.7 **Measurement & Payment:**
Payment shall be made as specified in the schedule of rates, only on the basis of excavation in cutting of burrow pit. Levels of the site are to be taken before the start and after completion of the work and the quantity of excavation in cutting shall be computed from these levels and paid for. The payment thus made shall be deemed to include transportation, filling and compaction of the excavated earth in low areas.

3.8.8 **Rate:**
Rates shall include all the operations described above inclusive of the cost of all materials labour, tools and equipment involved.

3.9.0 Earth Work in Compound Filling (With Earth Supplied By Contractor):

3.9.1 The following specifications and steps of work shall be followed for earth work in compound filling in large areas with earth excavated from Principal HansRaj College 's borrow pit areas including transportation from the source to the site.

3.9.2 Under no circumstances black cotton/expansive type of soil shall be used for filling. Samples of fill material shall be got approved from the Engineer-in-Charge prior to use/ supply. Laboratory test of the fill material shall be conducted to decide optimum moisture content and the Proctor density and record should be maintained.

3.9.3 The area to be filled up shall be earmarked on ground jointly with Site Engineer. Levels of the area shall be taken on a grid of 10 m. x 10 m. The grid level shall be plotted on a drawing with benchmark reference and signed jointly by the contractor and Site Engineer. The Site Engineer shall decide the finished ground level. Filling height shall be kept 5% more than the maximum of the filling height required in the entire area. Accordingly brick masonry pillars of size 230 mm x 230 mm shall be erected in the entire area to be filled in the form of a grid (20m x 20m) matching with the grid levels of existing ground taken on the grid of 10m x 10m. The levels of the pillars with respect to the desired finished ground level (determined on the basis of maximum fill height plus 5%) shall be checked by the Site Engineer and clearance shall then be given for starting earth filling work.

3.9.4 Filling shall be done in layers not exceeding 20 cm. thick. Clods/lumps etc. shall be broken to dust. As the earth filling and rolling work proceeds, the entire area shall be wetted by sprinkling water to the extent of calculated optimum moisture content or to the moisture content required to achieve field density of 90% of laboratory Proctor density and rolled with power/hand roller of capacity 8 to 10 ton. During the course of earth filling, field Proctor density of the compacted earth shall be checked and recorded for every 60 cm. depth of filling or part thereof. Samples of field Proctor density shall be taken at random for at least one for every 1000 sq. m. area of filling. The field Proctor density shall not be less than 90% of the laboratory Proctor density of the fill material. Records of all test results shall be maintained in a register. After completion of the compound filling,
levelling, grading and compacting to the satisfaction of the Engineer-in-Charge, final levels of the
finished ground shall be taken jointly by contractor and site engineer on a grid of 10 m x 10 m matching with the original grid on which levels of the existing ground level were taken before
commencement of the filling work

3.9.5 **Measurement:**
Payment will be made on the consolidated earth filling volume. Volume calculation shall be done on the basis of level difference between jointly measured original ground level and the finished ground level taken on the grid of 10 m x 10 m. The cubical content thus calculated shall be rounded up to two decimal places for the purpose of payment.

3.9.6 **Rate:**
The rate includes the cost of all the operations described above including the cost of material (where so specified), labour, carriage and equipment etc.

3.10.0 Earth Working Compound Filling (With Earth Excavated from Principal HansRaj College 's Borrow Pit Areas)

3.10.1 The following specifications and steps of work shall be followed for earth work in compound filling in
large areas with earth excavated from Principal HansRaj College 's borrow pit areas including transportation

from the source to the site. Under no circumstances black cotton/expansive type of soil shall be used for filling. Samples of fill material shall be got approved from the Engineer-in-Charge prior to use/supply. Laboratory test of the fill material shall be conducted to decide optimum moisture content and the Proctor density and record should be maintained.

3.10.2 The area to be filled up shall be earmarked on ground jointly with Site Engineer. Levels of the area shall be taken on a grid of 10 m. x 10 m. The grid level shall be plotted on a drawing with benchmark reference and signed jointly by the contractor and Site Engineer. The Site Engineer shall decide the finished ground level. Filling height shall be kept 5% more than the maximum of the filling height required in the entire area. Accordingly brick machinery pillars of size 230 mm x 230
mm shall be erected in the entire area to be filled in the form of a grid 20m x 20m matching with the grid levels of existing ground taken on the grid of 10m x 10m. After the levels of the pillars with respect to the desired finished ground level (determined on the basis of maximum fill height plus 5%) shall be checked by the Site Engineer and clearance shall then be given for starting earth filling work.

3.10.3 Filling shall be done in layers not exceeding 20 cm. thick. Clods/lumps etc. shall be broken to dust. As the earth filling and rolling work proceeds, the entire area shall be wetted by sprinkling water to the extent of calculated optimum moisture content or to the moisture content required to achieve field density of 90% of laboratory Proctor density and rolled with power/hand roller of capacity 8 to 10 ton. During the course of earth filling, field Proctor density of the compacted earth shall be checked and recorded for every 60 cm. depth of filling or part thereof. Samples of field Proctor density shall be taken at random for at least one for every 1000 sq. m. area of filling. The field Proctor density shall not be less than 90% of the laboratory Proctor density of the fill material. Records of all test results shall be maintained in a register. After completion of the compound filling, levelling, grading and compacting to the satisfaction of the Engineer-in-Charge, final levels of
the finished ground level shall be taken jointly by contractor and site engineer on a grid of 10 m x 10 m. matching with the original grid on which levels of the existing ground level were taken before commencement of the filling work.

3.10.4 During excavation of borrow pit, the natural drainage of the area hall be maintained by contractor.

3.10.5 **Measurement:**
Payment shall be made as specified in the schedule of rates, only on the basis of excavation in cutting. Levels of the site are to be taken before the start and after completion of the work and the quantity of excavation in cutting shall be computed from these levels and paid for. The payment thus made shall be deemed to include transportation, filling and compaction of the excavated earth in low areas.

3.10.6 **Rate:**
Rates shall include all the operations described above inclusive of the cost of all materials labour, tools and equipment involved.

3.11.0 Earth Work in Filling for Road Embankment/ Sub grade:

3.11.1 The following specifications and steps of work shall be followed for earthwork in filling in road embankment/ Sub grade with earth supplied by the contractor from borrow areas arranged by him including transportation from the source to the site.

3.11.2 Materials used for filling shall be earth, moorum, gravel, a mixture of these or any other material approved by Engineer-in-Charge. Under no circumstances black cotton/expansive type of soil shall be used for filling. Samples of fill material shall be got approved from the Engineer-in-Charge prior to use/ supply. Laboratory test of the fill material shall be conducted to decide optimum moisture content and the Proctor density and record should be maintained.

3.11.3 Earth filling shall be done in regular horizontal layers, not exceeding 20 cm in depth. The earth shall be free from all roots, grass, stumps, rubbish etc. and lumps and clods exceeding 8 cm in any direction shall be broken. Each layer shall be compacted by rolling with 8 to 10 tonnes power roller under suitable moisture conditions to achieve a density of at least 95% of the maximum dry density (Proctor density). For this purpose earth shall be spread in layers with sufficient water to give field moisture content of about +1% to -2 % of the optimum moisture content (OMC). OMC shall be determined according to IS: 2720 (Part-VIII)-Method of tests for soils.

3.11.4 Each compacted layer shall be tested in the field for density and accepted before the operations for next layer are begun. One measurement of density shall be made for each 500 sqm of compacted area or for a smaller area as directed by the Engineer-in-Charge. Density shall be determined as per IS: 2720 (Part-XXVIII).

3.11.5 **Measurement:**

The filling shall be measured & quantity of earthwork computed from cross sectional measurements. Payment will be made on the consolidated earth filling volume.

3.11.6 **Rate:**

The rate includes the cost of all the operations described above including the cost of material (where so specified), labour, carriage and equipment etc.

3.12.0 Earth Work in Filling of Foundation Trenches & Plinth

3.12.1 Earth used for filling shall be either from Principal HansRaj College 's sources or excess excavated earth available at site or from contractor's supply as directed by Engineer-in- charge. Under no circumstances black cotton/ expansive type of soil shall be used for filling. Samples shall be got approved prior to use/supply.

3.12.2 **Filling in Plinth:**

Plinth under floor shall be filled with earth in layers, each layer not exceeding 20 cm in thickness, watered and consolidated by ramming. The surface shall be flooded with water for at least 24 hours, and allowed to dry and then refilled, rammed and consolidated in order to avoid settlement at a later stage. The finished level of filling shall be kept to slope as indicated in drawing and/or as directed at site.

3.12.3 **Filling in Foundation trenches:**

As soon as the works in foundation have been measured, the spaces around foundation and drains in trenches shall be cleared of all debris, brick bats, mortar dropping etc, and filled with earth in layers, each layer not exceeding 20 cm in depth, watered, rammed and consolidated before the succeeding one is laid. Earth shall be rammed with iron rammers where possible and with the butt ends of crowbars where rammer cannot be used.

3.12.4 Where it is specified that the earth has to be supplied by the contractor, the rates are deemed to include cost/rental of the borrow areas.

3.12.5 **Measurements:**

3.12.5.1 ***Filling sides of foundation:***

Where it is specified to be paid separately in schedule of rates the cubical contents of foundation concrete and masonry in foundation up to ground level shall be worked out and the same deducted from the cubical contents of earth work in excavation for foundations to arrive at the quantity for filling sides of foundation.

3.12.5.2 ***Filling in Plinth and Floors:***

Depth of consolidated earth fillings shall be measured for the purpose of payments. The dimensions

of the filling shall be on the basis of pre-measurement correct to nearest cm and cubical contents worked out in cubic metre correct to two places of decimal.

3.12.6 ***Rate:***

The rate includes the cost of all the operations described above. The rate shall include the cost of material, labour, carriage, and equipment involved in all the operations described above. Where it is specified that the earth has to be supplied by the contractor, the rates are deemed to include cost/rental of the borrow areas.

4.0.0. SAND FILLING:

4.1.1 Sand shall be clean and free from dust, organic and foreign matter and shall be corresponding to grading zone II or as specified in the Schedule of Rates and as directed by Engineer-in-Charge. The following specifications and steps of work shall be followed for sand filling in large areas with sand supplied by the contractor. Under no circumstances black cotton/expansive type of soil shall be used for filling. Samples of fill material shall be got approved from the Engineer-in-Charge prior to use/supply. Laboratory test of the fill material shall be conducted to decide optimum moisture content and the Proctor density and record should be maintained.

4.1.2 Setting out, making profiles & measurements:

Setting out and making necessary profiles shall be as specified in clause No.4.3.0.

4.1.3 Sand filling in plinth and under floors etc.

Sand filling in plinth and under floors shall be done in layers, not exceeding 20 cm in depth. Each layers of sand shall be spread with adequate water and then be compacted by ramming. The surface shall then be flooded with water for at least 24 hours and allowed to dry and then refilled, rammed and consolidated to avoid settlement at a later stage. The surface of the consolidated sand shall be dressed to required level or slope. Concreting of floor shall not be started till the Engineer-in-Charge has inspected and approved of the sand filling.

4.1.4 **Measurements:**

The length, breadth & depth of consolidated sand shall be measured to the nearest cm & cubical contents worked out.

4.1.5 **Rate:**

The rate includes the cost of all materials & labour involved in all the operations described above.

4.2.0 ***Sand filling in foundations & Tank pad foundation:***

4.2.1 Sand used shall be river sand obtained from a source approved by the Principal HansRaj College before commencement of work. It shall be well graded medium to coarse sand free from any vegetation, organic, clay or other impurities. Fineness modulus of sand shall be not less than 2.2 or falling in Zone-II. It shall be tested in an approved laboratory to ascertain its relative density, optimum moisture content for compaction and its suitability for use in foundation/tank pad constructions supporting a design load intensity of 16 T/ sqm. (max). All expenses for the test shall be borne by the contractor. Sand shall be spread in layers not exceeding 15 cm in loose thickness. Each layer shall be adequately watered, mixed and rolled till it gets evenly and densely compacted. The compaction shall be done by vibratory roller, vibro-rammer, vibrators, road rollers of 8 to10 tonne capacity, mechanical rammers and vibrators so as to achieve relative density of minimum 90%. The compaction shall be done under supervision of competent technical personnel. Adequate arrangement of testing for degree of compaction achieved shall be provided by the contractor at site. A minimum number of 5 tests per layer shall be conducted to ascertain the degree of compaction achieved. In addition to these tests, site engineer, whenever desires may ask contractor to conduct such tests and the contractor shall do so to satisfy the site engineer about the achieved degree of compaction. All expenses to conduct these tests shall be borne by the contractor. Before placing successive layers of sand, top surface of previous layer (the under layer) shall be moistened

and scarified thoroughly to obtain a rough surface which shall provide a satisfactory bond with the subsequent layer. Necessary cables if any to be laid shall also be embedded in the sand pad as directed by site engineer. Sand pad shall be properly compacted and graded true to the dimensions and levels as shown in the drawings.

4.2.2 ***Setting out, making profiles & measurements:***
Setting out and making necessary profiles shall be as specified in clause No.4.3.0

4.2.3 ***Rate:***
The rate shall include the cost of all materials, labour, carriage and equipment involved in all the operations described above.

5.0.0 MOORUM FILLING:

5.1.0 Moorum shall be of best quality available and free of all foreign matter. The source of moorum shall be got approved from Engineer-in-Charge before procuring. Filling, compaction, finalising of levels & measurement shall be done in the manner as specified for earthwork in compound filling i.e. clause 4.9.0.

5.2.0 ***Rate:***
The rate includes the cost of all materials & labour involved in all the operations described above.

6.0.0 ANTITERMITE TREATMENT:

Anti-termite treatment shall be carried out as per I.S. 6323 (Part II - 1981) and as mentioned herein below:

6.1.0 ***Materials:***

Any one of the following chemicals (as specified) in water emulsion shall be used.

Name of Chemical	Concentration (Percent) by Volume
Chloropyriphos Emulsifiable Concentrate (IS: 8944)	1.0

Chemicals are available in concentrated form in the market and concentration is indicated on the sealed containers. To achieve the percentage of concentration specified above, chemical should be diluted with water in required quantity before it is used. Graduated containers shall be used for dilution of chemical with water in the required proportion to achieve the desired percentage of concentration.

6.1.1 ***Example:***
To dilute chemical of 30 percent concentration, add 59 parts of water to one part of chemical to achieve 0.5 percent concentration. Chemicals shall be brought to site of work in sealed original containers. The material shall be brought in at a time, in adequate quantity to suffice for the whole or at least a fortnight's work. The material shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge.

6.1.2 ***Pre-construction chemical treatment:***
This is a process in which chemical treatment is applied to a building in the early stages of its construction. Hand operated pressure pump shall be used for uniform spraying of the chemical. To have proper check for uniform spraying of chemical, graduated containers shall be used. Proper

check shall be kept that the specified quantity of chemical is used for the required area during the operation.

6.1.3 ***Time of Application:***

Soil treatment should start when foundation trenches and pits are ready to take mass concrete foundations. Laying of mass concrete should start when the chemical emulsion has been absorbed by the soil and the surface is quite dry. Treatment should not be carried out when it is raining or soil is wet with rain or sub-soil water. The foregoing applies also in the case of treatment to the filled earth surface within the plinth before laying the sub grade for the floor.

6.1.4 ***Disturbance:***

The treated soil barriers shall not be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system.

6.1.5 ***Treatment for Masonry foundations & Basements:***

a) The bottom surface and the sides (up to a height of about 300 mm) of the excavations made for masonry foundations & basements shall be treated with the chemical at the rate of 5 litres per sqm of the surface area as shown in the drawing.

b) After the masonry foundations and the retaining walls of the basement come up, the backfill in immediate contact with the foundation structure shall be treated at the rate of 7.5 litres per sqm of the vertical surface of the sub-structure for each side. If water is used for ramming the earth fill, the chemical treatment shall be carried out after the ramming operation is done by rodding the earth at 150 mm centres close to the wall surface and spraying the chemical with the above dosage. The earth is usually returned in layers and the treatment shall be carried out in similar stages. The chemical emulsion shall be directed towards the concrete or masonry surfaces of the columns and walls so that the earth in contact with these surfaces is well treated with the chemicals as per drawing.

6.1.6 ***Treatment for RCC Foundation and Basements:***

In the case of RCC framed structures with columns and Plinth beams and R.C.C. basements the concrete mix is rich and dense (being 1:2:4 or richer), it is unnecessary to start the treatment from the bottom of excavations for columns and plinth beams. The treatment shall start at the depth of 500 mm below finished ground level. From this depth the back-fill around the columns, beams and R.C.C. basement walls shall be treated at the rate of 7.5 litres/Sqm of the vertical surface. The other details of treatment shall be as laid down in clause (b) above complete as per drawing.

6.1.7 ***Treatment of Top Surface of Plinth filling:***

The top surface of the filled earth within plinth walls shall be treated with chemical emulsion at the rate of 5 litres per sqm of the surface before the sand/sub-grade is laid. Holes up to 50 to 75 mm deep at 150 mm centres both ways shall be made with crow bars on the surface to facilitate saturation of the soil with chemical emulsion.

6.1.8 ***Treatment of Junction of Wall and the Floor:***

To achieve continuity of the vertical chemical barrier on inner wall surfaces from the ground level, small channel 30x30 mm shall be made at all the junctions of wall and columns with the floor (before laying the sub-grade) and rod holes made in the channel up to ground level 150 mm apart and the chemical emulsion poured along the channel @ 7.5 litres/sqm of the vertical wall or column surface so as to soak the soil right to bottom. The soil shall be tamped back into place after this operation.

6.1.9 ***Treatment of soil along external perimeter of building:***

After the building is complete, provide holes in the soil with iron rods along the external perimeter of the buildings at intervals of about 150 mm and depth 300 mm and filling these holes with chemical emulsion at the rate of 7.5 litres per square metre of vertical surfaces.

6.1.10 ***Safety Precautions:***

All chemicals used for anti-termite treatment are poisonous and hazardous to health. These chemicals can have an adverse effect on health when absorbed through the skin, inhaled as vapours or spray mists or swallowed. Person using or handling these chemicals should be warned of these dangers and advised that absorption through the skin is the most likely source of accidental poisoning. They should be cautioned to observe carefully the safety precautions given below:

These chemicals are usually brought to site in the form of emulsifiable concentrates. The containers should be clearly labelled and should be stored carefully so that children and pets cannot get at them. They should be kept securely closed.

Particularly care should be taken to prevent skin contact with the concentrates. Prolonged exposure to dilute emulsions should also be avoided. Workers should wear clean clothing and should wash thoroughly with soap and water, especially before eating and smoking. In the event of severe contamination, clothing should be removed at once and the skin washed with soap and water if chemical splash into the eyes, they shall be flushed with plenty of soap and water and immediate medical attention should be sought.

The concentrates are oil solutions and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed during mixing.

6.1.11 Care should be taken in the application of chemicals to see that they are not allowed to contaminate wells or springs which serve as sources of drinking water.

6.1.15 ***Measurement:***

The measurements shall be made in Sq.M. on the basis of plinth area of the building only for all operations described above. Nothing extra shall be measured.

6.1.16 ***Rate:***

The rate shall include the cost of all materials, equipment and labour involved in all the operations described above including making holes and making good the same by refilling.

7.0.0 BRICK WORK:

7.1.0 Brick work will be with bricks of class specified in schedule of rates, laid in cement mortar of designed proportion as specified in item or drawings. Bricks shall be soaked in water thoroughly at the site of work for at least 6 hours before use. When the bricks are soaked they shall be removed from the tank sufficiently early so that at the time of lying they are skin dry. The bricks shall be placed in the tanks by hand, one by one, and not by throwing. The mortar shall be used before it shows any signs of setting or stiffening.

7.1.1 Unless otherwise specified, brick work shall be done in English bond with the frog upwards. No broken brick shall be used except at closures. Brick work shall conform to IS-2212. The courses shall be truly horizontal and the work strictly in plumb. The mortar joints should not exceed 10 mm in thickness except where extra thickness is required for the purpose of bringing the brick work to the required height or level or for making both faces even. The brick work shall not be raised by more than 14 single courses per day.

7.1.2 Masonry shall be kept constantly moist while under construction and for a period of at least 10 days after completion. Watering shall be continued twice a day for at least one month after completion.

7.1.3 Construction of walls shall, as far as possible, be carried out in regular and level course throughout their entire length and no portion of work shall be 0.90 metre lower than the other. All cross walls, buttresses, counter forts, steps etc. shall be built up, course by course, with the main walls carefully embedded into them. Where such bonding is not possible in the course of the work for any reason, necessary grooves or toothing shall be left in the brick work for subsequent bonding. No extra payment will be made for this.

7.1.4 Brick work in foundation and plinth shall be the portion of brick work between foundation level and plinth level. Provision of relevant clauses of Special Conditions of Contract shall be applicable for distinguishing work in foundation from that of superstructure.

7.1.5 Brick work in superstructure will mean all brick works above plinth level. Parapet shall be considered as part of the wall. In exposed brick work, specially selected brick shall be used for facing, ensuring that irregular and wrinkled bricks or bricks which have irregular edges and corners are not used. The surface shall be rubbed down with brushes if necessary and thoroughly washed. The joints in faces which are to be plastered or pointed should be raked out to a depth of 15 mm while the mortar is still green. The raked joints shall be brushed and well wetted, and shall be later refilled with mortar to give ruled finish.

7.1.6 The rate for brick work shall include supplying, erecting and dismantling the necessary scaffolding. Scaffolding shall be strong and stiff. Holes left in the brick work to take the put logs shall be properly bricked up before plastering or pointing is done. Put-log holes shall not under any circumstances be allowed in pillars.

7.1.7 ***Measurement:***

Payment will be made on cubic metre basis on the volume of work done calculated on actual measurement of length, height and thickness. Any extra work over the specified dimensions shall be ignored. No extra payment will be made for cutting bricks if required either for openings or for rounding or for insertion at the time of construction of small fixtures in wall such as angles, joists, distribution boards, small size pipes, etc. No deduction will made for volumes occupied by such fixtures. No deduction shall be made for openings up to 0.1 square metre, cement concrete blocks for holdfasts/ holding down bolts. In calculating area of opening, any separate lintel or sills shall be included with the size of opening but end portions of lintel shall be excluded.

7.1.8 ***Rate:***

The contractor's rate shall include cost of all material supply, fixing and removal of scaffoldings, curing etc. and shall apply to all brick work in steps, string course, blocking course, brick work curved in plan and parapet over roof etc.

7.2.0 HALF-BRICK MASONRY:

7.2.1 Half - brick wall (115 mm) laid in stretcher bond including reinforced wall be measured in square metre for payment. In reinforced wall 2 no. 6 mm dia MS bars shall be provided at every fourth course. Proper laps & end embedment (of not less than 200 mm) shall be provided. They shall be securely anchored at their end where the partitions end.

7.2.2 ***Measurements:***

Thickness of walls in excess of thickness computed on the basis of nominal brick sizes, if any shall be ignored while measuring. No separate payment shall be made for steel reinforcement used in the brick masonry. Deduction for openings shall be as per IS: 1200. The area shall be calculated in square metres.

7.2.3 ***Rate:***

The rate includes the cost of all materials and labour involved in all the operations described including cost of reinforcement.

8.0.0 SOLID AND HOLLOW CONCRETE BLOCK MASONARY

The specifications for concrete block masonry shall in general follow the above requirements of brick masonry except for the following stipulations. Solid and hollow concrete block shall conform to the requirements of IS: 2185 (latest edition). Concrete blocks shall be sound, free from cracks, broken edges, honeycombing and other defects that would interfere with the proper placing of block or impair the strength or performance of construction.

8.1.0 ***Dimensions and tolerances***

Solid and hollow concrete blocks shall be made in sizes and shapes to meet different requirements. Nominal dimensions of concrete block shall be as below:

Length	:	400, 500 or 600 mm
Height	:	200 or 100 mm
Width	:	50, 75, 100, 150, 200, 250 or 300 mm

In addition, blocks in half lengths i.e. 200, 250, 300 mm or any other requirements may also be used. Maximum variation in the length of the blocks shall not be more than plus or minus 5mm and maximum variation in height and width of unit shall not be more than plus or minus 3 mm.

8.2.0 ***Physical Requirements***

The average crushing strength of eight blocks, when determined in accordance with IS: 2185 (latest edition) shall not be less than as specified in table 10 hereunder:-

TABLE - 10

Type	Grade	Density of Blocks (Kg/M^3)	Minimum Average Compressive Strength of Units (N/mm^2)	Minimum Strength Of Individual Units (N/Mm2)
Hollow load bearing unit	A (3.5)	Not less than 1500	3.5	2.8
	A (4.5)		4.5	3.6
	A (5.5)		5.5	4.4
	A (7.0)		7.0	5.6
	B (2.0)	Less than 1500, but not less than 1000	2.0	1.6
	B (3.0)		3.0	2.4
	B (5.0)		5.0	4.0
Hollow non Load bearing units	C (1.5)	Less than 1500, but not less than 1000	1.5	1.2
Solid Load Bearing units	D (5.0)	Not less than 1800	5.0	4.0
	D (4.0)		4.0	3.2

8.3.0 ***Other Properties***

The drying shrinkage, moisture movement and water absorption of the blocks (average of three blocks), when unrestrained, shall be determined in accordance with IS: 2185 (latest edition) and shall not exceed 0.1%, 0.09% and 10% respectively.

8.4.0 ***Wetting of Blocks***

Blocks need not be wetted before or during laying in the walls. In case the climatic conditions

necessitate, the top and the sides of the blocks may only be slightly moistened so as to prevent absorption of water from the mortar and ensure the development of the required bond with the mortar.

8.5.0 ***Intersecting walls***

When two walls meet or intersect and the courses are to be laid up at the same time, a true masonry bond between at least 50% of the units at the intersection is necessary. When such intersecting walls are laid up separately, pockets with 20 mm maximum vertical spacing shall be left in the first wall laid. The corresponding course of the second wall shall be built into these pockets.

8.6.0 ***Piers***

The top course of block in the pier shall be built in solid blocks. Hollow concrete block shall not be used for isolated piers, unless their hollows are specified to be filled with cement concrete.

Fixtures, fittings, etc shall be built into the masonry in cement and coarse sand mortar 1:3 while laying the blocks wherever possible. Hold fast shall be built into the joints of the masonry during
laying.

Holes, chases, sleeves, openings, etc of the required size and shape shall be formed in the masonry with special blocks while laying, for fixing pipes, service lines, passage of water etc. After service lines, pipes etc. are fixed, voids left, in any, shall be filled up with cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 stone aggregate 20 mm nominal size) and neatly finished.

8.7.0 ***Finishing***

Rendering shall be done to the walls when walls are wet. Joints for plastering or pointing as specified shall be raked to a depth of 12 mm.

Joints on internal faces, unless otherwise indicated, shall be raked for plastering. If the internal, faces of the masonry are not to be plastered the joints shall be finished flush as the work proceeds or pointed flush where so indicated.

9.0.0 **UN-COURSED RANDOM RUBBLE MASONRY:**

9.1.0 ***Laying:***

All stones shall be wetted before use. The work shall be carried out true to plumb or to the specified pattern. Every stone shall be carefully fitted to the adjacent stones, so as to form neat and close joints. Stones may be laid at random without being brought up to any level courses except at plinth, window sills and roof level etc. Laying shall be done with (1:6) cement mortar (1 cement: 6 coarse sand) such that thickness of mortar joints at the face is not more than 20 mm and shall be included in the item. The bond shall be obtained by filling in closely the adjacent stone and by using bond stones. Face stone shall extend the bond well into the packing. These shall be arranged to break joints as much as possible and to avoid long vertical lines of joints. Their height shall not be greater than the breadth at the face or the depth inwards. Stones for hearting or interior filling of the wall, shall consist of rubble stones which may be of any shape but shall not pass through a circular ring of 15 cm inner diameter, thickness of these stones in any direction shall not be less than 15 cm. The length of stones shall not exceed three times the height and breadth shall not be greater than three fourth the thickness of wall or 15 cm whichever is greater. These shall be carefully laid, hammered down with a wooden mallet into position and solidly embedded in mortar. Chips and spalls of stone may be used wherever necessary to avoid thick mortar beds or joints and at the same time ensuring that no hollow spaces are left anywhere in the masonry. The hearting shall be laid nearly level with facing and backing, except that at about one metre interval, vertical plump projecting about 15 cm to 20 cm shall be firmly embedded to form a bond between successive courses. The chips shall not be used below the hearting stones to bring these up to the level of face stones. The use of chips shall be restricted to the filling of interstices between the adjacent stones in hearting, and these shall not exceed 20% of the quantity of stone masonry. The masonry in a structure shall be carried regularly. Where the masonry of one part has to be delayed, the work shall be raked back at an angle not steeper than 45 Deg. Toothing in masonry shall not be allowed.

9.2.0 ***Joints:***

Stones shall be so laid that all joints are full of mortar. Face joints shall not be more than 2.0 cm thick.

When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. Otherwise the joints shall be raked to a minimum depth of 20 mm by raking tool during the progress of work, when the mortar is still green.

9.3.0 ***Curing:***

Green work shall be protected from damage and mortar dropping during construction. Masonry work in cement or composite mortar shall be kept constantly moist on all the faces for a minimum period of seven days.

9.4.0 ***Scaffolding:***

For this class of work, single scaffolding having one set of vertical support shall be allowed. The supports shall be sound and strong, tied together by horizontal pieces, over which the scaffolding planks shall be fixed. The inner and horizontal scaffolding member may rest in a hole provided in the masonry. Such holes, however, shall not be allowed in pillars less than one metre in width. The holes left in masonry work for supporting scaffolding, shall be filled and made good before plastering. The Contractor shall be responsible for providing and maintaining scaffolding strong enough so as to withstand all likely loads on it.

9.5.0 ***Measurement and Payments:***

Payment for un-coursed rubble masonry shall be made in cubic metre basis nearest to two places of decimal. The length, height and thickness shall be measured correct to cm. The thickness of wall shall be measured at joints, excluding the bushings. Only specified dimensions shall be allowed, anything extra shall be ignored. The rate shall be inclusive of striking and raking out joints whenever mentioned in the Schedule of Rates. Deduction for openings shall be as per IS: 1200. Pointing the joints with an admixture of pigment shall be paid separately on square metre basis.

9.6.0 **Measurement, rate and other details:-**

For measurement, payment, and other details, related clauses of Brick work shall apply.

10.0.0 PLAIN & REINFORCED CONCRETE:

10.1.0 Except where otherwise specified, implied or authorised by the Engineer-in-charge in writing, all materials and workmanship must conform to the latest edition of the Indian standard specification including any amendments published by the said institution from time to time.

10.2.0 The concrete mixes should give the designed strength as mentioned in TABLE-11 during work tests in accordance with IS 456 & IS 516.

TABLE – 11

Kind of Concrete-Mix	Minimum compressive strength for 15 cm cube	
	7 days (Kg/cm^2)	28 days (Kg/cm^2)
1:2:4	140	210
1:1-1/ 2:3	175	264
1:1:2	210	325

10.3.0 for the design mix (if specified in SOR), the contractor shall submit the calculations/procedure and the mix shall be established at site for the required strength before staring the RCC work.

10.4.0 The contractor shall submit representative samples of concrete or other materials to be used in order that they may be tested and the suitability of materials established. During the progress of work, samples of concrete shall be taken as per I.S 456 & I.S 1199 or as may be necessary and tested as per IS specifications. Record of all tests carried out shall be maintained by the contractor & register submitted to Site engineer/Engineer-in-charge. All expenses in this connection with the above mentioned tests shall be borne by the contractor.

10.5.0 In addition to above tests, the contractor shall also undertake rebound hammer test as per the procedure prescribed in IS-13321 (part-2, 1992). These tests shall be normally carried at the rate of one test for every 50 cum of RCC work and as per the directions of Engineer-in-charge/Site engineer. However, at least one test shall be undertaken for every 10 structural beams/columns. Record of all tests carried out shall be maintained by the contractor & register submitted to Site engineer/Engineer-in-charge. All expenses in this connection with the above mentioned tests shall be borne by the contractor.

10.6.0 If difficulty be experienced in placing the concrete of specified mix and approved consistency between and below the reinforcement bars at the bottom of beams and similar members, the bars shall be embedded in concrete of improved workability as directed by the site engineer. The consistency should be determined by making trial mixes and getting the same approved. The slump of the above trial mixes shall be measured and this slump should not exceed throughout all batches of concrete made from the same materials mixed in the same proportion as the trial mixes and used in those parts of the works as directed by the Site Engineer. In no case, however, shall the slump exceed 50 mm for concrete slabs or exceed 25 mm for concrete consolidated by mechanical vibration. The slump test shall be carried out as per IS specifications by the Contractor at his own cost. Record of all tests carried out in relation to various grades of concrete etc. shall be maintained by the contractor.

MINIMUM CEMENT CONTENT: -

From durability considerations the minimum cement content to be provided is given in table-12 below.

TABLE – 12

Nominal mix	Cement Content Kg per Cubic metre of concrete
1:1:2	450
1:1.5:3	400
1:2:4	320
1:3:6	220
1:4:8	170

10.7.0 ***BATCHING AND MIXING CONCRETE:***

Batching of cement, coarse aggregate, sand, and water should be done by volume and the concrete ingredients shall be mixed in an approved mechanical mixer, designed to obtain positively uniform distribution of all the component materials throughout the mass during the mixing operations. Water shall be added prior to and during the mixing operations. The coarse aggregate and sand shall be measured in suitable measuring boxes which shall be provided by the contractor and approved by the Site-Engineer before using the same. The measurement boxes shall be proportioned in such a manner to avoid the necessity of dividing the contents of bags of cement. Due allowance should be made for bulking of sand and its moisture content in accordance with IS: 2386 (Part III) - 1963. The method of determining surface moisture content in Aggregates shall conform to IS-456 (latest edition). Right proportion of materials shall be loaded in mixing drum and adequate water added in accordance with water cement ratio desired and shall be mixed to form an intimate mixture of uniform consistency. The mechanical batch type concrete mixer shall have two blades fitted with lighting hopper type. The mixing time, for a mixer up to 0.75 m^3 capacity shall not be less than 2 minutes and not less than 2 & 1/2 minutes for a mixer of over 0.75 m^3 capacity.

In exceptional circumstances such as mechanical breakdown of mixer, work in remote areas or when the quantity of concrete work is very small, hand mixing may be permitted subjected to adding 10% extra cement. Hand mixing shall be carried out on a watertight platform till concrete of uniform colour and consistency is obtained.

No concreting shall commence in any portion of work unless shuttering and reinforcement etc., have been checked by the Site Engineer and approved by him. Mixing of concrete shall be done at a

central place as directed by the Site Engineer.

10.8.0 ***PLACING OF CONCRETE:***

The concrete shall be placed on a clean bed having the designed level and without any interruption. As soon as possible, after mixing, the concrete should be transported to the site by an approved method and deposited directly in the formwork. If segregation occurs during the transportation, concrete should be remixed adding fresh cement before being placed as per the instructions of Site Engineer.

Concrete should in no case be dropped from a height of more than 1.0 metre and shall be carefully laid in position in horizontal layers not exceeding 15 cm in thickness. Before deposit of concrete all debris and dirt shall be removed from the space to be occupied by concrete. The method of concreting and compaction to be employed in any particular section of the work is to be, to the entire satisfaction of the Site Engineer.

The concrete, after being laid shall be compacted by means of vibrators of the approved type and design by and under proper supervision as directed by the Site Engineer. The vibrations should not be confined only to the top surface but the whole mass of concrete should be well vibrated until the dense mass assumes jelly like appearance and consistency with the water just appearing on the surfaces. Over vibration or vibration of very wet mixes is harmful and shall be avoided. Care is to be taken to avoid segregation, and the formation of air bubbles. Honey-combs shall be avoided. Hand compaction shall be done with the help of tamping rods, before the initial setting starts. For hand compaction the contractor shall take permission of Engineer-in-Charge. After compaction the top surface shall be finished even and smooth with wooden trowel.

The time required from batching of concrete to placing and compaction of the concrete mass should in any case be within 20 minutes and the whole process completed before the initial setting takes place.

All precautions for work in extreme weather shall be taken as mentioned in relevant clauses of IS: 456 (latest edition). Due protection shall be provided to prevent cement being blown away during the process of proportioning and mixing during windy weather. During hot weather, it shall be ensured that the temperature of wet concrete does not exceed 38^0 C.

For concrete under water, relevant portions of instructions given in IS-456 shall be followed except when otherwise stated. The mix for concreting under water shall be approved by the site engineer, depending on the conditions of placing. Great care should be taken to prevent the cement being washed out.

Concreting for any complete member/part of a structure shall ordinarily be done in a continuous operation. Where this is not possible prior permission of the Site Engineer should be obtained for doing the work in parts. The site engineer will direct as to what portions should the concreting be carried out at a stretch or where the work may be interrupted, and the work shall be done accordingly.

Whenever the work is interrupted for more than an hour bonding grooves shall be formed in the concrete already laid and the surface shall be roughened, thoroughly cleaned and given a wash of neat cement @ 2 Kg/m^2 of thick consistency before laying new concrete.

All R.C.C. and P.C.C. work shall be carried out in strict accordance with this specification and
detailed drawings, which will be supplied for the purpose. The working drawings and other details shall be studied thoroughly and any point not clear to the contractor, should be brought to the notice of the Engineer-in-Charge for clarification well in advance and before proceeding with the work.

No concrete work shall be cast in the absence of the Site Engineer or his representative.

10.9.0 ***CURING:***

The curing of concrete shall be in accordance with IS 456 except that the concrete shall be cured for a period of 10 days from the date of casting. Cement concrete shall not be disturbed after initial setting has started. Care should be taken to protect green concrete from damage by falling of debris, excessive loading or anything that may disturb the setting process or impair its strength. Re-tampering of concrete, which has partially set, is absolutely prohibited.

10.10.0 ***Payment:***

Payment for plain and reinforced cement concrete in site shall be made on cubic metre basis of actual finished work done. Deductions shall be made for opening as per IS: 1200. In respect of reinforced cement concrete, Contractor shall ensure that tests as specified above are carried out to establish conformity of stated strength requirements and the test result(s) are submitted to the Engineer-in-charge for acceptance of the work. However, the Engineer in charge at his discretion may release part payment pending acceptance of reinforced cement concrete work. The Contractor at his own risk and cost shall rectify all defects observed in the work to the satisfaction of Engineer in charge. The rate for plain and reinforced cement concrete shall be inclusive of all form work, shuttering staging etc. The rate shall not, however, include reinforcement, which will be paid separately. Water proofing materials when specified and used shall also be paid for separately.

10.11.0 ***PAINTING OF CONCRETE SURFACE WITH BITUMEN BELOW GROUND:***

10.11.1 ***Surface Preparation:***

The surface shall be painted when it is thoroughly dry. The surface to be painted shall be cleaned with wire brush and cotton or gunny cloth. All loose materials and scales shall be removed and the surface shall be further cleaned with a piece of cloth lightly soaked in Kerosene oil.

10.11.2 ***Painting with Bitumen:***

The contractor shall bring the bitumen to site in its original packing and shall open and use it in the presence of Engineer-in-Charge or his authorised representative. The container shall not be removed from site until the painting job is completed and the Engineer-in-Charge has a time to satisfy himself regarding the quantity of bitumen actually used and given his permission to remove the same. The surface prepared and treated shall be painted uniformly with bitumen of approved quality such as residual type petroleum bitumen penetration 80/100, hot cut back bitumen or equivalent, after heating it to the required temperature as per specifications of the manufacturers. The coating of bitumen shall be continued at least 15 cm along the vertical surfaces. In case of wall, it shall be continued up to the drip course. Care shall be taken to see that no blank patches are left. The quantity of bitumen to be spread per 10 square metres of roof surface shall be 17 kg. unless otherwise stipulated in the description of the item and shall be carefully regulated so that the application is uniform at the stipulated rate of kg.

10.11.3 ***Spreading of Sand:***

Immediately after painting dry/clean sharp and coarse sand at the rate of 60 dm^3 per 10 sqm shall be evenly spread over the surface when the bitumen is still hot wherever possible.

10.11.4 ***Measurements:***

The area of the surface painted shall be measured in square metres. The measurements of length and breadth shall be taken out to a cm.

10.11.5 ***Rate:***

The rate shall include the cost of all materials and labour involved in all the operation described above.

10.12.0 ***SUPER PLASTICISERS:***

10.12.1 This item shall be operated upon specific approval of Engineer-in-charge. In case of use of super-plasticiser the type, amount & method of application proposed shall be submitted to Engineer-in-charge for approval. Super-plasticiser shall conform to IS: 9103 and IS: 2645 (latest addition) and

should be compatible with all the grade & brand of cement used (ordinary Portland cement). Super-plasticisers manufactured by M/s. Fosroc Chemicals (India) Pvt. Ltd, M/s The Structural Water Proofing Co. Ltd, M/s Asian Laboratories, M/s MC-Gaucherie (India) Pvt. Ltd, M/s Sika Qualcrete

Private Ltd, shall only be approved for use. It shall be free from chlorides and its sulphate content shall not exceed 0.1% by weight. Typical water reduction shall be in the range of 12 to 20%. The method of use, rate of addition, dosage etc. shall be strictly as per the specifications of the manufacturer. The optimum dosage shall be determined by trial mixes with the particular concrete mix and shall be approved by Engineer-in-Charge or his authorised representative prior to use in works. Under no circumstances, the mix proportion shall be altered. Trial mixes shall be done in advance prior to use in work.

10.12.2 ***Measurement:***

Payment shall be made on the basis of actual quantity of super plasticiser used in the works. This shall be measured in litres.

10.13.0 ***GROUT MIX FOR FOUNDATION BOLT GROUTING:***

10.13.1 The grout mixture shall conform to IS: 4032 for strength and expansion capability. It shall be free from iron, chlorides and other oxidising agents. The grain size shall be 0-3 mm and water requirement shall be 13-15%. Compressive strength at three days shall not be less than 280 Kg/Sq.cm. Maximum linear expansion shall not exceed 0.2% and 0.12% in free and restrained states respectively. Grout materials manufactured by M/s. ACC or M/s. FOSROC or any other equivalent approved may be used. The grouting mixture shall always be stored in a dry place. This item shall be operated for grouting of pocket holes. Prior approval of Engineer-in-charge shall be obtained before use. The manufacturer's instructions shall be strictly adhered.

10.13.2 Surface Preparation, Mixing, Placement and Curing: The base concrete shall be cleaned to remove all foreign matter and wetted thoroughly before grouting. All free water shall be removed. The dry grout shall be mixed with recommended quantity of water in a mechanical mixer or as specified by the manufacturer. Mixing shall be restricted to quantities which can be placed in ten to fifteen minutes. Minimum mixing time shall be three minutes. The grouting mix shall be placed quickly and continuously, spread and compacted by rodding care shall be taken to ensure flow and compaction below bed plates. Grout shall be carefully observed for initial settlement. If any settlement is observed, further grout shall be added & rodded. It shall than be cured for a minimum period of seven days.

10.13.3 ***Measurement:***

Payment shall be made on the basis of actual quantity of dry grout material used in the works. This shall be measured in kilograms.

10.14.0 ***PRECAST CEMENT CONCRETE:***

10.14.1 Pre-cast cement concrete slab elements shall be used for making shelves, small lintels, pit cover slabs drain cover slab etc. All relevant specifications and workmanship mentioned for reinforced cement concrete shall in general be observed for pre-cast elements unless otherwise specified. Form works for pre-cast element shall be such as to ensure true corners, plain surface etc. Metal forms shall be used when directed by the Site Engineer. Provision shall be made in the forms and moulds to accommodate fixing devices, such as nips, clips, hook bolts and forming of notches and holes. The units shall be pre-cast on a cement or steel platform adequately oiled. Pre-cast slabs shall have dense surface finish free from cracks, Crevices or exposed coarse aggregates. Pre-cast concrete element after 24 hours of casting shall be kept immersed in water tank of suitable size for

at least 10 days. No pre-cast unit shall be erected or put in operation within 28 days of casting. The longitudinal reinforcement shall have a minimum cover of 12 mm or twice the diameter of the main bar whichever is more, unless otherwise mentioned. Stacking of the pre-cast elements shall be done as per instructions of the Site Engineer. Pre-cast members shall be clearly marked to indicate the top of the member, its location and orientation in the structure. Erection of pre-cast members shall be done to the desired position, alignment, level, plumb etc. for all heights such that they are not overstressed or damaged and jointed with such cement mortar 1:3 (1 cement :3 coarse sand) Rates quoted for pre-cast members shall be inclusive of all labour, materials, equipment, erection charges etc. complete. Steel reinforcements as shown in relevant drawing or as per instruction of the Site Engineer shall be provided and shall be paid extra. Measurement: Mode of payment shall be as per the measurement by volume of precast concreting done. Reinforcement used shall be on the same lines as per reinforced cement concrete. No separate payment shall be made for form work.

11.0.0 REINFORCEMENT:

11.1.0 Bending, binding, lapping and placing reinforcement in position shall be done as per exhibit drawings and as per provisions of IS: 456 and other relevant IS codes. Bars shall be bent cold correctly to the size & shape as detailed in the drawings and as per provision of IS: 2502-1963 and as per direction of the site engineer. Bars shall be thoroughly cleaned of rust, loose mill scales, dust, grease, oil, and any other foreign matters before placing in position. The bars crossing one another shall be tied together at every inter section with two strands of annealed steel wire 0.9 to 1.6 mm thickness twisted tight to make the skeleton of steel work rigid & to avoid displacement of reinforcement. Unless otherwise specified minimum cover & spacing and bond length for reinforcement bar shall be provided as per the provisions of IS:456 (latest edition). No concrete work shall be started prior to approval of the placing & binding of reinforcement by the Site Engineer.

11.2.0 ***Measurement:***

11.2.1 Payment for M.S. reinforcement, twisted bars & for all other reinforcement bars shall be on the basis bar bending schedule and weights of bar given as under. Wherever actual lengths placed differ from bar bending schedule actual length will only be measured. Standard hook length, chairs, spacer bar and authorised laps shall only be included in the calculation of total weight and paid. Binding wires shall not be included in the calculated weight. Measurement of weight shall not include cutting allowance/wastage etc.

Bar dia mm	Weight kg./metre
5	0.154
6	0.222
8	0.395
10	0.617
12	0.888
16	1.580
18	2.000
20	2.470
22	2.980
25	3.850
28	4.800
32	6.323
36	7.990

However, the payment for 6mm and 8mm dia (nominal size) MS rods will be based on the weight as arrived at by the procedure as specified below.

For the purpose of arriving at an average weight per unit length of any individual size of the bar, a set of bars of the same size selected at random from each consignment shall be weighed, their lengths accurately

measured and average weight per unit, length found out.

Unit weights thus found out for each size and each consignment shall be approved by the Engineer. Bars measured as used in works shall be converted into weight by adopting unit weights referred to above.

Steel brought to site and steel remaining unused shall not be removed from site without the written permission of the Engineer.

11.3.0 For keeping the bars in correct position pre-cast cover blocks in cement mortar 1:2 (1 cement : 2coarse sand) about 4cm x 4 cm section & of thickness equal to the specified cover shall be placed between the bars & shuttering, so as to secure & maintain the requisite cover of concrete over reinforcement.

11.4.0 Rate quoted for reinforcement shall include cost of reinforcing bars, cutting, allowance/ wastage, reinforcement straightening, bending, cleaning, binding wires, cover blocks etc. and placing in position at all heights and depths.

12.0.0 FORM WORK:

12.1.1 Form-work shall be strong enough to withstand dead and live load and forces caused by ramming/vibration of concrete and other incidental loads, likely to be imposed upon it during and after casting of concrete. Shuttering shall either be of wooden plank 30 mm minimum thickness or steel plate with stiffened edges. The shuttering shall be supported at bottoms by props of vertical Sal ballies properly cross braced together so as to make the form work rigid. The shuttering shall have a smooth and even surface and joints shall not permit leakage of cement grout. The timber planks shall be accurately sawn and planed on one side. The surface of shuttering that would come in contact with concrete shall be covered with a thin sheet of polythene paper rolls, after removing all rubbish such as chippings, shavings, saw dust etc. from the shuttering. Alternatively application of raw linseed oil or soap solution to the surface of the shuttering may be allowed at the discretion of the Site Engineer. Sufficient camber shall be provided to the shuttering so as to offset subsequent deflection after pouring of concrete on it. A minimum camber of 4 mm per meter length of beam and 1/50 of length of cantilever /projected member shall be provided as directed by the Site Engineer. Minimum period that shall elapse after the concrete is laid, before removal of centring and shuttering shall be as per provisions of IS: 456. The completed formwork shall be inspected and approved by the Site Engineer before reinforcement bars are placed in position.

12.2.0 No payment shall be made for formwork, centring shuttering etc. Rates quoted for plain & reinforced concrete shall be inclusive of form works, centring, shuttering and removal of form work etc. complete.

13.0.0 EPOXY PHENOLIC IPN COATING:

Where specified this coating shall be applied over MS/CTD reinforcement bars & also on structural steel prior to placing steel in position. This coating shall be applied by licensed applicators (as certified by CBRI). The following firms have been licensed by CBRI & are indicated below for reference.

- M/s Krishna Products, P.O. Box No. 17020, 5-B Mohsin Building, R.K. Vaidya Road, Dadar (West), Bombay - 400 028.
- M/s Hariom Construction & Waterproofing Co., 652/2, Sector 29, Gandhi Nagar - 382 029, Gujarat
- M/s Ciba Geigy of India Ltd., Plastics and Additives Division, Esplanade House, 29th Somani Marg. Bombay - 400 001
- M/s Beck & Co. (India) Ltd., Pimpri, PUNE - 411 018.

- Yamuna Gas & Chemicals Ltd., Sardana Nagar, Ambala Road, Jagadhari - 135 003.

18.1.0 ***Surface Preparation:***

13.1.1 i) M.S./CTD Reinforcement:
For effective bonding the surface of reinforcing steel shall be cleaned properly of all loose scales, rust, flakes etc. by rotary wire brush so as to form a shining surface. The use of acids for cleaning is strictly prohibited. The cleaned reinforcement bars should then be cut to size and bent to shape of the reinforcement to be laid. It is only after these operations are over IPN coating shall be applied.

13.1.2 ii) Structural Steel:
The surface specification of structural steel shall be same as M.S. Reinforcement, however mechanical wire brush shall be used for cleaning the surface and making it dazzling white/shining.

13.2.0 ***Coating (Reinforcement):***

13.2.1 Where specified Epoxy Phenolic IPN coating (developed at CBRI) shall be applied to the reinforcement. The epoxy resin solids should be more than 90 per cent in the epoxy polymer system and the minimum epoxy resin content in the coating system should be 70%.

13.3.0 ***Coating (Structural Steel):***

13.3.1 Primer Coat: - One coat of Zinc Phosphate primer shall be applied on the cleaned surface.

13.3.2 Top Coat:
When the surface of primer is just dry, two coats of CBRI developed IPN system based on epoxy/ phenolic poly blend, a high build epoxy resin with aromatic adduct system as hardener should be applied. The epoxy resin solids should be more than 90% in the epoxy polymer system and the minimum epoxy resin content in the coating system should be 60%. Detail formulation of IPN to be used is as below:

13.4.0 ***Primer:***

a) Epoxy resin (condensation product of Epichlorohydrin & Bisphenol A).	100 PBW*
b) Hardener (Aromatic amine adduct)	30-35 PBW*
c) Polymer of cashew nut shell liquid	30-35 PBW*
d) Hexamine	1.5-2.5 PBW*
e) Silica powder, flow controlling agent	50-56 PBW*

13.5.0 ***IPN top treatment:***

a) Epoxy resin (condensation product of Epichlorohydrin & Bisphenol A).	100 PBW*
b) Hardener (Aromatic amine adduct)	30-35 PBW*
c) Polymer of cashew nut shell liquid	30-35 PBW*
d) Hexamine	1.5-2.5 PBW*
e) Additives - flow controlling agent thixotropic agent, extender and pigment.	50-70 PBW*

* PBW = Parts by weight

13.6.0 ***Mode of measurement:***

For both structural steel and reinforcement steel, the mode of payment shall be on the basis of quantity (weight) of steel coated.

14.0.0 DAMP PROOF COURSE:

14.1.0 Damp proof course shall consist of cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone chips 10 mm nominal size) It shall be applied at the plinth level in a horizontal layer of specified thickness.

14.1.1 The level of the surface of the plinth shall be checked longitudinally and transversely. The last course of bricks below damp proof course shall be laid with frogs of the bricks downward. Side forms or shuttering of strong wooden battens of 40 mm thickness shall be fixed properly and firmly on both sides to confine the concrete so that the shuttering does not get disturbed during compaction and leak through. The inner edge of the shuttering shall be oiled to prevent concrete adhering to it. The surface shall be cleaned and the masonry shall be wetted before concrete is laid. The concrete shall be laid within half an hour of mixing and compacted thoroughly by tamping to make dense concrete and levelled both longitudinally and transversely. The DPC shall be laid in continuation in one day without any joints. Joints or breaks if unavoidable shall be given at places where DPC is to be discontinued such as sills of doors or openings. Shuttering may be removed after three days. On removal of shuttering the edges should come smooth without any honeycombing. Where specified a coat of hot residual BITUMEN of penetration 80/100 of approved quality @ 1.5 Kg/Sq.M shall be applied over the dried up surface of cement concrete, properly cleaned with brushes and finally with a piece of cloth, soaked in kerosene oil. An even layer of course
sand shall be spread over hot bitumen @ 0.75 kg/sqm.

14.1.2 DPC shall be cured by watering and kept wet for 7 days.

14.1.3 Payment shall be made on sq. metre basis of the area covered by DPC.

15.0.0 STEEL DOORS, WINDOWS, VENTILATORS & ROLLING SHUTTERS:

15.1.0 ***Doors, Windows & Ventilators:***

15.1.1 Steel doors, windows, ventilators etc. shall be manufactured from standard rolled steel sections. The steel shall be of fusion welding quality S-42-W designation conforming to IS: 2062-1984. In all
respects the steel section shall conform to IS: 7452-1990 for structural steel. Types, overall sizes, side opening and position shall be all as per IS: 1038 (latest edition) and as per exhibit drawings. The weight and different rolled steel sections, used in fabrication shall conform to those specified in IS: 1038 (latest edition). Lowest panel of the door, called as kick panels shall be provided of 1.25 mm MS sheet on either face of the door frames. The process of welding adopted shall be flash butt welding.

15.1.2 The steel doors and windows shall be according to the specified size and design. The sizes of door, window and ventilator opening shall be calculated so as to allow 1.25 cm clearance on all the four sides of the frame to allow for easy fittings into the opening. The actual size of doors, windows and ventilators shall not vary by more than +1.5 mm from those given in the design. All steel doors, windows, ventilators etc. shall be provided with a shop-priming coat. All steel doors, windows and ventilators shall be painted with two coats of ready mixed paint as per SOR.

15.1.3 Glazing: Ordinary glass panels of not less than 4 mm thickness shall be provided. The glass panels shall be free from flaws, specks or bubbles and shall have square corner and straight edges. Special metal sash putty of approved make such as special Gold Size or equivalent conforming to IS:

419-1967 shall be used for fixing glass panels. Putty shall be applied between glass panels and glazing bars. Putty shall be painted within 2 to 3 weeks after glazing to avoid its cracking. Quantity of putty shall not be less than 185 gm/m of glass perimeter. No separate payment shall be made for glazing. Rate quoted for glazed doors/windows/ventilators shall include glazing work.

15.1.4 Payment shall be made on square metre basis of the area of the opening in the wall covered by the door/ windows/ ventilators. Rate shall include breaking and making good the walls, sill etc. glazing, and providing and fixing all fixtures and fastening, painting, all labour, material etc. complete.

16.0.0 ALUMINIUM GLAZING WORK:

16.1.0. ***General:***

16.1.1 Aluminium Doors/Windows/ventilators shall be fabricated (by mitring) with box type frame sections & of size as shown in the drawing & conforming to IS: 1948-1961. All sections shall be fabricated from extruded sections as manufactured by reputed concerns & as approved by Engineer-in-charge. The weight & thickness of walls of sections shall be as specified in relevant item of schedule of rate. Robust construction shall be achieved by interlocking & screwing outer frame corners.

16.1.2 ***Finish:***

Aluminium doors will be anodised or powder coated as per requirement and as mentioned in Schedule of Rates. The average thickness of anodised coating shall not be less than 15 microns as per IS-1868. In case of powder coating thickness shall be not less than 70 microns and of approved shade and finish. A thick layer of clear transparent lacquer based on mathacrylates or cellulose butyrate shall be applied on aluminium door to protect the surface from waste cement during installation. Before handing over the building the lacquer coating shall be removed as directed by Engineer-in-charge.

16.1.3 ***Hinges:***

Hinges shall be projecting type, made of Aluminium alloy (cost/extruded conforming to relevant Indian Standards and welded to frames). Minimum two hinges shall be provided for each shutter, however, door shutter shall be provided with one additional hinge at the centre. The pins for hinge shall also be of aluminium alloy conforming to HR 30 of Indian Standard. Pins for hinges shall have an anodising coating of 25 micron thickness or powder coated of 70 microns thickness.

16.1.4 ***Fixing of panels/doors/windows/ ventilators:***

Fixing of frames with walls/other members shall be done in any of the following three manners;

i) Using 30 mm x no. 10 galvanised screws in case the frame is to be fitted to a wooden member.

ii) With slotted galvanised steel lugs fitted to the frame with galvanised nuts and screws embedded in cement concrete block (1:2:4) in case the frame is to be fitted on a brick/stone masonry wall.

iii) With plug and galvanised screws (45 mm x 10 nos.). Position and number of fixing lugs and screws shall be as per IS: 1948: 1961 as far as practicable, Complete with all accessories including cleaning the Aluminium sections free from lacquer.

16***.2.0*** ***ALUMINIUM GLAZED PANEL DOORS:***

16.2.1 Aluminium door shall be manufactured from standard aluminium alloy extruded sections and shall be all as per drawings. The aluminium alloy shall be as per IS-733, HE-O-WP. Hollow aluminium
alloy sections shall conform to IS designation HV-O-WP of IS 1285. Aluminium door will be made of

6 mm thick plate glass fitted and fixed with box 101.6 x 44.45 x 3.18 mm aluminium frame with snap beadings and glazing clips as per standard practice and exhibit drawings. Aluminium beading of approved size and make, gasket and felt will be used for holding the glass in position. One floor spring 12"x8" as per IS 7197 shall be provided with each panel at bottom unless otherwise specified and one pivot at top of each panel shall be provided. Proper locking arrangement as per drawings and direction of Engineer-in-Charge shall be provided.

16.2.2 ***Fittings & Fixtures:***

All doors shall be provided with double action floor spring, suitable locking arrangement (open-able either from outside or inside), bolting devices and handles. In case of double leaf shutters doors, the first closing shutter shall have a concealed aluminium bolt at top. All fixtures shall conform to relevant I.S. codes.

16.2.3 ***Rate:***

Rate shall include all materials and labour required for fixing the door including handles, tower bolts etc., but excluding floor springs (which shall be paid as per separate SOR item), complete with all accessories including cleaning the aluminium section free from lacquer.

16.***3.0*** ***ALUMINIUM GLAZED PANELS:***

16.3.1 Aluminium sections, finish, glazing, workmanship etc. shall, in general, conform to the specifications covered under clause 21.1.0 and its sub clauses except that floor-springs and locking arrangements which will not be required in case of glazed panels. These panels shall have to be fixed in wall openings (with provision for opening as directed by Engineer-in-charge) as per drawings and as per instructions of the Site Engineer.

16.3.2 Rate:

Aluminium glazed panelling shall be paid in two following items of schedule of rates:

i) Glazed panelling with single glass sheet.

ii) Glazed panelling with double glass sheet.

Rates shall include all materials and labour required for providing and fixing the panel in position complete.

16.4.0 ***ALUMINIUM GLAZED WINDOW/ VENTILATORS (OPENABLE SLIDING WINDOWS AND TOP HUNG VENTILATORS):***

16.4.1 Frames for windows/ventilators shall be fabricated from aluminium alloy section HE9-WP confirming IS : 733 and HE9-WP conforming to IS-1285 true to dimensions as shown in construction drawings after making clearance for proper fittings in the wall opening as per IS:1948.

16.4.2 Glazing:

Glazing panels of not less than 5 mm thickness or as specified shall be used. Sizes of glass panels shall conform to table I of IS: 1948, wherever practicable. Specifications and fixing of glazing shall confirm to those of steel door, windows and ventilators.

16.4.3 Fittings & Fixtures: All windows shall be provided with cast aluminium handles and peg stays conforming to A-5-M of IS: 617 with anodised finish of 15 micron thickness or powder coated. Ventilators shall either be top hung and provided with peg stays or of louver type. The peg shall be 300 mm long complete with peg & locking bracket. The locking bracket shall either fitted to the frame or to the ventilator.

16.4.4 Rate:

Rate quoted for glazed windows and ventilators shall be inclusive of glazing works and handles,

bolts and other standard fixtures.

16.4.6 Payment:

Payment shall be made on square metre basis of the area of the opening.

17.0.0 WOOD WORKS:

17.1.0 ***General:***

All wood works shall be second class Indian Teak Wood unless otherwise specifically mentioned. The timber shall be of good quality, well seasoned, uniform in colour, reasonably straight grain and shall be free from dead knots, cracks, and sap wood. Permissible defects in the timber shall be as indicated in Indian Standard 883 (latest edition). For doors, windows, and other carpentry and joinery works, no individual hard and sound knot shall be more than 25 mm in diameter, and the aggregate area of all the live knots shall not exceed 1% of the area of the piece. All wood work shall be painted with two coats of synthetic enamel paint over a coat of primer. For hand rail (in case of staircase) a coat of anti-termite wood primer shall be applied followed by coat of French polish. Rate shall include cost of labour and materials for painting also.

17.2.0 Wooden Frames for doors, windows, ventilators & other frames:

17.2.1 Wooden frames shall be made of second class Indian teak wood conforming to the specification mentioned herein before. Workmanship for wooden, frames, doors, windows etc. shall in general conform to Indian Standard 4021 - 1967 unless otherwise mentioned. The work shall be as per detailed drawings or as directed by the Site Engineer. All members shall be straight without any warp or bow. Frames shall have smooth, well planed surfaces except the surfaces touching the walls, lintels etc. which may be left clean sawn. The timber shall be sawn in the direction of grains. Rebates, rounding, and moulding as shown in drawings or as directed by the Site Engineer shall be done at no extra cost. The scantling shall be finished smooth and rubbed plane with sand papers to pin with hard wood or bamboo pins of 10 to 15 mm diameter. Use of iron nails shall never be permitted. All mortise and tenon joints shall fit in fully and accurately without wedging or filling.

17.2.2 All portions of the timber frame abutting or embedded in brick work or concrete shall be painted with coal-tar before being placed in position, without any extra cost. For door or other frames without any "Chowkhat" (bottom horizontal member) the vertical members, shall be buried in the floor for at least 40 mm depth.

17.2.3 Each frame up to 1.5 M length shall be provided with 4 nos. hold fast, two on each vertical member and for frames above 1.5 m length 6 nos., 3 on each vertical member. Hold fasts shall be 30x6 mm M.S. Flat 20 cm long. Hold fast shall be split and splayed at ends and embedded in cement concrete block (1:2:4). No extra payment shall be made for the hold fasts, making holes in wall or concrete and embedding the same in cement concrete blocks.

17.2.4 Payment for frames shall be made on gross volume of the frame. No deduction shall be made for rebate/rounding. Rates quoted shall be inclusive of labour, materials, fabrication, fittings, fixing of ancillary materials like hold fasts, coal-tar, paints etc. complete.

17.3.0 Panel Door Window etc.:

Workmanship for panel door, window shutter etc. shall conform in general to IS-1003. Timber for panel door windows shall be second class Indian Teak conforming to the specifications. The grains of timber panel shall run along the longer dimensions of the Panels. Door/Windows panels shall be 15 mm thick one piece plank finished smooth and fixed with style and rail 35 mm thick. Styles and end rails and intermediate rail shall be 150 mm wide and 35 mm thick. Styles and rails shall be properly and accurately mortised and tenon jointed and pinned with hard wood or bamboo pin 10 mm dia. Iron nails shall never be permitted. The lock rails of door shutters shall have its centre line

at a height of 800 mm from the bottom of shutter unless otherwise specified. The thickness of each tenon shall be approximately one third the finished thickness of the member and the width of each

tenon shall not exceed three times its thickness. The style and rails shall have 12 mm deep groove in panelled portion for the panel to fit in. All pieces shall be of accurate dimension, planed smooth, rebating, rounding, moulding etc. complete as shown in the drawing. Shutters shall not be painted, oiled or otherwise treated before these are fixed in position and passed by Site Engineer.

17.3.2 Each double leaf door shall be provided with the following heavy quality aluminium anodised fittings the anodic coating shall be of grade not less than AC 15-IS:1868-1982.

a) 6 Nos. 100 mm long butt hinges

b) One 300 x 16 mm Aldrop bolt.

c) Two 150 x 10 mm barrel bolts.

d) Four 150 mm long Door handles.

e) Two stoppers.

Each single leaf door shall be provided with following aluminium anodised heavy quality fittings:

a) One stopper
b) Two 150 x 10 mm barrel bolts
c) Two 150 x 10 mm barrel bolts
d) Three Nos. 100 mm long butt hinges.
e) One No. 300 x 16 mm sliding bolt.

17.3.3 Rate quoted for respective item in Schedule of Rates for door/windows shutters shall be deemed to include all labour, materials fabrication and fixing in position with necessary fittings as mentioned above, painting etc. complete. Payment will be made on square metre basis of the area of the shutters. If any fitting is not required in a particular door, suitable deduction shall be made for the same.

17.4.0 ***Flush Door Shutters:***

17.4.1 Flush shutter (solid core type) shall in general conform to IS-2202 (Part-I - 1991) and of exterior grade with block board core. Block board core shall conform to the requirements specified in Indian Standard 1659 - 1990. The wooden strips for the core shall not exceed 25 mm in width. In any one block board the core strip shall be one piece of timber only. Wooden frame prepared from style and rails of well seasoned and treated good quality wood shall be provided for holding the core. The width of the member shall not be less than 75 mm and not more than 100 mm.

17.4.2 The core surface shall have two or more commercial or teak plywood veneer firmly glued on each face and pressed. The combined thickness of all the veneers on each face shall not be less than 4 mm. Only phenol formaldehyde resin glue conforming to IS:848 - 1974 shall be used for door manufacture and a certificate to this effect from the manufacturer shall be furnished on demand. The flush door shutter shall be obtained from firms of repute and the supply shall be in accordance with the approved full size samples. All fittings for flush doors shall be of Aluminium anodised of approved type. Each door shutters shall be provided with the following fixtures and rate quoted for door item in the Schedule of Rates shall be inclusive of all these fittings and on square metre basis of the area of flush door shutter.

a) Three Nos. of butt hinges of size 125 mm x90 x 4 mm heavy quality (six nos. in case of double leaf shutters).
b) One Godrej or equivalent 7 levers mortise lock with a pair of handle and latch.
c) Two nos. 150 mm long Barrel Bolt.
d) One No. wooden stopper per leaf.

Vision panel of the approved size shall be provided in the flush doors wherever provided in the drawings or as per direction of Site Engineer. 4 mm thick plane glass with teak wood beading shall be provided. Vision panels shall be separately paid under relevant item on square metre basis.

17.4.3 Payment shall be made on sqm basis including the cost of all material, labour, painting etc. but excluding cost of vision panels.

17.5.0 ***Partially Glazed and Partially wooden partition work:***

17.5.1 Framework for partition shall be of First Class good quality and well seasoned Teakwood of size 2" x 2" (50 mm x 50 mm). It shall have uniform colour, reasonably straight rains and shall be free from dead knots, cracks and sap wood. The joints shall be pinned with hardwood or bamboo pins of 10 to 15 mm diameter. The timber shall be sawn in the direction of the grains. All mortise and tenon joints shall fit in fully and accurately without wedging or filling. All frame work shall be coated with anti-termite paint of approved brand and quality. Vertical members of the frame shall be placed not more than 60 cm. apart and horizontal members not more than 100 cm apart. Horizontal members each at top and bottom of the frame is a must. The portion of partition above door height will be fixed with 4 mm thick frosted glass panes fixed with teak wood beads of size 25x20 mm all-round fixed with screws. Frosted glass panels shall be fixed with frosted face on the inside.

17.5.2 After the frame is fixed commercial ply 1/4" (6 mm) thick of approved quality shall be pasted by phenol formaldehyde resin glue, on one face and 1/4" (6 mm) thick approved quality teak ply shall be pasted on the other face.

17.5.3 Teak ply and external face of glazed panelling frame shall have two or more coats of approved copal varnish or superior spray varnish, over an undercoat of flatting varnish of the same manufacturer as the top coat. Preparation of surface and application of varnish shall be as directed by Site Engineer.

17.5.4 Commercial ply facing and interior portion of glazed panelling shall be applied with two coats of approved synthetic enamel paint over a coat of primer.

17.5.5 Rates quoted shall be inclusive of all labour, materials, fabrication, fittings, fixing and cost of all ancillary materials like varnish, paints etc. complete.

17.5.6 Payment will be made on square metre basis of the area of panelling/partition. Doors wherever provided within the partition work, shall be paid separately under appropriate item.

18.0.0 FLOORING:

18.1.0 ***Scope:***

This section shall cover all floorings. No work under this section shall be started until specifically allowed by the Engineer-in-Charge and until all other major works such as plastering, embedding of conduits and pipes, channels, window fixing etc. have been completed. Samples of adequate size representing the nature of variation including quality, size and texture after polishing of the tiles to be used in the flooring work shall be prepared for all work and got approved by the Engineer-in-charge before proceeding. The approved samples shall be retained up to the end of the project.

18.2.0 ***CURING:***

After the floor has begun to harden it shall be protected from quick drying with moist gunny bags or by some suitable means as approved by the Site Engineer. After 24 hours of laying floor, the surface shall be cured by flooding with water to minimum 25 mm depth or by covering with wet gunny bags. The curing shall be continued for at least ten consecutive days.

18.3.0 ***CEMENT CONCRETE FLOORING:***

Cement Concrete:
Cement Concrete of specified mix shall be used and it shall generally conform to the specifications as described in Cement Concrete chapter.

Sub-grade:
Flooring shall be laid on concrete sub-grade where so provided. The sub grade shall be provided with slopes required for the flooring. Flooring in verandas, kitchens, baths, water closets and courtyards shall invariably be provided with suitable slope to drain off washing and rain water.

18.3.1 Laying in Panels:
Flooring of specified thickness shall be laid in the pattern as given in the drawings or as directed by the Engineer-in-Charge. The border shall have mitred joints at the corners of the room and intermediate joints shall be in straight line with the panel joints. The panels shall be of uniform size and no dimension of a panel shall exceed 2 m and the area of a panel shall not be more than 2 sqm. Cement concrete shall be placed in position, in one operation, in the panels. It shall then be levelled with the help of straight edge and trowel and beaten with a wooden "Thappy" or mason's trowel. The blows shall be fairly heavy in the beginning but as consolidation takes place, light rapid strokes shall be given. Beating shall cease as soon as the surface is found covered with cream of mortar. The surface shall be tested with straight edge and made true to required slopes. While laying concrete care shall be taken to see that the strips are not damaged/ disturbed. The top strips shall be visible clearly after finishing with cement slurry.

18.3.2 ***Laying with Strips:***
Normally cement concrete flooring shall be laid in one operation using glass sheet strip at the junction of two panels. The glass strip shall be 4mm thick & width equal to thickness of the floor. This method ensures uniformity in colour of all the panels and straightness at the junction of the panels.

18.3.3 ***Finishing:***
The finishing of the surface shall follow immediately after the cessation of beating. The surface shall be left for some time, till moisture disappears from it. Fresh quantity of cement at 2.0 kg of cement shall be mixed with water to form thick slurry and spread over an area of one sqm of flooring while the concrete is still green. The cement slurry shall then be properly pressed and finished smooth with steel trowel. Excessive trowelling shall be avoided. Use of dry cement or cement and sand mixture sprinkled on the surface to stiffen the concrete or absorb excessive moisture, shall not be permitted. The edges of sunk floors shall be finished and rounded with cement mortar 1:2 (1 cement: 2 coarse sand) and finished with a floating coat of neat cement. The junctions of floor with wall plaster, dado or skirting shall be rounded off where so specified. The men engaged on finishing operations shall be provided with raised wooden platform to sit on, so as to prevent damage to new work.

18.3.4 ***Curing:***
The curing shall be done for a minimum period of ten days. Curing shall not be commenced until the top layer has hardened. Covering with empty cement gunnies shall be avoided as the colour is likely to be bleached with the remnants of cement matter from the bags.

18.4.0 ***TERRAZZO (MARBLE CHIPS) FLOORING:***

18.4.1 Cement concrete of specified mix shall be used & the specifications covered under concrete shall apply. Fixing & laying shall be as per clause 23.3.1 & 23.3.2.

Top Layer: The mix for terrazzo topping shall consist of cement, marble powder, marble chips & water. Cement for use in terrazzo top layer shall comprise of 50% grey & 50% white cement. The cement & marble powder shall be mixed in the proportion of three parts to one part marble powder

by weight. The marble chips shall be in white and or in black. The marble chip shall be of 6 mm size.

Before starting the work, the contractor shall get the sample of marble chips approved by Engineer-in-Charge. The full quantity of dry mixture of mortar required for a room shall be prepared in a lot in order to ensure uniform colour. This mixture shall be stored in a dry place & well covered and protected from moisture. The dry mortar shall be mixed with water in the usual way as & when required. The mixed mortar shall be homogenous and stiff and to contain just sufficient water to make it workable. The terrazzo topping shall be laid while the under layer is still plastic. A cement

slurry preferably of the same colour as the topping shall be brushed on the surface immediately before laying is commenced. It shall be laid to uniform thickness slightly more than that specified thickness in order to get the specified finished thickness after rubbing. The surface of the top layer shall be trowelled over, pressed & brought true to required level by a straight edge & steel floats in such a manner that the maximum amount of marble chips come up & are spread uniformly over the surface.

18.4.2 ***Laying:***

Sub-grade concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tiles shall be with cement mortar of 1:4 (1 cement: 4 coarse sand) light shades using white cement. The ingredients shall be thoroughly mixed by volume in dry form. Care shall be taken to ensure that there are no hard lumps present. Water shall then be added and the ingredients thoroughly mixed. The average thickness of the bedding mortar shall be 30 mm and the thickness at any place shall not be less than 10 mm. Cement mortar bedding shall be spread, tamped and corrected to proper levels and allowed to slightly harden. Over this bedding, neat grey cement slurry of honey like consistency shall be spread at the rate of 4.4 kg of cement per square metre over such an area as would accommodate about twenty tiles. Tiles shall be washed clean and shall be laid in this grout one after another, each tiles being gently tapped with a wooden mallet till it is properly bedded, and in level with the adjoining tiles. The joints shall be kept as thin as possible not exceeding 1.5 m and in straight lines or to suit the required pattern. The surface of the flooring during laying shall be frequently checked with a straight edge at least 2 metre long, so as to obtain a true surface with the required slope. Where full size tiles cannot be fixed, these shall be cut (swan) to the required size and their edges rubbed smooth to ensure a straight and true joint. The tiles shall be laid as per pattern and schemes shown in drawing or as approved by Engineer-in-charge. Tiles which are fixed in the floor adjoining the wall shall enter not less than 12 mm under the plaster, skirting or dado. The junction between wall plaster and tile work shall be finished neatly and without waviness. After the tiles have been laid, surplus cement grout that may have come out of the joint shall be cleaned off.

18.4.3 ***Curing, Polishing and Finishing:***

Polishing shall be done by machine. About 36 hours after laying the top layer, the surface shall be watered & ground evenly with machine fitted with special rapid cutting grit blocks (carborundum stone) of coarse grade (No.60) till the marble chips are evenly exposed & the floor is smooth. The surface shall thereafter be grounded evenly with machine fitted with coarse grade grit blocks (No. 60) after the first grinding; the surface shall be thoroughly washed to remove all grinding mud, cleaned and mopped. It shall then be covered with a thin coat of grey or white cement, mixed with or without pigment to match the colour of the topping of the wearing surface in order to fill any pin hole that appear. The surface shall be again cured for 5 to 7 days. . The second grinding shall then be carried out with machine fitted with fine grade grit blocks (No.120). The final grinding with machine fitted with the fine grade grit, blocks (no. 320) shall be carried out the day after the second grinding described in the proceeding paragraph or before handing over the floor, as ordered by the Engineer-in-Charge. The finished surface should show the marble chips evenly exposed.

For small areas or where circumstances so require, hand polishing shall be permitted in lieu of machine polishing after laying. For hand polishing the following Carborundum stones, shall be used:

Ist grinding	-	coarse grade stone (No. 60).
Second grinding	-	medium grade (No. 80)
Final grinding	-	fine grade (No. 120).

In all other respects, the process shall be similar as for machine polishing.

After the final polish, oxalic acid shall be dusted over the surface at the rate of 33 gm per square metre sprinkled with water and rubbed hard with a namdah block (Pad of woollen rags). The following day the floor shall be wiped with a moist rag and dried with a soft cloth and finished clean.

19.5.0 ***Precast Terrazzo Tile Flooring:***

19.5.1 Terrazzo Tiles:

Terrazzo tiles shall be generally conform to IS:1237-1980 with marble chips of nominal sizes 1mm to 6mm, shades as specified in the schedule of rates and shall be of approved quality and shade. Requirement and methods of testing shall be as per relevant I.S. Code. The sizes of tiles shall be as specified in the drawings and or detailed in the schedule of rates. The thickness of tiles shall be 20mm/25mm or as shown with marble chips of sizes up to 6 mm.

19.5.2 Tolerances for Precast Terrazzo Tiles:

Tolerances on length and breadth shall be plus or minus one millimetre; tolerance on thickness shall be plus 5 mm. The range of dimensions in any one delivery of tiles shall not exceed 1 mm on length and breadth and 3 mm on thickness. The tiles shall be manufactured under hydraulic pressure of not less than 140 kg per square centimetre and shall be given the first grinding with machine before delivery to site. The proportion of cement to aggregate in the backing of the tiles shall not be leaner than 1:4 by weight. Similarly the proportion of cement to marble chips aggregate in the wearing layer of the tiles and the proportion of pigment to be used therein shall not exceed 10 per cent of weight of cement used in mix.

19.5.3 Laying:

Sub-grade concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tiles shall be with cement mortar of 1:4 (1 cement: 4 coarse sand) light shades using white cement. The ingredients shall be thoroughly mixed by volume in dry form. Care shall be taken to ensure that there are no hard lumps present. Water shall then be added and the ingredients thoroughly mixed. The average thickness of the bedding mortar shall be 30 mm and the thickness at any place shall not be less than 10 mm. Cement mortar bedding shall be spread, tamped and corrected to proper levels and allowed to slightly harden. Over this bedding, neat grey cement slurry of honey like consistency shall be spread at the rate of 4.4 kg of cement per square metre over such an area as would accommodate about twenty tiles. Tiles shall be washed clean and shall be laid in this grout one after another, each tiles being gently tapped with a wooden mallet till it is properly bedded, and in level with the adjoining tiles. The joints shall be kept as thin as possible not exceeding 1.5 m and in straight lines or to suit the required pattern. The surface of the flooring during laying shall be frequently checked with a straight edge at least 2 metre long, so as to obtain a true surface with the required slope. Where full size tiles cannot be fixed, these shall be cut (swan) to the required size and their edges rubbed smooth to ensure a straight and true joint. The tiles shall be laid as per pattern and schemes shown in drawing or as approved by Engineer-in-charge. Tiles which are fixed in the floor adjoining the wall shall enter not less than 12 mm under the plaster, skirting or dado. The junction between wall plaster and tile work shall be finished neatly and without waviness. After the tiles have been laid, surplus cement grout that may have come out of the joint shall be cleaned off.

19.5.4 Curing, Polishing and Finishing:

The day after the tiles are laid all joints shall be cleaned of the grey cement grout with a wire brush or trowel to a depth of 5 mm and all dust and loose mortar removed and cleaned. Joints shall then be grouted with grey or white cement mixed with or without pigment to match the shade of the

topping of the wearing layer of the tiles. The same cement slurry shall be applied to the entire surface of the tiles in a thin coat with a view to protect the surface from abrasive damage and fill any pin holes that may exist on the surface. The floor shall then be kept wet for a minimum period of 7 days. The surface shall thereafter be grounded evenly with machine fitted with coarse grade grit blocks (no. 60). Water shall be used profusely during grinding. After grinding the surface shall be thoroughly washed to remove all grinding mud, cleaned and mopped. It shall then be covered

with a thin coat of grey or white cement, mixed with or without pigment to match the colour of the topping of the wearing surface in order to fill any pin hole that appear. The surface shall be again cured. The second grinding shall then be carried out with machine fitted with fine grade grit blocks (No.120). The final grinding with machine fitted with the fine grade grit, blocks (no. 320) shall be carried out the day after the second grinding described in the proceeding paragraph or before handing over the floor, as ordered by the Engineer-in-Charge. For small areas or where circumstances so require, hand polishing shall be permitted in lieu of machine polishing after laying. For hand polishing the following Carborundum stones, shall be used:

Ist grinding	-	coarse grade stone (No. 60).
Second grinding	-	medium grade (No. 80)
Final grinding	-	fine grade (No. 120).

In all other respects, the process shall be similar as for machine polishing.

After the final polish, oxalic acid shall be dusted over the surface at the rate of 33 gm per square metre sprinkled with water and rubbed hard with a namdah block (Pad of woollen rags). The following day the floor shall be wiped with a moist rag and dried with a soft cloth and finished clean.

If any tile is disturbed or damaged, it shall be refitted or replaced; properly jointed and polished. The finished floor shall not sound hollow when tapped with a wooden mallet and shall be protected with dry sand dust till it is completely set.

19.6.0 ***VITREOUS CERAMIC / PORCELAIN / VITRIFIED FLOOR TILES:***

19.6.1 Make:

Vitreous Ceramic/ Porcelain/ Vitrified tiles shall be of best quality and of approved make/ manufacturer. They shall be of specified thickness and size, type and colour and laid to pattern as shown in the drawings or as approved by the Engineer-in-Charge.

19.6.2 Sub-base:

The base shall first be prepared as indicated in clause no. (Pre-cast terrazzo floor) indicated herein above. Over the prepared base, if required 1:3:6 cement concrete screed shall be laid to make up the total thickness of floor finish as specified. The surface shall be laid to falls and slopes as required and scratched for key.

19.6.3 Laying of Floor tiles:

After the base is cured and dried, 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) shall be laid on the surface and spread evenly with a trowel. Neat cement slurry of honey like consistency shall be spread over. The back of the tile previously cleaned and soaked in water shall be placed over the mortar and brought to proper level by striking gently with a wooden mallet.

19.6.4 Pointing:

The tiles shall be laid in the manner as specified above in required pattern with as thin a joint as possible. The joints shall be thoroughly cleaned and pointed with white cement slurry (1 white cement : 2 sand) admixed with pigment of matching colour as the tiles. The pointing can alternatively, be carried out with an approved non-shrink grout of matching colour as recommended by the manufacturer.

19.6.5 Cutting of Tiles:

Care shall be taken to see that full tiles are used as far as possible. Where not possible, the edge tiles shall be neatly cut with a tile cutter and the edges rubbed smooth. The cut edge of the tiles shall not install in exposed locations.

19.6.6 Curing:

The tiles shall be cured for 7 days with water and then thoroughly cleaned and dried.

19.7.0 ***CERAMIC WALL TILE IN DADO:***

Notwithstanding anything written above, the manufacturer's printed instructions regarding laying and curing shall be strictly followed.

19.7.2 Tiles:

The tiles shall be of approved make/manufacturer and shall generally conform to IS: 13753. They shall be flat, and true to shape and free from cracks, crazing, spots, chipped edges and corners. The glazing shall be of uniform shade. The tiles shall be of nominal sizes of 300 x 200 mm, 200 x 100 mm or as otherwise specified. The thickness of the tiles shall be 7 mm unless otherwise required or shown.

19.7.3 White and Coloured Tiles:

The tiles shall be white, black matte or coloured as specified or as instructed by Engineer-in-charge.

19.7.4 Preparation of Surface:

The joints shall be raked out to a depth of at least 12 mm in masonry wall, while the masonry is being laid. In case of concrete walls, the surfaces shall be backed and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting/dado is commenced.

19.7.5 Mortar:

12 mm thick plaster of cement mortar 1:3 (1 cement: 3 coarse sand) shall be applied and allowed slightly to harden. The plaster shall be roughened with wire brushes or by scratching diagonal at close intervals.

19.7.6 Laying of Tiles:

The tiles shall be soaked in water, adequately washed clean, and a coat of neat cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tile shall amped and corrected to proper plane and lines. The tiles shall be set in the required pattern and butt jointed. The joints shall be as fine as possible and uniform. Top of dado shall be truly horizontal and joints truly vertical except where cut to the required size and their edges rubbed smooth are shall be taken to ensure that as far as possible cut tile are in non-exposed locations. Works shall be carried out in all areas only after a sample.

19.7.7 Pointing:

After laying is complete, the joints shall be cleaned off the grey cement grout with wire brush and all dust and loose mortar removed. The joints shall then be flush pointed with white cement slurry added with approved pigments to match the colour of tiles.

19.7.8 Curing and Finishing:

The surface shall be cleaned and kept wet by sprinkling water for seven days. The finished surface shall be clean, free of patches and glossy and shall not sound hollow. Finished dry surfaces shall be washed with mild organic acid, if so required. The finished surface shall meet the approval of the Engineer-in-Charge.

19.8.0 ***CEMENT CONCRETE FLOORING WITH METALLIC HARDENER TOPPING:***

19.8.1 Sub-Grade:
Cement concrete sub grade, laying pattern shall be as specified in Cement concrete floor.

19.8.2 Under-Layer:
Under layer concrete shall be as specified in the relevant specification for terrazzo flooring stated

19.8.3 Top Layer:
Metallic concrete hardener topping where so specified shall consists of 15 mm thick layer of mix 1:2 (1 cement : 2 stone aggregate 6 mm nominal size) by volume or as otherwise specified, with which metallic hardening compound is mixed in ratio of 1:4 (1 metallic concrete hardener : 4 cement) by weight. The metallic compound shall be of approved quality consisting of uniformly graded iron particles, free from non-ferrous metal particles, oil, grease, sand, soluble alkaline compound. Concrete hardener shall be dry mixed thoroughly with cement on a clean dry Pucca Platform. This dry mixture shall be mixed with stone aggregate 6 mm nominal size or as otherwise specified in the ratio 1:2 (1 cement mixture : 2 stone aggregate) by volume and well turned over. Just enough water shall then be added to this dry mix as required for floor concrete. The mixture so obtained shall be laid in 15 mm thickness over 37 mm thick under layer of cement concrete floor 1:2:4 (1 cement : 2 coarse sand: 4 stone aggregate 20 mm nominal size) within 2 to 4 hours of its laying. The topping shall be laid true to provide a uniform and even surface. After the initial set has started the surface shall be finished smooth true to slope with steel floats.

19.8.4 Curing:
The floor shall be cured as specified here-in-above.

19.9.0 ***MARBLE FLOORING:***

Marble flooring where so specified shall consist of marble slabs laid over cement mortar bed. Marble shall be as specified in 2.7.0.

19.9.1 Dressing of slabs:
Every stone shall be cut to the required size and shape, fine chisel dressed on all sides to the full depth. The top surface shall also be fine chisel dressed to remove all waviness. The thickness of the slab shall be as specified. Base concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted and mopped. The bedding for the slabs shall be with cement mortar 1:4 (1 cement: 4 coarse sand) of 20 mm average thickness. Slabs free from all adherent materials shall be laid on bed, pressed and tapped with wooden mallet and brought to the level of the adjoining slabs. It shall then be lifted and laid aside. The hollows created in the mortar bed are made good. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread at the rate of 4.4. kg of cement per sqm. The edges of the slab already paved shall be filled with white cement with or without admixture of pigment to match the shade of the marble slabs. The slab to be paved shall than be placed back in position and tapped with wooden mallet till it is properly bedded in level. After each slab has been laid surplus cement on the surface of the slabs shall be cleaned off. Slabs adjoining the wall shall enter not less than 12 mm under the skirting or dado.

19.9.2 Curing, Polishing & Finishing:
Floor shall be kept wet for a minimum period of 7 days. The floor shall then be grounded & polished as specified in 23.4.4 except that cement slurry with or without pigments shall not be applied to the surface before each polishing, instead white cement may be used. Flooring shall be laid to required slope/ level and shall be cured for a minimum of 7 days.

19.10.0 ***KOTA STONE FLOORING:***

19.10.1 Kota stone slabs:
The slabs shall be of selected quality, hard, sound and homogenous in texture free from cracks, decay, weathering and flaws. They shall be hand or machine cut to the requisite thickness. They shall be of the colour indicated in the drawings or as instructed by the Engineer-in-Charge. Every

slab shall be cut to the required size and shape and fine chisel dressed on the sides to the full depth. The slabs shall have the top face polished before being brought to site, unless otherwise specified. All angles and edges of the slabs shall be true square, free from chippings and the surface shall be true and plane. The thickness of the slab shall be 25 mm. The allowed tolerance with respect to length, breadth and thickness shall be + 2 mm.

19.10.2 Preparation of surface and laying:

Base concrete or RCC slab on which the stone slabs are to be laid shall be cleaned wetted and mopped. The bedding shall be with cement mortar 1:4 (1 cement: 4 coarse sand) of 20 mm average thickness. The slab shall be washed clean before laying. It shall be laid on top, pressed, and tapped to level with the adjoining slabs. It shall be lifted and laid aside. The mortar surface shall then be corrected by adding fresh mortar at hollows. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread @ 4.4 kg of cement per sqm. The edges of already paved slabs shall be buttered with grey cement with pigment to match the shade of the slabs. The slab to be paved shall then be lowered and tapped to level with as fine a joint as possible. Surplus cement on the surface shall be cleaned off. The flooring shall be cared for a minimum period of 7 days. The surface of the flooring shall be finished to the levels specified in the drawings or as per the instructions of the Site Engineer. The day after the stone slabs are laid all joints shall be cleaned with a wire brush or trowel to a depth of 5 mm and all dust and loose mortar removed and cleaned. Joints shall then be grouted with grey cement mixed with pigment to match the shade of the slabs. The floor shall then be kept wet for a minimum period of 7 days. The surface shall then be grounded & polished as specified for cast -in-situ terrazzo floor except that (a) first polishing with coarse grade Carborundum stone shall not be done (b) Cement slurry with or without pigments shall not be applied on the surface before polishing.

19.11.0 ***ACID PROOF TILE:***

Acid proof tiles in floor/ dado/ skirting etc. where so specified in general shall conform to IS: 4457. The concrete or plastered surface should be completely dried and cleaned free of dust and other foreign particles and levelled even. Over this surface, a coat of bitumastic paint shall be applied and allowed to dry for 12 hours. Acid proof tiles of specified size in SOR shall be laid uniformly over the floor/dado/skirting thus prepared. The joints between the tiles shall be 6 mm and shall be filled with hot plasticized sulphur/ acid resisting cement. After the final setting, the joints should be smoothened with emery stone and using water.

19.12.0 Measurement:

Length & breadth shall be measured correct to a cm before laying. Payment shall be made on square metre basis. Rate shall include cost of all labour & materials involved in all the operations but shall not include the cost of sub- grade concrete under top flooring which shall be paid under relevant Item.

19.13.0 Skirting and Dado*:*

Skirting & dado shall be fixed only after flooring. The under layer shall consist of layer of stiff cement sand mortar of 1:3 or as specified in SOR & finished rough to provide key for the topping. Topping shall be as specified. For fixing of tiles, the back of each tile to be fixed shall be covered with a thin layer of neat cement & the tile shall then be gently tapped against the wall with wooden mallet. The fixing shall be done as close as possible from bottom upwards. Skirting & dado shall be ground & polished just as floor work or polished by hand by rubbing down with suitable polishing stones in three operations evenly & without scratching the surface. Before handing over it shall be thoroughly washed & cleaned. Dilute oxalic acid may also be used for cleaning if required.

20.0.0 WATER PROOFING:

20.1.0 Water Proof treatment on roof shall be as specified in Schedule of Rates.

20.1.1 The surface to be treated shall have a minimum slope of 1 in 120 or as directed by Site Engineer. Grading shall be carried out with PCC 1:2:4 with 10 mm down aggregate to 40 mm average

thickness and finished smooth. Such grading shall be paid separately under appropriate item.

20.1.2 Junction between the roof and vertical face of parapet wall etc. shall be cased by running triangular fillets 75x75 mm size in PCC 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size). At the drain mouths the fillets shall be suitably cut back and rounded off for easy application of water proofing treatment and easy flow of water. The provision of fillets shall be deemed to cover the item of water proofing and shall not be measured or paid for separately.

20.1.3 For carrying over and tucking in the water proofing felts into parapet wall etc. a horizontal groove 65 mm deep and 75 mm wide section with its lower edge not less than 150 mm above the graded roof surface shall be left on the inner face of the same during construction if possible. When such groove has not been left, the same shall be cut out neatly. The base and rear of the groove shall be finished smooth with cement mortar 1:4 (1cement: 4 coarse sand). Such cutting of groove and its finishing smooth shall be deemed to be part of the water proofing item and shall not be measured or paid separately. No deduction shall be made either, for making the groove when the later has already been left in masonry.

20.1.4 Tucking in of the water proofing felt will be required where parapet wall exceed 45 cm in height from graded surface. Where the height is 45 cm or less, no groove will be required as the water proofing treatment will be carried over the top of the parapet wall to its full thickness. Such treatment shall not be measured or paid for separately.

20.1.5 The graded surface of the roof and concrete fillets and face of walls etc. shall be thoroughly cleaned with wire brushes & all loose scale etc. removed. The cracked surface shall be cut to `V' Section, cleaned and filled up flush with cement mortar slurry 1:4 (1 cement : 4 coarse sand). Such cleaning of the surface or treating the crack shall not be paid for separately.

20.1.6 After grouting the crack, if any, with Cement grout the primer shall be brushed over the cleaned and dried surface before the bonding material is applied. The primer conforming to IS: 3384-1986 shall be applied at minimum rate of 0.30 litre/sqm (first layer).

20.1.7 The second layer shall consist of straight run bitumen conforming to IS: 73-1961 @ 0.70 Kg/sqm applied hot (not less than 50 deg. c) as per IS: 7290-1979. The fourth layer shall consist of cold cut back bitumen @ 1 kg/sqm over felt film as per IS:7290. The fifth and final course shall consist of coarse sand @ 0.75 Kg/sqm over bitumen and subsequent preparation of the surface.

20.1.8 The self finished synthetic felts to be used shall conform to IS 7941 of 1976. It shall have 3 layers of LDPE/HDPE and 1 layer of 2 mm foam insulation. It shall be waterproof, acid resistant and fire resistant.

20.1.9 The felt film forming the 3rd course shall be cut to the required length, brushed clean of dust materials and laid out flat to eliminate cut, and subsequent stitching. The felt shall not be laid in single piece of very long length as they are likely to shrink. Length of 6 to 8 metres is suitable. Each strip shall have overlap of 7.5 cm, with the adjacent strip duly bonded with cold cut back adhesive @ 0.35 kg/sqm. All the overlaps shall be levelled and pressed down to level the unevenness. The felt shall be carried over up to the adjacent parapet wall as per clause 24.1.4 anchored thereto with cement grout by inserting the felt in the groove on the wall. Chase cutting on the wall for making grooves and anchoring grout shall be done by the Contractor without any extra cost to the Principal HansRaj College .

20.1.10 Payment will be made on square metre basis of the area of roof surface covered by the water proofing felt. No extra measurement shall be made for laps, joints, anchoring in grooves, carrying over parapet etc.

21.0.0 CI RAIN WATER PIPE AND FITTINGS:

21.1.0 Pipes and fittings shall be of approved manufacture. Pipe shall be true to shape, have smooth and

cylindrical inner and outer surfaces and be as nearly as practicable, concentric. These shall be of sound and uniform casting, free from laps, pin holes or other imperfections and shall be neatly finished and carefully fitted with both inside and outside. The pipes shall be factory painted with a coat of tar both inside and outside (applicable for CI pipes).

21.1.1 Pipes shall be secured to wall at all joints with MS holder bats and clamps. The clamps shall be made from 1.6 mm thick MS flat 30 mm width, bent to the required shape so as to fit tight on the socket of the pipe. The clamps shall be fixed to the wall by clamping/embedding their hooks in steelworks/cement. Concrete blocks 10 x 12 x 10 cm of mix 1:2:4 (1 cement: 2 coarse sand : 4 stone aggregate 10 mm nominal size) for which the necessary holes shall be made in proper places. The annular space between spigot and socket of the pipe shall be filled with five turns of spun yarn soaked in cement slurry and then filled with cement mortar 1:2 (1 cement : 2 fine sand and finished flush).

21.1.2 Payment will be made on running metre basis inclusive of all material, jointing, fitting and fixing in position, including bends, shoes and other specials.

22.0.0 A.C. RAIN WATER PIPES:

22.1.0 Specification for C.I. rain water pipes shall in general apply except the pipe material.

23.0.0 FINISHING:

23.1.0 ***Plastering:***

23.1.1 Unless otherwise specified, brick surface is to be plastered with cement mortar (1:6), 15 mm thickness using medium coarse sand. Concrete surface and ceiling etc. shall be plastered with cement mortar (1:4), 6 mm thick using medium coarse sand. Before plastering work is started all joints shall be raked out and loose mortar shall be brushed out. For plaster over cement concrete surface, the surface shall be thoroughly chipped. The surface shall then be thoroughly washed with water, cleaned and kept wet before commencement of wall plasters.

23.1.2 Curing for plastered surface shall be started 24 hours after finishing the plaster and shall be kept wet for a period of 7 days.

23.1.3 Payment for plastering shall be made on square metre basis. Deduction shall not be made for opening less than 0.5 Sq.M area and no payment shall be made for jambs, sills etc. For opening 0.5 Sq.M to 3.0 Sq.M each deduction shall be made for 50% of the opening size and no payment shall be made for jambs and sills. For opening of area more than 3 Sq.M, deduction shall be made for jambs and sills. For opening of area more than 3 Sq.M, deduction shall be made for the full area but jamb, sill etc. shall be measured and paid. All measurement shall be made for each face. The rate of plastering shall be inclusive of all cost of scaffolding, labour, material etc. complete.

23.2.0 ***Neat Cement Punning:***

23.2.1 Punning when specified shall be done as soon as the plastered surface or concrete surface has hardened a little and shall not be delayed too long after the same. Required quantity of cement and water shall be thoroughly mixed together into a paste of thick consistency. The cement paste shall be applied uniformly to a thickness of 1.5 mm to 2 mm over the surface with small steel trowel and polished well, to smooth shining finish. Neat cement punning wherever possible shall be done in one operation to eliminate joint marks. The surface shall be cured continuously for at least 7 days with wet gunny bags or any other method as approved by the Site Engineer shall be used.

23.2.2 Payment shall be made on square metre basis of finished surface.

23.3.0 ***Rough Cast Plastering:***

23.3.1 Rough Cast Plastering shall consist of two layers, under layer 12 mm thick cement plaster 1:4 (1cement : 4 coarse sand) and a top layer of 10 mm thick cement plaster 1:3 (1 cement : 3 fine sand) mixed with 10% finally grounded hydrated lime by volume of cement. Preparation of surface shall be as described in clause 28.1.1 top layer shall be applied a day to two after the under layer has taken

initial set. The later shall not be allowed to dry out, before the top coat is laid on. The mortar shall be sufficiently plastic so that the mix of sand and gravel gets well pitched into the plastered surface. In order to make the plaster base plastic, about 10% of finally grounded hydrated lime by volume of cement shall be added to mortar to ensure even thickness and a true surface, plaster about 15 cm x 15 cm shall be first applied horizontally and vertically, at not more than 2.0 metres intervals.

23.3.2 Rough Cast Finish:
Rough cast mixture shall consist of sand and gravel or crushed stone from 6 mm to 12.5 mm nominal size. The mix shall be wetted and shall be dashed on the plaster base in plastic state by hand scoop so that the mix gets well pitched into the plaster base. The mix shall again be dashed over the vacant spaces, if any so that the finished surface represents a homogeneous surface of sand mixed with gravel. Initially a sample of rough cast shall be got approved by the Engineer-in-Charge.

23.3.3 Curing shall be done as described in clause 28.1.2 herein before.

23.3.4 Payment will be done on square metre basis, as laid down in clause 28.1.3 herein before.

23.4.0 **Stone Grit Finish Plaster:**

23.4.1 Stone grit plaster shall be provided on all the external surfaces as indicated in the drawings and directed. This finish on external surfaces shall be done in two coats as under:

23.4.2 This surfaces shall be prepared by raking out all the joints in accordance with good workmanship as described in plastering. All scaffoldings, centring and shuttering as the case may be, shall be erected. This scaffolding shall be sound, durable and erected tightly, adequately secured for workmen's movement.

23.4.3 The surface to be plastered with it shall be well moist and cured before application of base coat and completely ready for work.

23.4.4 After wetting and cleaning the base coat/ backing coat 12 mm thick of cement plaster 1:4 (1 part of cement to four parts coarse sand) shall be applied uniformly, levelled and made rough with wire brush to form key/ good bond for the succeeding coat.

23.4.5 After the preceding coat has hardened after curing adequately the succeeding coat of 15 mm thickness in cement and marble powder mix 4:1 {4 cement (50% grey cement & 50% white cement) : 1 marble powder} by weight in proportion of 4:7 (4 cement marble powder mix : 7 white marble chips 6 mm to 10 mm size) by volume with grooves all round laid in panels uniformly and gently. The excess mortar from the top surface for aggregates by washing with water and brushes shall be removed after sufficient internal without causing any harm to grit finish.

23.4.6 Sufficient cement slurry as required but not less than 2 kg. per square meter prior to application of base coat/ backing coat and tops finishing coat of grit shall be applied respectively.

23.4.7 The grit finish shall be done in panels of design and pattern as indicated in the drawing and or as directed by Engineer-in-Charge. The grooves shall be formed by fixing the wooden strips of required size and shape prior to laying the grit and by fixing the strips on base coat with directed by the Site Engineer.

23.4.8 The white marble chips required for the purpose shall be truly angular faces, nicely crushed, strong and durable and 6 to 10 mm size.

23.4.9 The grit finish shall be nicely cured but not less than seven days by keeping constantly wet. Curing shall commence after 24 hours of its laying.

23.4.10 The wooden strips shall be removed after the grit finish has hardened considerably. White

removing the strips the care shall be taken that the edges of panels are not broken. If the edges are broken and/or are not truly right angular or as directed by Engineer-in-Charge work shall be redone at the Contractor's expense.

23.4.11 The grit finish when completed in full shall be washed again by rubbing with wire brushed by using "IMLI" water dilute acid to satisfaction of Site Engineer.

23.4.12 Any patch work or any undulation or any work not conforming to requirements shall render the work rejected and shall redone at Contractor's expense.

23.4.13 The application of such work shall include all heights/ depths, upon RCC or Brick masonry surfaces and any difficult portions or access arising out of the Architectural plans and designs.

23.4.14 The cost of work shall be deemed to be included all such operations as described above or as may be necessary to complete the work in full and final satisfaction of Site Engineer/ Engineer-in-Charge.

23.4.15 Payment will be done on square metre basis, as laid down in clause 28.1.3 herein before.

23.4.16 Curing:
After the completion of plaster work, it shall be cured by adequate watering for a period of seven (7) days.

23.5.0 ***Plastering at Junction of Masonary/ RCC:***
All junction of masonry wall with R.C.C structures e.g. column, beam etc. shall be plastered after providing and fixing of approved G.I. Chicken Wire Mesh 250 mm vide centrally over the length of junction either vertically or horizontally to the satisfaction of Engineer-in-Charge. G.I. Chicken Wire Mesh of required width shall also be fixed over the chasing for conduits. Pipes etc. shall be embedded on masonry wall before plastering is commenced.

24.0.0 INTEGRAL WATER PROOFING COMPOUND:
Water proofing compound shall, in general, conform to IS: 2645, approved brand like `CICO', `PIDDIPROOF, ACCOPROOF' or equivalent shall be used. Waterproofing compound shall be procured in sealed/packed condition. Approval of the Engineer-in-Charge or his authorised representative shall be obtained prior to using the same in works. Proportion and manner of mixing the water proofing compound with cement shall be as per manufacturer's specification and instructions.

Water proofing compound shall normally be used in damp proof course and plastering works wherever mentioned in drawings. However, contractor may be ordered to use water proofing compound in plain or reinforced cement concrete works, flooring works etc. by the Engineer-in-Charge. Usage of water proofing compound shall be paid for as a separate item of work under relevant item of work in the `Schedule of Rates', payment shall be made on weight basis of water proofing compound used.

25.0.0 WHITE WASHING/COLOUR WASHING:

25.1.0 Before wash, the surfaces shall be thoroughly brushed free from mortar dropping and foreign matters.

25.1.1 The wash shall be prepared from fresh stone shale lime. The lime shall be thoroughly soaked and screened through a clean coarse cloth and admixed with gum and indigo. 3 gm. of indigo and 20 gm. of gum per kg of lime shall be used approximately; one kg of lime will produce 5 litres of white milky
solution. The solution shall be got approved by the Site Engineer before application. Number of coats shall be as specified in the Schedule of Rates and each coat shall be allowed to dry before next one is applied. For colour washing, pigment as per manufacturer's specification is required.

Mode of measurement and payment shall be same as for plastering as mentioned in clause no. 24.1.3.

25.1.2 ***Dry Distemper:***

25.1.3 Dry distemper of approved brand and manufacture shall be used. The shade shall be got approved by the Engineer-in-Charge before application of the distemper. The dry distemper shall be stirred slowly in clean water using 0.6 litre of water per kg of distemper or as specified by the manufacturer. Warm water shall preferably be used. It shall be allowed to stand at least 30 minutes and the mixture shall then be well stirred before use. The finished surface shall be even and uniform and shall show no brush marks. Mode of payment and measurement shall be same as for plastering as mentioned in clause no. 24.1.3.

25.2.0 ***Water Proof Cement Paint:***

25.2.1 The water proof cement paint shall be "Snowcem" or equivalent of approved brand and manufacture. The same and the colour of the paint shall be got approved by the Site Engineer before application.

25.2.2 The surface to be coated with water proof cement paint shall be thoroughly cleaned of all dust and falling mortar by washing and scrubbing. The surface shall be thoroughly wetted with clean water before the water proof cement paint is applied. Water proof cement paint shall be mixed in such quantity as can be used up within a hour of its mixing. Curing shall be done as per manufacturer's specifications.

25.2.3 Mode of measurement and payment shall be same as for plastering as mentioned in clause 28.1.3.

25.3.0 ***Oil Bound Distemper:***

25.3.1 Materials:
Oil bound washable distemper of approved shade; brand and manufacture shall be used. The primer shall be of the same manufacture as oil bound distemper. The distemper and primer shall be procured by the contractor in sealed tin in sufficient quantities at a time to suffice for a fortnight's work and the same shall be kept in the joint custody of the contractor and the Site Engineer. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Site Engineer.

25.3.2 Preparation of Surface:
The surface shall be thoroughly cleaned of dust, old white or colour wash if any by washing and scrubbing and then be allowed to dry for at least 48 hours. It shall then be sand-prepared to remove any unevenness. Depressions if any shall be made up with plaster of paris putty.

25.3.3 Application:
The primer coat shall be applied first horizontally and then vertically immediately afterwards. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound distemper is applied. The surface thus prepared shall be lightly sand papered to make it smooth for receiving distemper, taking care not to rub out the primer coat. One coat of distemper properly diluted with thinner (as stipulated by manufacturer) shall be applied with brush in horizontal strokes followed immediately by vertical ones which together constitute one coat. The subsequent coat shall be applied in the same way, so as to obtain an even shade. A time interval of at least 24 hours shall be allowed between consecutive coats to permit proper drying of the preceding coat.

25.3.4 Mode of measurement and payment shall be same as for plastering mentioned in clause no. 28.1.3.

26.0.0 PAINTING:

27.1.0 Paints, oil etc. of approved brand and manufactures as approved by the Site Engineer shall be used. Paints manufactured by M/s. Johnson & Nicholson, Asian Paints, British Paints, ICI, Nerolac, Bombay paints Ltd., and Shalimar shall only be approved. Primer and thinner used shall also be of same manufacture and brand. Ready mixed paints as received from the manufacturer without any admixture shall be used as per manufacturer's instructions. If for any reason thinning is necessary (in case of ready mixed paint) the brand of thinner recommended by the manufacturer or as instructed by the Site Engineer shall be used.

27.1.1 The surface shall be thoroughly cleaned and dusted. All the rust, dirt, scales, smokes and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Site Engineer after inspection, before painting is commenced.

27.1.2 The wood work to be painted shall be dry and free from moisture. The unevenness shall be rubbed down with smooth sand paper and shall be well dusted. Knots, if any, shall be covered with preparation of red lead made by grinding lead in water and mixing with strong glue, sized and used hot.

27.1.3 Payment shall be made on square metre basis for the area painted.

28.0.0 SANITARY WORKS:

28.1.0 European type water closet:

28.1.1 Water closet shall be of white vitreous china clay and shall be of wash down type conforming to IS:2556 Part VIII and all as described in the Schedule of Rates. The closet shall be of one piece construction and have integral flushing rim of suitable type. Each water closet shall have four holes with its pedestal for fixing to the floor. The water closet shall have an integral S or P trap outlet with at least 50 mm water-seal. The closet shall be provided with 15 litres white vitreous china clay low level flushing cistern with all fittings, MS or C.I. brackets and 40 mm dia flush bend pipe. The closet shall be provided with black plastic seat and lid.

28.1.2 The water closet shall be fixed to the floor by means of 75 mm long 6.5 mm diameter counter sunk bolts and nuts embedded in the floor concrete. The cisterns shall be fixed on C.I. cantilever brackets which shall be firmly embedded in the wall in cement mortar 1:4 (1cement: 4 fine sand). The cistern shall be connected to the closet by means of 40 mm diameter white porcelain enamelled flush bend with rubber inlet connection.

28.1.3 Rate shall include cost of all materials, labour involved in all the operations specified above including fixing, cutting of wall and floor and making good the same.

28.2.0 ***Indian Type Water Closet***:

28.2.1 Water closet shall be of white vitreous china clay. Each pan shall have an integral flushing rim of suitable type. It shall also have an inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of self draining type. The pan shall be fitted with 100 mm S.C.I. trap `P' or `S' type with approximate 50 mm water seal. White glazed foot rest and a high level C.I. flushing cistern of 15 litre capacities with all fixtures.

28.2.2 The pan shall be sunk into the floor and embedded in a cushion of average 15 cm cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded brick ballast 40 mm nominal size). The concrete shall be left 115 m below the top level of the pan so as to allow for flooring and its bed concrete. The joint between the pan and trap shall be made leak proof with cement mortar 1:1 (1cement: 1 fine sand). Fixing of flushing cistern shall be as per clause 32.1.2. The flush pipe shall be of galvanised steel tube of 32 mm nominal internal diameter. The flush pipe from cistern shall be connected to pan by means of cement or putty joint. Cistern bracket flush-pipe and over-flow pipe shall be painted with two or more coats of white zinc paint. Foot rest of size not less than 25 x 13 x 3 cm of white glazed earthenware shall be set in cement mortar 1:3 (1 cement : 3 coarse sand). The position of the foot rest with the pan shall be as per the direction of the Engineer in Charge.

28.2.3 Rate shall include cost of all material, labour involved in all the operation mentioned herein above. No extra payment shall be made for painting, fixing, cutting or making good of the wall and floor.

28.3.0 ***Urinals:***

28.3.1 Urinals shall be of white vitreous china clay flat back type conforming to IS: 2556 Part-VI. Urinal shall be of one piece construction with integral flushing rim. These shall be mounted on walls. The flushing inlet pipe connection piece shall be of PVC 15 mm dia with brass union and CP. stop cock for cistern, 25 mm dia CP. distribution pipe and waste pipe shall be 750 mm long 32 mm dia. G.I. pipe with necessary brass union and CP. brass screws shall be used for fixing the urinals. Fixing shall ensure that no liquid is left over in the pan after flushing. Urinals shall be connected to automatic flushing cistern either individually or in groups. For a set of three urinals one automatic flushing cistern of 15 litre capacity shall be provided.

28.3.2 The flushing cistern shall be of C.I. conforming to IS: 2326 and fixed in the same manner as stated in clause no. 32.1.2.

28.3.3 Rate shall include cost of all material and labour involved in all the operations mentioned above.

28.4.0 ***SINKS:***

28.4.1 The sinks shall be of white vitreous china clay conforming to IS: 2556 part V and shall be of the following size: 600x450 mm x 250 mm. They shall be one piece construction including a combined overflow. The floor of the sink shall gently slope towards the outlet. The outlet in all cases be suitable for waste fittings having flanges of 88 mm diameter and the waste hole shall have a minimum diameter of 65 mm at the bottom to suit the waste fittings. Each sink shall be provided with a non-ferrous 50 mm dia waste fitting. The sink shall have over flow of the weir type and the inverts shall be 30 mm below the top edge.

28.4.2 Each sink shall be provided with a waste plug, of suitable chain and stay plug chains shall be of brass wire of 1.800 mm with brazed over links approximately 13 mm in length and shall be chromium plated. It shall have an overall length from the collar to the stay of not less than 30 mm. There shall be triangular or D-shackle at each end, one of which shall be Abrazed to the plug and the other securely fixed to the stay. The 50 mm long shank of the waste shall be threaded to the full length to the under side of flange in each case. The waste fittings and plug fittings shall be chromium plated. The chromium plating shall be of grade B conforming to IS: 1068.

28.4.3 Sink shall be fitted on C.I. or M.S. brackets (conforming to IS:775) and the Brackets shall be painted white one coat of anti-corrosive priming, the sink shall be fixed at 800 mm above finished floor level or as directed by the Site Engineer.

28.4.4 Rate shall include cost of all materials and labour involved in all the operations mentioned above.

28.5.0 ***WASH BASINS:***

28.5.1 Wash basins shall be of white vitreous china clay flat back type conforming to IS: 2556 Part IV. Wash basin shall be of one piece construction including a combined over flow. This shall be fitted on C.I. or M.S. brackets (conforming to IS: 775). The wall side shall be fixed well flushed with the plaster of wall and the joint, if any, shall be properly finished with mortar and painted white. The basin shall be provided with two C.P. brass pillar cocks, 32 mm dia. C.P. brass waste trap, C.P. brass chain, rubber stopper and 32 mm dia. C.P. brass waste pipe. The basin shall be fixed at 800 mm above finished floor level or as directed by the Site Engineer.

28.5.2 Rate shall include cost of all materials and labour involved in all the operations mentioned above.

28.6.0 BEVELLED EDGE MIRROR:

28.6.1 The bevelled edge mirror shall be of best quality of `Hindustan Pilkington' or equivalent make approved by Engineer-in-Charge. The size of the mirror shall be 600 x 450 mm and of thickness 6 mm. Mirror shall be provided with a backing of asbestos sheet of 6 mm thickness and fixed to wooden cleat with 4 C.P. brass screws.

28.6.2 Payment shall be made on number of mirrors fixed.

29.0.0 BRICK MASONRY CHAMBERS FOR DRAINAGE:

29.1.0 Brick masonry chambers shall be constructed as per drawing true to dimensions. The chambers shall be 600 x 600 mm in size and of average 750 mm in depth. The brick work shall be with second class brick in cement mortar 1:5 (1cement: 5 fine sand). Bed concrete shall be 100 mm thick cement concrete 1:4:8 (1cement: 4 coarse sand: 8 grade stone aggregate). Brick work shall be plastered inside with cement mortar 1:3 (1cement: 3 fine sand) finished with a floating coat of neat cement. Benching shall be done with Cement concrete 1:2:4 (1cement: 2 fine sand: 4 graded stone aggregate 20 mm down) finished smooth with neat cement. The Chamber shall be covered with 100 mm thick slab in 1:2:4reinforced Concrete fitted with 540 mm diameter CI light duty cover. Cover shall be made free from casting & other defects. All sharp edges shall be removed and finished smooth. It shall be coated with 2 coats of anti-corrosive paints.

29.1.1 Payment shall be made on number of brick masonry chamber provided.

30.0.0 STONE WARE PIPES:

30.1.0 The stoneware pipe shall be with spigot and socket type conforming to grade A, IS 651-1965 thoroughly burnt, with uniform thickness throughout, of a close and even texture, free from air blocks, fire bristles, cracks and other imperfections and the surfaces both internal and external shall be smooth. Stone pipes with cracked socket or with cracks anywhere in the body shall be rejected. Minimum thickness of 100 mm dia pipe shall be 12 mm and weight 15 kg/metre. For 150 mm dia pipe minimum thickness shall be 18 mm and weight 24 kg/metre.

30.1.2 The excavation of the trenches for pipe sewer shall be to the exact alignment and grade as per drawing or as directed by the Site Engineer and up to an average depth of 1.0 M as required. All pipes shall be laid on a bed concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) and 100 mm thick.

30.1.3 Pipes shall be laid carefully in line and grade required. The pipe joints shall be fitted with tarred gasket in each joint and sufficiently long to surround entirely the spigot end of the pipe, the gasket to be driven as far as possible, in the joint by means of a suitable instrument. After that C.M. 1:1 is to be forced on top of it until the whole space around the spigot between it and the socket is full, the cement being splayed off to form a neat fillet around the pipe and all the joints shall be cured sufficiently to the entire satisfaction of the Site Engineer. The width of the bed concrete shall be 50 cm and shall be provided with side haunch finished tangential to the pipe. Then the lines shall be tested for any leakage through the joints by closing the end.

30.1.4 Rate includes breaking and making good the manholes for connecting, bed concrete, excavation, refilling the trenches and testing of water tightness and disposing of the surplus earth etc as directed.

30.1.5 Measurement and payment shall be made on running metre basis of pipe laid.

31.0.0 STONE WARE GULLY TRAP:

31.1.0 Gully trap shall conform to IS: 651-1965. These shall be sound, free from visible defects such as fire cracks or hair cracks. The glaze of the trap shall be free from crazing. They shall give a sharp clear ringing sound when struck with light hammer. There shall be no broken blister. Each gully trap shall have one C.I. grating of square size corresponding to the dimensions of inlet of gully trap. It will

also have water tight. C.I. covers with inside frame dimensions of 300 x 300 mm, the cover weighing not less than 4.52 kg and the frame not less than 2.72 kg. The grating, cover and frame shall be sound and of good casting and shall have truly square machined seating faces.

31.2.0 Each gully trap shall be fixed on cement concrete foundation of 68 cm. Square, inside the excavated pit done true to level as per drawing or as directed by Site Engineer. The mix of the concrete will be 1:4:8 (1cement: 4 fine sand: 8 Graded stone aggregate 40 mm nominal size). Joining of gully outlet to the branch drain shall be done as per clause 34.1.3 stated herein before.

31.3.0 After fixing and testing gully and branch drain, a brick masonry chamber 300 x 300 mm (inside) in brick work in cement mortar 1:4 (1 cement : 4 fine sand) shall be built with a 10 cm brick and round the gully trap from the bed of concrete up to ground level. The space between chamber wall and trap shall be filled in with cement concrete 1:4:8 (1cement: 4 fine sand: 8 graded stone aggregate 40 mm nominal size). The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with Cement mortar 1:3 (1cement: 3 coarse sand) finishing with a floating coat of neat cement.

31.4.0 The rate shall include cost of all material and labour involved in all the operations described above. Payment shall be made on number basis.

32.0.0 TOILET PAPER HOLDER:

32.1.0 The toilet paper holder shall be of C.P. Brass of size 150 mm x 150 mm fixed with C.P. brass, screws over the wooden cleat. Chromium plating shall be of Grade B type conforming to IS: 1068 (latest edition). The payment shall be made on per number basis. The rate is inclusive of providing and fixing of toilet paper holder with screws, and making good the wall complete with all labour and material.

33.0.0 MARBLE PARTITION BETWEEN URINALS:

33.1.0 The marble partition in between the two urinals shall be 25 mm thick; table rubbed and polished with round edges, light ash, pink on grey in colour. The partitions shall be pushed inside the wall up to 100 mm depth, and shall be fixed in C.M. 1:3 (1 cement : 3 fine sand) and M.S. bracket channel 2 Nos. embedded into the walls, as per drawing and directions. The payment shall be made on square metre basis of exposed portions only. The rate shall be inclusive of cost of all labour, material etc. involved for satisfactory completion of the above mentioned operations, and as per drawings and direction.

34.0.0 TOWEL RAIL:

34.1.0 The towel rail shall be of chromium plated and shall be of 20 mm dia. and up to 600 mm length. Aluminium brackets shall be fixed on both the sides. The rod shall be fixed with screws and wooden batten on the walls as directed. The mode of measurement shall be on number basis.

35.0.0 SEPTIC TANKS:

35.1.0 Specifications relating to earth work in excavation and filling, plain and reinforced concrete, brick work, plastering etc. shall be as per the specification mentioned under different clauses. Septic tanks shall be constructed as per IS: 2470 and detailed drawings true to dimension. Payment will be made on number of tanks completed on lump-sum basis inclusive of all works, fittings, fixtures etc. as shown in the drawing.

36.0.0 SOAK PIT:

36.1.0 Soak pit shall be constructed as per the drawing. The earthwork in excavation shall be carried out to the exact dimensions as shown in the drawings. In the soak pit a honey comb dry brick shaft 45 x 45 cm and 292.5 cm high shall be constructed. Round the shaft within the radius of 60 cm shall be placed well burnt brick bats. Brick ballast of size from 50 mm to 80 mm nominal size shall be used.

The construction of shaft and filling of the bats and ballast shall progress simultaneously. Over the filling shall be placed single matting, which shall be covered with minimum layer of 7.5 cm earth. The shaft shall be covered with 7.5 cm. thick R.C.C. slab, and 22.5 cm wide and 12.5 cm deep brick edging with brick shall be provided as per drawing. The soak pit shall be connected with the septic tank by 100 mm dia SW pipe. Relevant specifications for earthwork in excavation, filling, plain and reinforced concrete, brick work, plastering etc. shall be followed as mentioned herein before. However, the rate shall be inclusive of all the above operations.

36.2.0 Payment shall be made on the basis of number of Soak Pit provided.

37.0.0 WATER SUPPLY WORKS:

37.1.0 ***Bib and Stop Cocks:***

37.1.1 Bib cocks and stop cocks of screw down type shall conform to IS: 781. All taps shall be of heavy grade and chromium plated brass. Chromium plating conform to the best quality as per IS: 1068 (latest edition).

37.1.2 Payment shall be made on number of each items fixed.

37.2.0 ***G.I. PIPE & FITTINGS:***

37.2.1 All G.I. Pipes and fittings shall conform to IS:1239 and shall be of medium grade (Class - B) for water supply services. All screwed tubes and sockets shall have pipe thread in accordance with the requirement specified in IS: 554.

37.2.2 All fittings shall be of malleable galvanised iron approved by the Engineer-in-Charge. Fittings in G.I. line shall include all couplings, elbows, tees, bends, union, nipples, reducers, rubber insertion etc.

No extra payment shall be made for these fittings. Payment shall be made on running metre basis. All pipes above ground shall be fixed with G.I. holder bat clamps clear off the wall at 1 to 2 metres centre to centre as directed. All visible pipes and clamps inside and outside the building shall be painted with two coats of white paints or aluminium paint as directed by the Site Engineer. No extra payment shall be made for clamps, hooks, cutting holes in walls, chasing and making good the same with 1:3 cement mortar (1 cement : 3 coarse sand) and for painting. All couplings, elbows, tees, bends, union, nipples, reducers etc. shall also be deemed to be included and covered by the rates for running metres of G.I. pipes.

37.2.3 All underground pipes shall be laid in trenches of 60 cm depth and 30 cm width with an all round sand cushion of 10 cm. Before laying, the pipes shall be painted with two coats of anti-corrosive bitumastic paint of approved quality. The excess earth after filling the trenches shall be disposed off as directed by Site Engineer.

37.2.4 After laying and jointing, the pipes and fittings shall be inspected under working conditions of pressure and flow. Any joint found leaking shall be redone and all leaking pipes shall be replaced at no extra cost. The pipes and fittings after laying shall be tested under a gradually applied test hydraulic pressure of 6 kg/sq.cm. The pipe and joints shall be capable of maintaining the above pressure for at least half an hour without any indication of fall of pressure. All expenses in carrying out the test shall be borne by the Contractor.

37.2.5 Measurement shall be made in running metre of the finished job as described above. Rate shall include the cost of materials and labour involved in painting, excavation, sand cushion and refilling of trenches.

37.3.0 ***GUN METAL WHEEL VALVE:***

37.3.1 The wheel valves shall be of heavy pattern and of best approved quality and shall conform to IS:

778 and tested at a pressure of 17.5 kg/sq.cm.

37.3.2 The rate shall be per number basis; the rate shall include supplying and fixing valve in position as per drawing or direction of Site Engineer.

37.4.0 ***C.I. SLUICE VALVE:***

37.4.1 The Sluice valve shall be class-I, and inside non-raising screw type double flanged with hand wheel. These shall comply in all respect with Indian Standard specification IS: 780 (1963). The body, domes, covers, wedge gate and stuffing box shall be of good quality cast iron. The bodies, spindles and other parts shall be truly machined with surfaces smoothly finished. The area of the water way of the fittings shall be not less than the area equal to the nominal bore of the pipe. The valve shall be marked with an arrow to show the direction of turn for closing of the valve. The valve shall be fully examined and cleaned off all foreign matter before being fixed. The fixing of the valve shall be done by means of bolts, nuts and 3 mm rubber insertions or chemically treated compressed fibre board 1.5 mm thickness and weight not less than 0.183 gm/sq.cm with the flanges of spigot and the socket tail pieces drilled to the same specification. The tail pieces shall be conform to IS: 1938. These shall be jointed to the pipe line by means of lead caulked joints.

37.4.2 Payment for this item shall be made on number basis. The rate shall include cost of all materials, labour, equipment, transportation etc. involved for the satisfactory installation of valves with tail pieces, in the pipelines with accessories. Only valve chamber shall be paid separately.

37.5.0 ***BRASS FERRULES:***

37.5.1 The ferrules for connections with C.I. main shall generally conform to IS: 2692. It shall be of non-ferrous materials with C.I. Bell mouth cover and shall be of nominal bore as specified. The ferrule shall be fitted with screw and plug with valve capable of completely shutting off the water supply to the communication pipe if and when required.

37.5.2 For fixing ferrule, the empty main is drilled and tapped at 45 degree to the vertical and ferrule screwed in. The ferrule must be so fitted that no portion of the projection of the shank shall be left projecting within the main into which it is fitted. Payment shall be made per number of ferrule supplied and fixed. The rate shall include necessary excavation, back filling, drilling, tapping, making
connections with the G.I. Pipe, including supply of ferrule, tools, testing etc. complete in all respect.

37.6.0 ***PROVIDING AND LAYING CAST IRON PIPE CLASS LA:***

37.6.1 Centrifugally cast C.I. spun pipes shall conform to IS: 1536-1960 and specials shall conform to IS: 1538-1960. The pipes shall be spigot and socket end type class LA and withstand hydraulic test pressure 20 kg/sq.cm. Pipes and specials should be sound with smooth inner and outer surface, and shall ring clearly when struck with light hammer; the end of the pipes and specials shall be reasonably square to their axis. All pipes and special shall be painted with two coats of anticorrosive paint before laying.

37.6.2 The spigot end of the pipe shall be inserted in the socket and right up to the back. Spun yarn shall be of clean hemp and of good quality. Spun yarn twisted in rope of uniform thickness and soaked in hot coal tar, shall be inserted carefully into the socket in two or three laps. Lead conforming to IS: 782-1962 in molten state shall then be poured into the joint filling same in one pouring. The lead shall be then caulked in by proper tools to make it even all-round. Quantity of lead used for various sizes of pipes shall be as mentioned below:

Pipe size per	Quantity of lead in Kg. per joint.
100 mm dia	2.72

80 mm dia 2.00

37.6.3 The pipe shall be laid on an average depth of 1.0 m below ground level as shown in drawing or as instructed by Site Engineer. Earthwork in excavation and back filling shall be done in the manner as specified in the relevant item, covering earthwork in excavation and back-filling. Tees, bends, reducers, end caps etc. shall be provided in the pipeline as per the drawing or as directed by the Site Engineer.

37.6.4 Cement concrete thrust blocks of suitable design as approved by the Engineer-in-Charge shall be provided at 45^0 and 90^0 bends of the pipes.

37.6.5 After jointing the pipes, the whole line shall be tested at a pressure of 10 kg/sqm for 24 hours, without pressure drop. The line shall be disinfected with a liquid chlorine solution; hypochlorite of lime (bleaching powder) may be used. The dose should not be less than 50 ppm of available chlorine and time of contact shall not be less than 8-12 hours as residual of not less than 5 ppm shall be produced in all parts of line. The pipe line shall be thoroughly flushed with clean water afterward. Payment shall be made on running metre basis for the actual length of the pipe laid including specials. The rate shall be inclusive of cost of all labour, materials, equipment, transportation, earthwork in excavation and backfilling etc. necessary for laying and jointing pipes and specials, concrete thrust block, hydraulically testing and disinfecting the line as per direction and satisfaction of the Site Engineer.

37.6.6 ***BRICK MASONRY CHAMBER FOR VALVES:***

37.6.7 Specification of brick masonry chamber under sanitary work shall apply except that there shall be no benching and channel making.

37.6.8 Payment shall be made on number of chambers completed.

38.0.0 CEMENT CONCRETE HUME PIPES:

38.1.0 The pipes shall be with reinforcement conforming to IS: 458-1961 and class NP-2. The pipes shall be centrifugally cast, true to shape, straight, perfectly sound and free from cracks and flaws. The external and internal surfaces of the pipe shall be smooth and hard. Wall thickness of the pipes shall be 25mm, 30mm & 35mm for 250mm, 300mm & 450mm diameter pipes respectively & pipe (class NP-3) shall be 100mm for 1000mm diameter.

38.2.0 The pipes shall be laid across the road, pathways and similar locations for drainage purposes as per the drawing and instructions of the Site Engineer. Two adjoining pipes shall be butted against each other and adjusted in correct position. The collar shall be slipped over the joint, covering both pipes equally. The annular space shall be filled with a stiff mixture of cement mortar 1:2 (1cement: 2Fine sand).

38.3.0 Earthwork in excavation & back filling shall be done in manner as specified under relevant item covering earth work in excavation & back filling. No separate payment shall be made for excavation & backfilling.

38.4.0 Payment shall be made on running metre basis for the actual length of pipe laid. The rate shall be inclusive of laying & joining of pipe at all depths etc. complete inclusive of cost of all labour, material, earth work excavation, testing, material, equipment etc.

39.0.0 PLINTH PROTECTION:

39.1.0 Plinth protection shall be provided around building in width as shown in drawing. The treatment comprises of 5 cm thick cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone

aggregate 20 mm nominal size) over 7.5 cm bed of dry brick aggregate 40 mm nominal size grouted with fine sand. Plinth protection shall be laid with a minimum outward slope of 1 in 30.

39.1.1 The ground shall first be prepared to the required slope around the building including cutting, filling if necessary. Bed shall be watered and rammed with heavy iron square rammers. Surplus earth, if any, obtained shall be disposed off within a lead of 50 metres or as directed by Site Engineer.

39.1.2 Brick aggregate shall be spread evenly over the prepared surface to 7.5 cm depth and given a minimum outward slope 1:30. Aggregate shall be carefully laid and packed, bigger size being placed at the bottom. The brick aggregates shall be consolidated with heavy iron rammers. After consolidation, the surface shall be grouted evenly with fine sand and slightly sprinkled with water and again rammed with heavy iron rammers. The finished surface shall be given uniform appearance.

39.1.3 After the sub-grade has been compacted 5 cm thick, cement concrete 1:3:6 shall be laid in alternate panels. The panels shall be of uniform size, not exceeding 2.5 m in length. Adjacent panels shall be laid on different days. The panels shall be bounded by wooden battens or flat iron having the same depth as the plinth protection floor. The plinth protection shall butt against the masonry of wall which shall not be plastered.

39.1.4 Payment shall be made on sqm basis, and rate shall include all the operation described above.

40.0.0 DISMANTLING & DEMOLISHING:

40.1.1 The term `Dismantling' implies carefully separating the parts without damage and removing. The term `Demolition' implies taking up or down or breaking up. This shall consist of demolishing in whole or part of work including all relevant items as directed. The dismantling & demolition
operations shall always be well planned before hand. The operational procedure shall be got approved by Engineer-in-Charge before starting of work. Use of pneumatic tools or silent non-explosive demolition agent (like ACCONEX of M/s. ACC or any other equivalent approved brand) may be used as per manufacturer's recommendation & instruction of Engineer-in-charge. Under no circumstances blasting shall be allowed. Wherever necessary, propping, shoring and underpinning shall be provided for the safety of the adjoining work or property, which is too left intact, before dismantling and demolishing is taken up and work shall be carried out in such as way that no damage is caused to the adjoining work or property. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary. Necessary instructions issued by Engineer-in-Charge and/or Site Engineer shall be strictly adhered to in this regard. The demolished materials shall be handled carefully and properly stacked as directed by the Site Engineer.

40.2.0 Unserviceable materials rubbish etc. shall be disposed off as directed. All materials obtained from demolition shall be the property of the Principal HansRaj College .

40.3.0 Demolition of reinforced concrete, plain concrete, stone masonry etc. shall be paid in cubic metres and road crust demolishing shall be paid on sqm basis. For road crust, the depth shall be taken as total summation of depth of premix carpet, WBM and base stone soling, No extra payment will be made for reinforcement encountered. Reinforcement is to be cut out and stacked separately.

MATERIALS OF APPROVED BRAND OR MANUFACTURER

S. No.	Material	Manufacturer/ Supplier/ Make
1	CEMENT- OPC 43/53 grade	ULRRATECH, JK, AMBUJA, BIRLA, ACC any other make as approved by EIC
2	WHITE CEMENT	J.K., BIRLA
3	CHLORPYROPHOS	AGRO CARE, AM VAC, DURSBAN, THIDDAN
4	READY MIX CONCRETE	As approved by EIC
5	SUPER PLASTICIZERS	SIKA, FOSROC, BASF, ASIAN LABORATORIES
6	WATER PROOFING COMPOUND (LIQUID)	PIDLITE, CICO, FOSROC, SNOWCEM INDIA, BASF
7	NON SHRINK GROUT	BAL ENDURA, PIDILITE, FOSROC, BASF
8	PIGMENT	SUDERSHAN CHEMICAL INDUSTRIES LTD., TATA PIGMENT
9	HARDENERS	IRONITE, FERROK, HARDONATE
10	EXPANSION JOINT	GREENS BORO OR APPROVED EQUIVALENT
11	WALL PUTTY	GOLDSIZE PUTTY BY SHALIMAR PAINTS LTD., J K, BIRLA
12	POLYSUPLHIDE SEALANT	PIDILITE ,TUFFSEAL,CHOKSEY, ASIAN, FOSROC,BASF
13	SILICON SEALANT	DOW CORNING, GE
14	REINFORCEMENT STEEL	TISCO, SAIL, JINDAL any other make as approved by EIC
15	STRUCTURAL STEEL	TISCO, SAIL, JINDAL, any other make as approved by EIC
16	GLAZED CERAMIC TILES	JOHNSON, KAJARIA KAJARIA , NITCO , SOMANY , ASIAN,, NITCO, ASIAN, RAK
17	VITRIFIED TILES	1st QUALITY OF KAJARIA, ASIAN, SOMANY, JOHANSON
18	GRC PRODUCT	ADITTY BIRLA, NARMADA FIBRES AND DECORATES
19	GLASS MOSAIC TILES	MRIDUL, ACCURE
20	ACID RESISTANCE TILE	PELICAN CERAMIC, JENICO REFRACTORIES
21	INTERLOCKING PAVER BLOCKS	KK KONKRETE PRODUCT, PAVIT , K S
22	KERB STONE	KK KONKRETE PRODUCT, PAVER INDIA, NITCO
23	ALUMINIUM HARDWARE	EARL BIHARI, CROWN, SAVEX,
24	SS FITTINGS	JINDAL, OZONE, DORMA
25	ANCHOR FASTNER	HILTI, FISHER RE- 500
26	ALUMINIUM SECTIONS	INDAL, HINDALCO, JINDAL, BHORUKA
27	ROLLING SHUTTERS & GRILLS	STANDARD, SWASTIK, AAKASH, PRAKASH OR as
28	STAINLESS STEEL SCREWS	KUNDAN, ARROW, JINDAL, EBCO
29	ALUMINIUM EXTRUSION SECTIONS	HINDALCO, INDALCO, JINDAL, MAHAVIR,
30	HARDWARE & BRASSWARE	SHALIMAR, INDO-BRASS, AMARBHOY DOSSAJI,

31	LOCKS/LATCH	GODREJ , HARRISON
32	DISTEMPER & PAINTS	ICI, ASIAN PAINTS, BERGER PAINTS,
33	TEXTURED PAINT	SPECTRUM , ASIAN, ICI
34	FLUSH DOOR & PLYWOOD (CONFORMING TO IS :710)	ARCHID, KITPLY, GREEN PLY, CENTURY, SARDA
35	LAMINATES	MERINO, GREEN PLY, CENTURY, SARDA
36	GYPSUM BOARD	INDIA GYPSUM, LAFARGE BORAL
37	PRELAM PARTICLE BOARD	NOVAPAN OR EQUIVALENT
38	PVC WATER STOP SEAL	MARUTI RUBBER UDYOG, JYOTI
39	POLY CARBONATE SHEET	GE, POLYGAL,DANPALON
40	EPDM MEMBRANE WATERPROOFING	FIRESTONE, STP,CARLISLE
41	ALUMINIUMIUM COMPOSITE PANEL	ALUCOBOND, ALUCOPA, ALOMAX
42	GLASS	SAINT GOBAIN , MODI
43	FALSE CEILING (GYPSUM BOARD)	INDIA GYPSUM , EVEREST
44	FALSE CEILING (METAL)	ARMSTRONG , HARSONS, LUXLAON
45	FALSE CEILING (MINARAL)	ARMSTRONG, NITTOBO
46	NUT BOLTS	KUNDAN, PUJA, ATUL
47	SECURITY DOOR	GODREJ, STEELAGE
48	SHUTTERING PLYWOOD	ANCHOR, KITPLY, SWASTIK
49	SANITARY FIXTURES INCLUDING WALL HUNG WC	PARRYWARE, HINDWARE, CERA, JAGUAR
50	CP & SS FITTINGS	GEM, LAURET, JAQUAR, ESS ESS
51	FLUSH VALVE	JAQUAR, HINDWARE, GEM, ORIENT
52	TOILET ACCESSORIES	JAQUAR, HINDWARE, GEM, ORIENT
53	CI PIPES	JINDAL, ELECTROSTEEL, RIL, NECO
54	SW PIPES	DEVERAJ ANAND, PERFECT, SOOD & SOOD
55	CI PIPE FITTING	RIF, KAJECO, SRIF, NECO
56	GI / MS PIPES	TATA , JINDAL HISSAR , PRAKASH
57	GI FITTINGS	ZOLOTO, UNIK, KS, R BRAND
58	CPVC PIPES	ASTRAL , AJAY FLOW GARD , GLYNWED
59	PVC PIPES, SWR / UPVC PIPE	FINOLEX, KISAN, SUPREME, PRINCE,

S No	Material	Manufacturer/ Supplier/ Make
60	PVC STORAGE TANK	SINTEX, UNIPLAS, DURAPLAST
61	RCC PIPES (ISI MARKED)	IHP, AKSHAY, or As approved by EIC
62	CI MANHOLES FRAME & COVERS	RIF, KAJECO
63	STAINLESS STEEL SINK	AMC, NEELKANT, ORIENTAL, NIRALI
64	W C SEAT COVER	COMMANDER, PARRYWARE, DIPLOMAT,
65	COCKROACH TRAP	CHILLY (CCT)
66	BALL VALVE	ZOLOTO, CIM, TBM
67	BUTTERFLY VALVE	AUDCO, ADVANCE, ZOLOTO, VENUS
68	NON RETURN VALVE	ZOLOTO, ADVANCE, KIRLOSKAR, VC, LEADER,
69	HAND DRIER	KOPAL OR APPROVED EQUIVALENT
70	GEYSER	BAJAJ, RACOLD, VENUS, V GAURD
71	CP WASTE SPREADERS URINAL FLUSH PIPES	DEVELOP, ORIENT
72	CALCIUM SILICATE BOARD	RAMCO

ELECTRICAL ITEMS:

S. NO.	ITEM	APPROVED MAKE
1	SWITCH & SOCKET & FAN REGULATOR	NORTHWEST, ROMA, LEGRAND
2	WIRES (FRLS)	FINOLEX, SKYTONE,HAVELLS, Polycap
3	CABLES	Finolex, Havells ,KEI, Polycab
4	MCB, DB, ELCB	HAGER,LEGRAND,L&T
5	PVC CONDUIT	SATIA, PRIME, RAJSHREE, RIGID AKG
6	FANS	CROMPTON , HAVELLSGREAVES, BAJAJ, USHA
7	TELEPHONE CABLES	FINOLEX, SKYTONE, HAVELLS, DELTON
8	FIRE ALARM SYSTEM	AGNI, INFERNO
9	DETCTORS- HEAT/SMOKE	APPOLO, EDWARDS
10	LIGHTS & FITTING	PHIPLIS, WIPRO, HAVELLS, SYSKA

APPROVED MAKE LIST FOR HVAC WORK

S. No	Description of Item	Approved Makes
1.	**High Side Equipment**	
1.1	VRV/VRF System	Daikin/ Mitsubishi Electric/ Toshiba
1.2	Y-Joints VRV/VRF system	Daikin/ Mitsubishi Electric/ Toshiba
3.	**Fans**	
3.1	Propeller Fan	Caryaire/Kruger/Nuaire (UK)/ Nicotra
4.	**Cables & Accessories**	
4.1	Control Cables	Skytone/Universal/Delton/Finolex
4.2	XLPE / PVC Insulated Aluminium Conductor Armoured Power Cables	Skytone/havells/Universal/RPG Asian/INCAB
4.3	Communication Cable	Fusion/Comscope/ Contemp/Finolex
4.4	Cable Gland Double Compression with Earthing Links	Power/Gripwell /Baliga Lighting Ltd.
4.5	PVC Insulated Copper Conductor Stranded Flexible Wires	Finolex/ National Cables – NC/ polycab/ Skytone Havells
4.6	PVC Conduit & Accessoires (ISI Approved)	BEC/ Precision/ D Plast/ Polypack
4.7	MS/ GI Conduit (ISI Approved)	BEC/ AKG/ STEEL KRAFT
4.8	Accessories for MS/GI Conduit (ISI Approved)	Jindal/AKG & Prakash
4.9	Bimettalic Cable Lugs	Hax (Brass copper Alloy India Ltd)/ Dowell's (Biller india Pvt. Ltd.)
4.10	Lugs (Tinned Copper)	Dowell
4.11.	Slotted/Tray	Kelp/Fletco/MM Enterprises/Aditya Steel / DNV.
5.	Ducting and Grills	
5.1	Grilles/ Diffusers	Caryaire/ Ravistar/ Mapro/ Tristar
5.2	Fire Dampers	Caryaire/ Conaire / AirFlow
5.3	G.I. Sheet Metal Duct	Jindal/National/ Tata
5.4	Fire Dampers motors	Belimo/Siemens
5.5	Self Adhesive Sealing Gasket for Ducts	Prima Seal/Air Flow
5.6	Hessian (Fire treated)	Navair/ Pyroguard
5.7	Stick Pins	Prima Seal/ Air Flow
	VCD/ Gravity louvers/ Exaust & fresh air louvers	Caryaire/Ravistar/Mapro/ Tristar
5.8	Overload Relays with built in single phase preventer	L&T/ Minlec/Siemens/ Group Schneider (MG)

		France
6.	**Pipes & Fittings**	
6.1	UPVC pipe for darin	AKG/Polypack/supreme
6.2	Cu- Pipes	Totaline/Rajco/Maxflow /Mandev
7.	**Insulation**	
7.1	Expanded Polystyrene (TF Quality) (Pre-moulded pipe section/slab)	Thermolloyd/ Beard Sell/ Styrene Pakagings/ DEBS Products/ P R Pakaging/ Coolite/ Indian Pakaging Services
7.2	Cross Linked Polyethylene	Trocellen/Thermaflex/Thermobreak
7.3	Glass Wool	Owens Corning/ U.P. Twinga
7.4	Closed Cell Elastomeric Insulation	Armacell/K-flex/A-flex
7.5	Aluminum Tape	Johnson/ Birla 3M
7.6	Acoustic Lining	UP Twiga/ Lloyd Insulation
7.7	Non Woven Polyster (Mikron)	Mikron
8.	**Electrical Equipment**	
8.1	Electrical Panel Board/ Motor Control Centre (Power Coated)	Tricolite/ Adlec Systems pvt Ltd./Triton/ System Power Control /KEPL/Risha Controls/Expert Engineers
8.2	Electric Motor (TEFC)	Siemens/ Crompton/ Kirloskar/ ABB
8.3	Starters/ Switch gear	Siemens/ L&T/ Group Schneider (MG) France
8.4	Miniature Circuit Breaker (MCB)	Siemens/ MDS Legrand/ Hager (L&T)
8.5	Moulded Case Circuit breaker (MCCB)	Siemens/ L&T/ GE Power/ Group Schneider (MG)NS
8.6	Air Circuit Breaker (ACB)	Siemens/ L&T/ GE Power/ Group Schneider (MG)NW
8.7	Earth leakage circuit Breaker (ELCB)	MDS Legrand/ Hager (Larsen & Toubro)
8.8	Push Button Starter	Siemens/ L&T/Group Schneider (MG)
8.9	Auxiliary Relays/ Contactors	Siemens/ L&T/ Group Schneider (MG) France
8.10	Line Type Fuse	Siemens/ L&T/GE
8.11	Timer	Siemens/ L&T/GE
8.12	Terminal Block	Elmax
8.13	Voltmeter/ Ammeter (Digital)	Automatic Electric/ L&T/ Siemens / Enercon
8.14	Indicating Lamps (LED Type)/ Push Button	Siemens/ L&T/ Vashnio
8.15	Single Phase Preventer (Current Base)	L&T/ Minlec
8.16	Electronic Digital Meters (A/V/PF/Hz/KW/KWA) With Led	Enercon System Pvt. Ltd/ L&T

	Display	
8.18	Selector Switches/ Toggle Switch	Siemens/ L&T/ Kaycee
8.18	Selector Switches/ Toggle Switch	Siemens/ L&T/ Kaycee
8.19	Change over switch	Siemens/ L&T/ HH Elcon/ HPL-Socomech
8.20	Protection Relay	Alstom/ L&T/ Siemens
8.21	Control Transformer/ Potential Transformers	Precise/ Gillbert & Maxwell/AE
8.22	Current Transformer (Epoxy Cast Resin)	Precise/ Gillbert & Maxwell/AE
8.23	Rubber Mats 1199 V, 6 mm thick (ISI approved	Jyoti
8.24	Weather Proof Boxes (IPSS)	Advance/Adlec/Milestone
8.25	MS Painted Cable Trays	Ricco/Slotco/M.M Enterprises / Aditya Steel / DNV

Note:

1.1 Samples of all building materials, doors and windows, fittings and other articles required for use on the work shall be got approved from the Engineer-in-Charge. Articles manufactured by firms of reputes, approved by the Engineer-in-Charge, shall only be used. Only articles classified as 'First Quality' by the manufactures shall be used. Articles which are not 'First Quality' shall be rejected by the Engineer-in-Charge. Preference shall be given to these articles which bear ISI certificate work. In case, articles bearing ISI certification mark are not available, the daily of samples brought by the construction shall be judged by the standards laid down in the relevant ISI specifications

1.2 All material and articles brought by the contractor to the site of work for use shall conform to the samples approved, which shall be preserved till the completion of work. Final decision to reject any material shall rest with the Engineer-in-Charge.

1.3 The materials and items to be provided by the contractor shall be the best of their respective kinds as approved by the Engineer in charge. Any materials not found as per specification shall be rejected and removed from site immediately by the contractor at the contractor's expense.

(STAMP & SIGNATURE OF BIDDER)

GENERAL INFORMATION FOR GUIDANCE TO TENDERES

The schedule of quantities is to be read for the purpose of pricing in conjunction with the special conditions general rules for the guidance of contractors, conditions of contract, specifications, drawings, schedule of supply of materials and the appendices.

The prices inserted in the schedule of quantities shall be inclusive value of the work described including all cost and expenses which may be required in and for the construction of the work described together with all general risks, liabilities and obligations set forth or implied in the documents on which the tender is to be based.

The quantities stated are to be considered approximate only and the unit prices entered in the schedule of quantities and prices shall apply only to the actual quantities measured in the completed work in accordance with the specifications.

All the materials other than those shown in schedule of supply of materials in Section VII are to be arranged by the contractor and his rates should account for the same.

Rates quoted for all items in this tender shall include cost of all materials including cement. Department will not supply any materials, the rates quoted must be all inclusive.

The contractor shall be responsible for supply of cement and procure ordinary Portland cement 43 grade conforming to IS: 8112 and use it on works. The contractor shall purchase cement from the approved manufacturers only. Secured advances on cement up to 75% of purchase price shall be paid to the contractor after indemnifying the Government and through insurance cover. The quantity of cement on which secured advance shall be paid will be restricted to the consignment of cement tested and passed in the test in department laboratory. Prior approval to be obtained from the Engineer for the quantities proposed to be purchased.

Regarding supply of STEEL the contractor shall procure only TMT bars or approved equivalent conforming to IS-1786 (Latest edition) from approved manufacturers with a test certificate, and use it on works after getting approval from department Engineer or tested in department laboratory.

Hans Raj College shall supply water and electricity at one point and necessary arrangement for distribution shall be done by contractor to carryout this work & college deduct 1% for water & 1% for electricity on the cost of actual work done from vendor bills for the same.

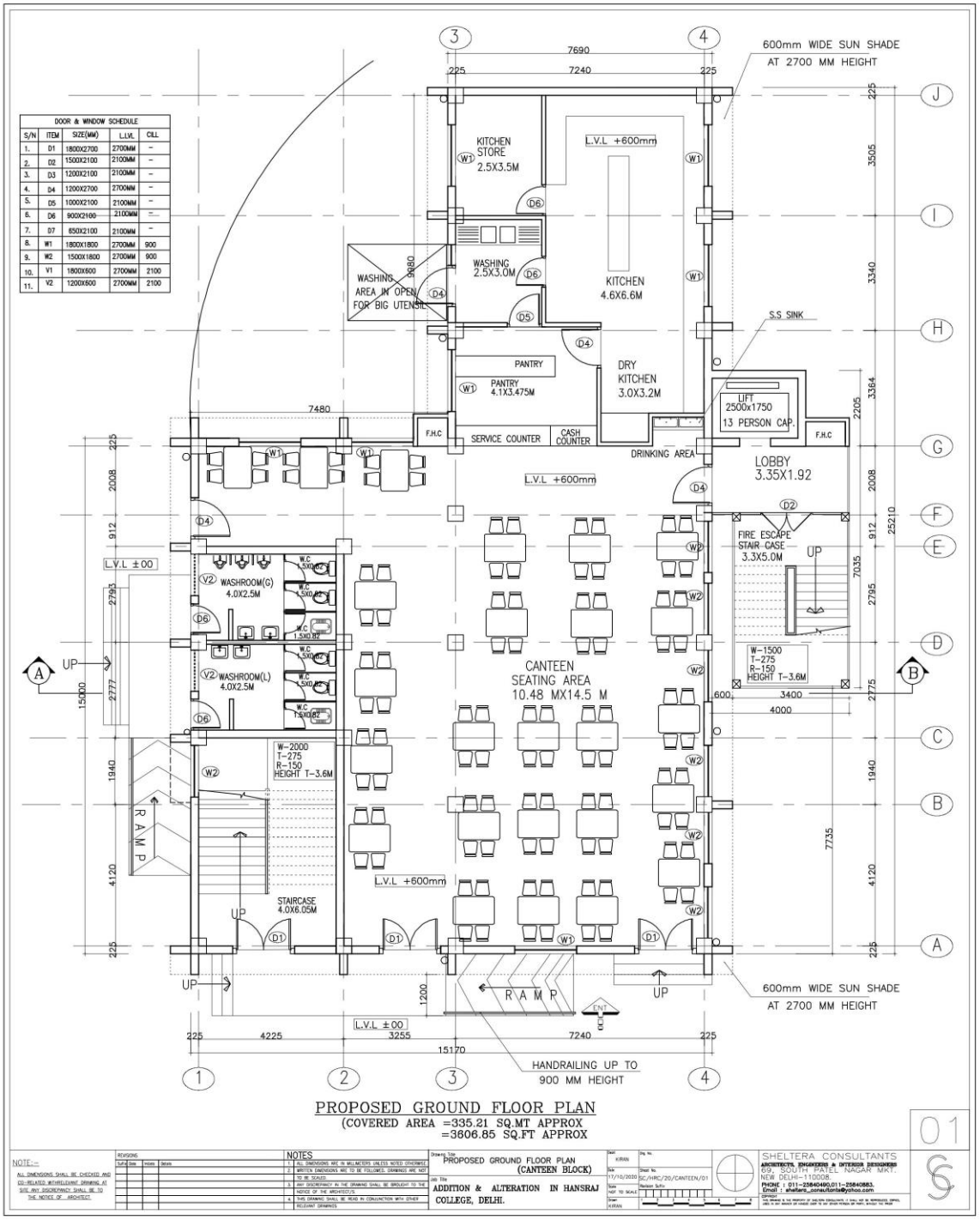
If contractors need any clarification they are required to contact the

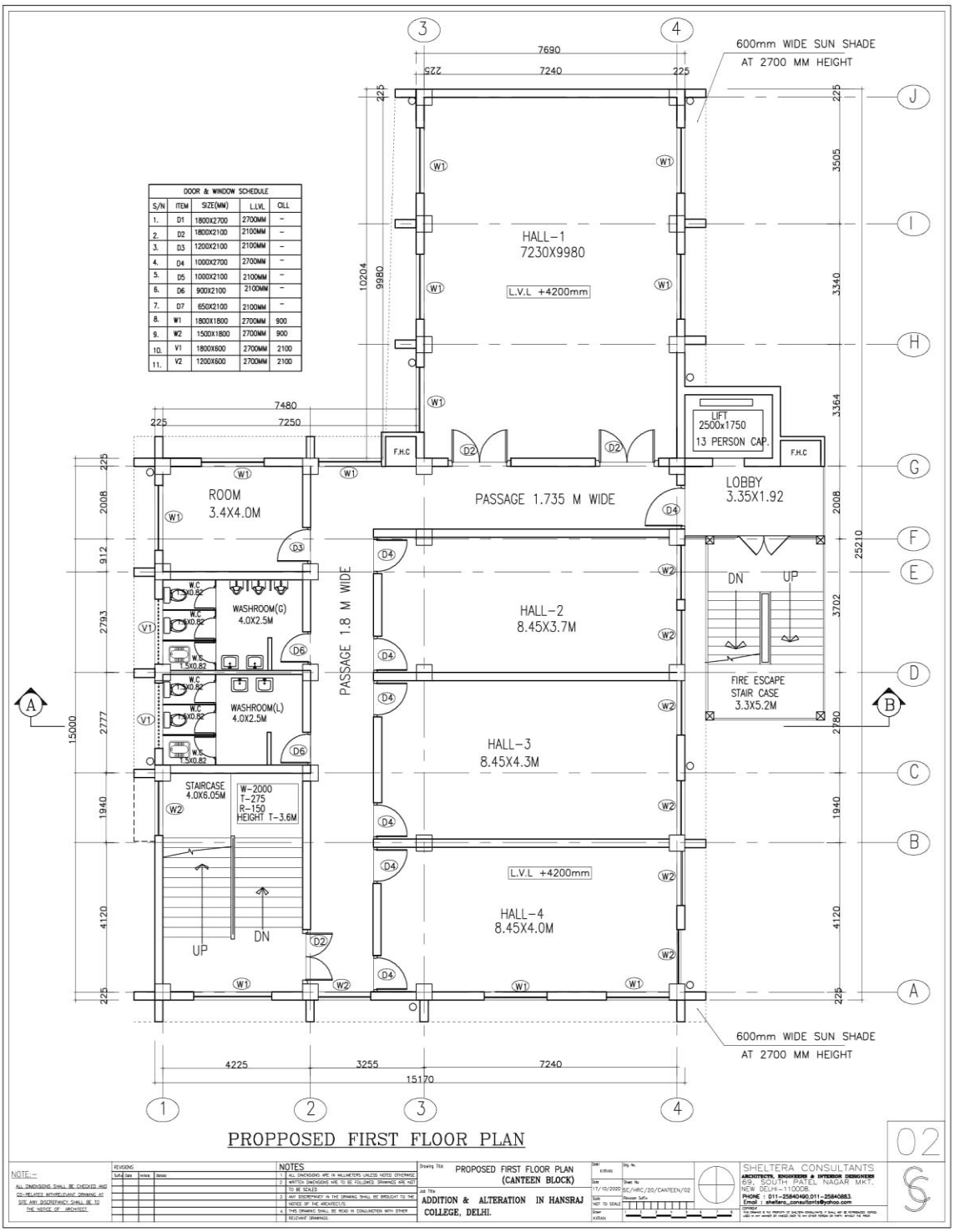
Principal, HANS RAJ College, Mahatma Hans Raj Marg, Delhi

LIST OF DRAWINGS

SL. NO.	TITLE
1.0	07 Nos.

Note: The above drawings enclosed with tender are indicative and for general information only to help the bidder to have a better understanding of Scope of Work. The contents/ requirements may change, modify, alter, increase or decrease to any extent. Bidders are requested to note this & quote their rates/ prices accordingly.


DOOR & WINDOW SCHEDULE
S/N | ITEM | SIZE(MM) | L.VL | CILL
1. D1 1800X2700 2700MM –
2. D2 1500X2100 2100MM –
3. D3 1200X2100 2100MM –
4. D4 1200X2700 2700MM –
5. D5 1000X2100 2100MM –
6. D6 900X2100 2100MM –
7. D7 650X2100 2100MM –
8. W1 1800X1800 2700MM 900
9. W2 1500X1800 2700MM 900
10. V1 1800X600 2700MM 2100
11. V2 1200X600 2700MM 2100
600mm WIDE SUN SHADE AT 2700 MM HEIGHT
KITCHEN STORE 2.5X3.5M
L.V.L +600mm
WASHING 2.5X3.0M
KITCHEN 4.6X6.6M
WASHING AREA IN OPEN FOR BIG UTENSIL
S.S SINK
PANTRY
PANTRY 4.1X3.475M
DRY KITCHEN 3.0X3.2M
LIFT 2500x1750 13 PERSON CAP.
F.H.C
SERVICE COUNTER
CASH COUNTER
DRINKING AREA
LOBBY 3.35X1.92
FIRE ESCAPE STAIR CASE 3.3X5.0M
UP
W-1500 T-275 R-150 HEIGHT T-3.6M
L.V.L ±00
WASHROOM(G) 4.0X2.5M
WASHROOM(L) 4.0X2.5M
W.C 1.5X0.82
CANTEEN SEATING AREA 10.48 MX14.5 M
W-2000 T-275 R-150 HEIGHT T-3.6M
RAMP
STAIRCASE 4.0X6.05M
HANDRAILING UP TO 900 MM HEIGHT
7690
7240
7480
15000
15170
4225
3255
3400
4000
PROPOSED GROUND FLOOR PLAN
(COVERED AREA =335.21 SQ.MT APPROX
=3606.85 SQ.FT APPROX
NOTES
PROPOSED GROUND FLOOR PLAN (CANTEEN BLOCK)
ADDITION & ALTERATION IN HANSRAJ COLLEGE, DELHI.
SHELTERA CONSULTANTS
ARCHITECTS, ENGINEERS & INTERIOR DESIGNERS
69, SOUTH PATEL NAGAR MKT.
NEW DELHI-110008
SC/HRC/20/CANTEEN/01
17/10/2020
01


DOOR & WINDOW SCHEDULE
S/N | ITEM | SIZE(MM) | LVL | CILL
1. | D1 | 1800X2700 | 2700MM | –
2. | D2 | 1800X2100 | 2100MM | –
3. | D3 | 1200X2100 | 2100MM | –
4. | D4 | 1000X2700 | 2700MM | –
5. | D5 | 1000X2100 | 2100MM | –
6. | D6 | 900X2100 | 2100MM | –
7. | D7 | 650X2100 | 2100MM | –
8. | W1 | 1800X1800 | 2700MM | 900
9. | W2 | 1500X1800 | 2700MM | 900
10. | V1 | 1800X600 | 2700MM | 2100
11. | V2 | 1200X600 | 2700MM | 2100
600mm WIDE SUN SHADE AT 2700 MM HEIGHT
HALL–1 7230X9980
L.V.L +4200mm
LIFT 2500x1750 13 PERSON CAP.
F.H.C
LOBBY 3.35X1.92
PASSAGE 1.735 M WIDE
ROOM 3.4X4.0M
WASHROOM(G) 4.0X2.5M
WASHROOM(L) 4.0X2.5M
PASSAGE 1.8 M WIDE
HALL–2 8.45X3.7M
HALL–3 8.45X4.3M
HALL–4 8.45X4.0M
FIRE ESCAPE STAIR CASE 3.3X5.2M
STAIRCASE 4.0X6.05M
W–2000 T–275 R–150 HEIGHT T–3.6M
UP
DN
7690
7240
225
10204
9980
7480
7250
15000
4225
3255
15170
25210
PROPPOSED FIRST FLOOR PLAN
02
NOTES
PROPOSED FIRST FLOOR PLAN (CANTEEN BLOCK)
ADDITION & ALTERATION IN HANSRAJ COLLEGE, DELHI.
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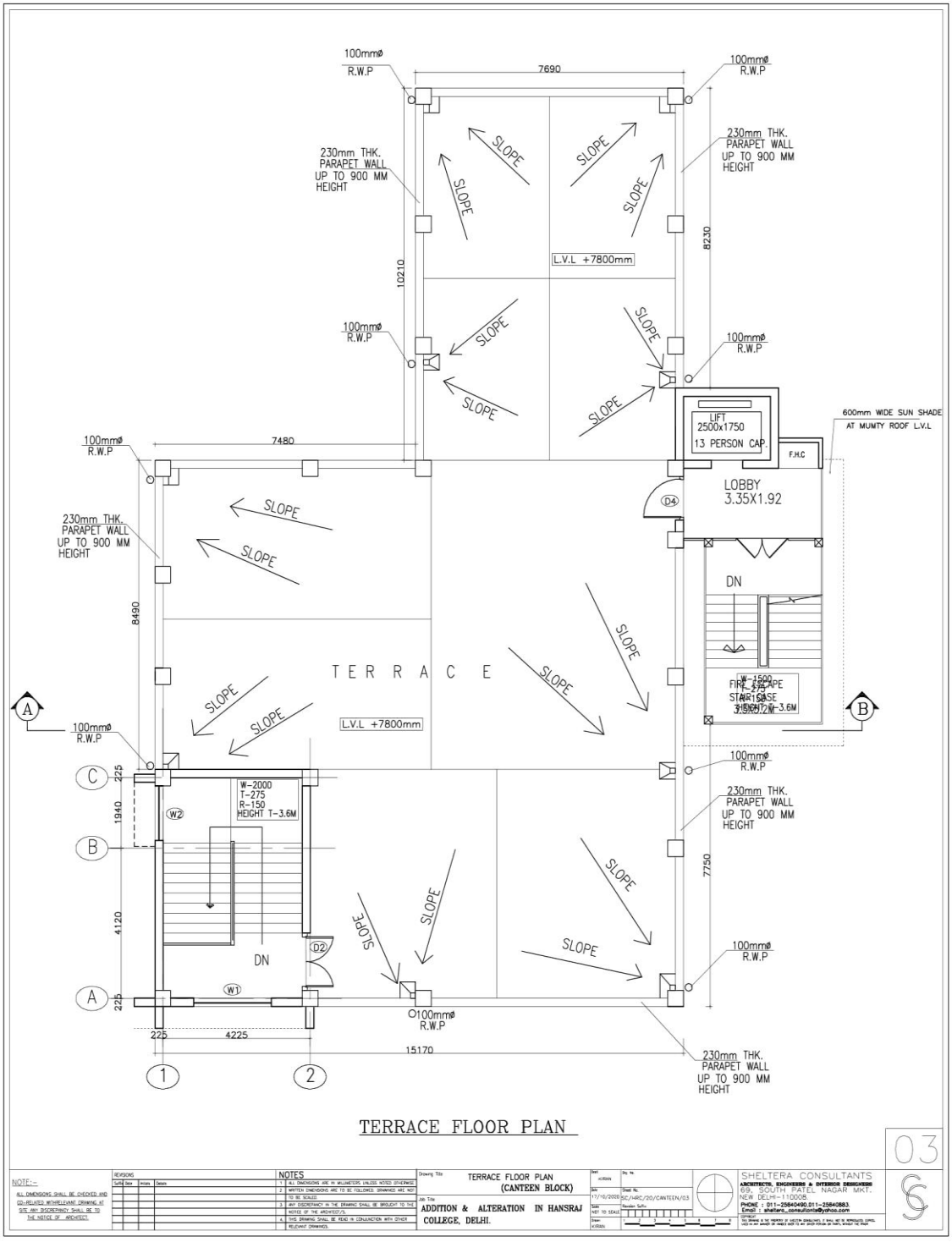
69, SOUTH PATEL NAGAR MKT. NEW DELHI–110008.
PHONE : 011–25840490,011–25840883.
Email : sheltera_consultants@yahoo.com


100mmø R.W.P
7690
230mm THK. PARAPET WALL UP TO 900 MM HEIGHT
SLOPE
L.V.L +7800mm
10210
8230
LIFT 2500x1750 13 PERSON CAP.
F.H.C
600mm WIDE SUN SHADE AT MUMTY ROOF L.V.L
7480
LOBBY 3.35X1.92
D4
DN
8490
T E R R A C E
W-1500 T-275 R-150 HEIGHT T-3.6M
W-2000 T-275 R-150 HEIGHT T-3.6M
W2
D2
W1
1940
4120
225
4225
15170
7750
1
2
A
B
C
TERRACE FLOOR PLAN
03
NOTE:-
ALL DIMENSIONS SHALL BE CHECKED AND CO-RELATED WITHRELEVANT DRAWING AT SITE ANY DISCREPANCY SHALL BE TO THE NOTICE OF ARCHITECT.
NOTES
1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE
2 WRITEN DIMENSIONS ARE TO BE FOLLOWED. DRAWINGS ARE NOT TO BE SCALED
3 ANY DISCREPANCY IN THE DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECTS.
4 THIS DRAWING SHALL BE READ IN CONJUNCTION WITH OTHER RELEVANT DRAWINGS.
Drawing Title TERRACE FLOOR PLAN (CANTEEN BLOCK)
Job Title ADDITION & ALTERATION IN HANSRAJ COLLEGE, DELHI.
17/10/2020
SC/HRC/20/CANTEEN/03
NOT TO SCALE
SHELTERA CONSULTANTS
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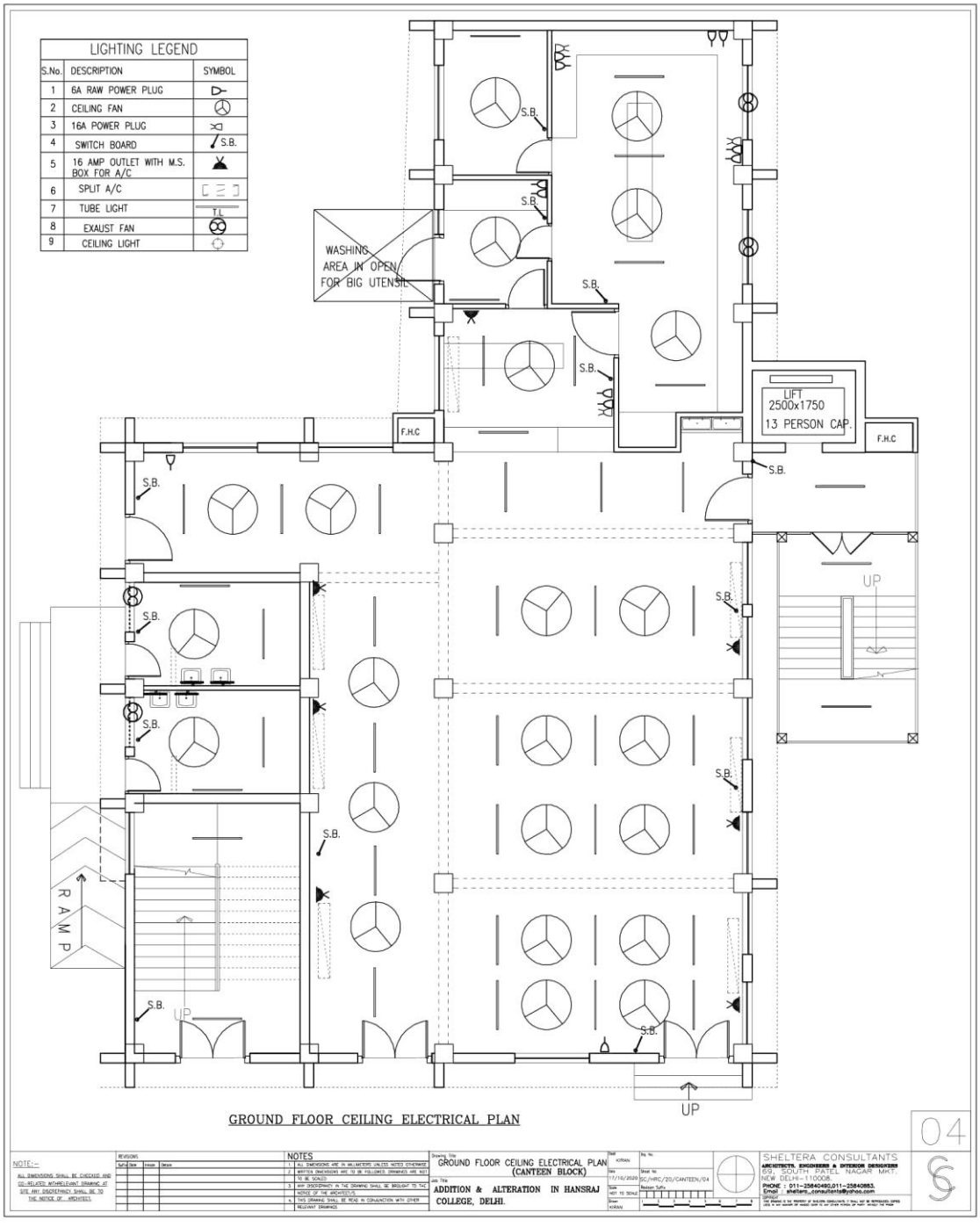
69, SOUTH PATEL NAGAR MKT.
NEW DELHI-110008.
PHONE : 011-25840490,011-25840883
Email : shelters_consultants@yahoo.com


LIGHTING LEGEND
S.No. DESCRIPTION SYMBOL
1 6A RAW POWER PLUG
2 CEILING FAN
3 16A POWER PLUG
4 SWITCH BOARD S.B.
5 16 AMP OUTLET WITH M.S. BOX FOR A/C
6 SPLIT A/C
7 TUBE LIGHT TL
8 EXAUST FAN
9 CEILING LIGHT
WASHING AREA IN OPEN FOR BIG UTENSIL
LIFT 2500x1750 13 PERSON CAP.
F.H.C
S.B.
UP
RAMP
GROUND FLOOR CEILING ELECTRICAL PLAN
NOTE:-
ALL DIMENSIONS SHALL BE CHECKED AND CO-RELATED WITHRELEVANT DRAWING AT SITE ANY DISCREPANCY SHALL BE TO THE NOTICE OF ARCHITECT.
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE
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3. ANY DISCREPANCY IN THE DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECTS
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH OTHER RELEVANT DRAWINGS
Drawing Title GROUND FLOOR CEILING ELECTRICAL PLAN (CANTEEN BLOCK)
Job Title ADDITION & ALTERATION IN HANSRAJ COLLEGE, DELHI.
Drawn KIRAN
Date 7/10/2020
Drawing No. SC/HRC/2D/CANTEEN/04
Scale NOT TO SCALE
SHELTERA CONSULTANTS
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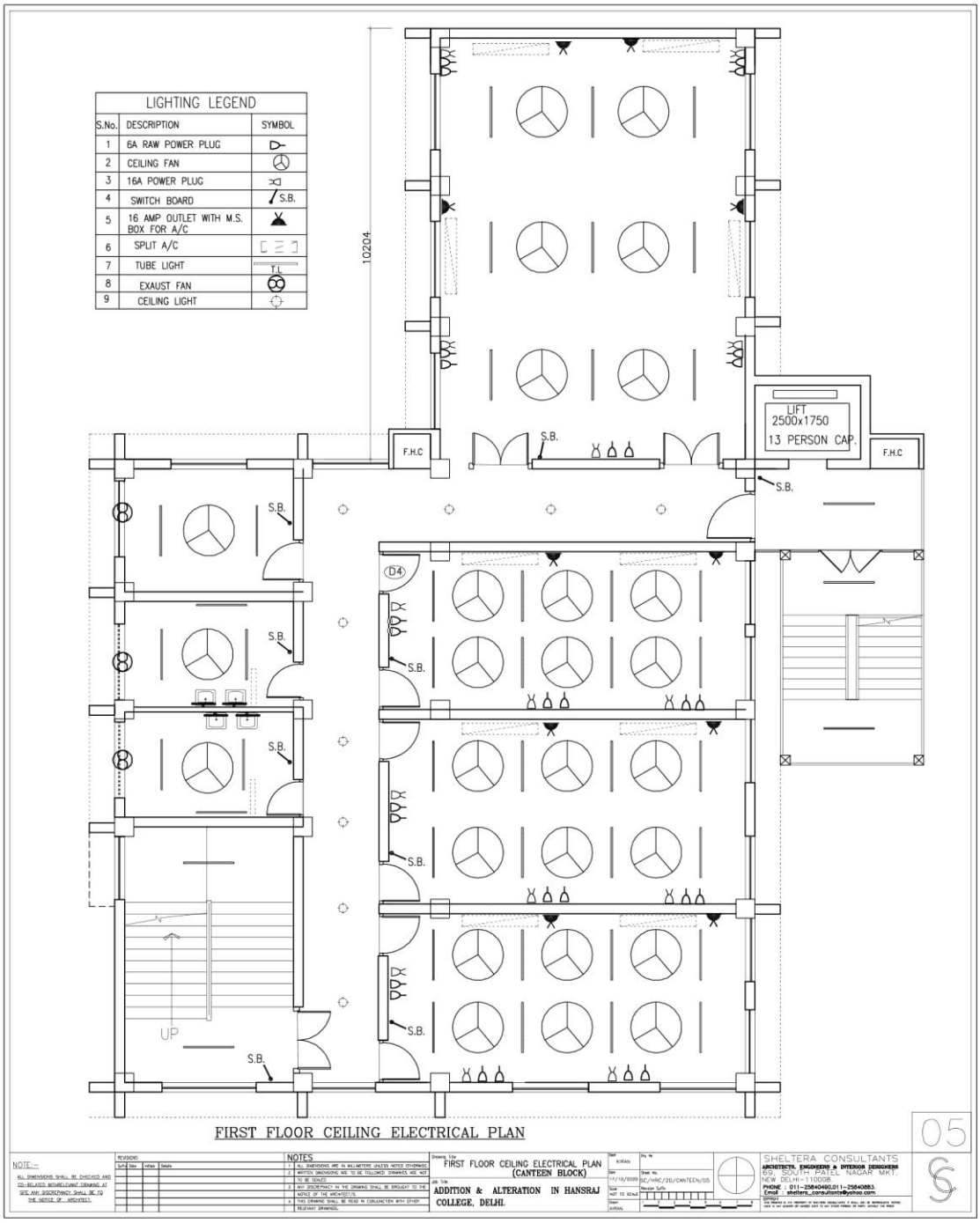
Email : shelters_consultants@yahoo.com
04


LIGHTING LEGEND
S.No. DESCRIPTION SYMBOL
1 6A RAW POWER PLUG
2 CEILING FAN
3 16A POWER PLUG
4 SWITCH BOARD S.B.
5 16 AMP OUTLET WITH M.S. BOX FOR A/C
6 SPLIT A/C
7 TUBE LIGHT T.L.
8 EXAUST FAN
9 CEILING LIGHT
10204
LIFT 2500x1750 13 PERSON CAP.
F.H.C
S.B.
D4
UP
FIRST FLOOR CEILING ELECTRICAL PLAN
05
NOTE:-
NOTES
FIRST FLOOR CEILING ELECTRICAL PLAN (CANTEEN BLOCK)
ADDITION & ALTERATION IN HANSRAJ COLLEGE, DELHI.
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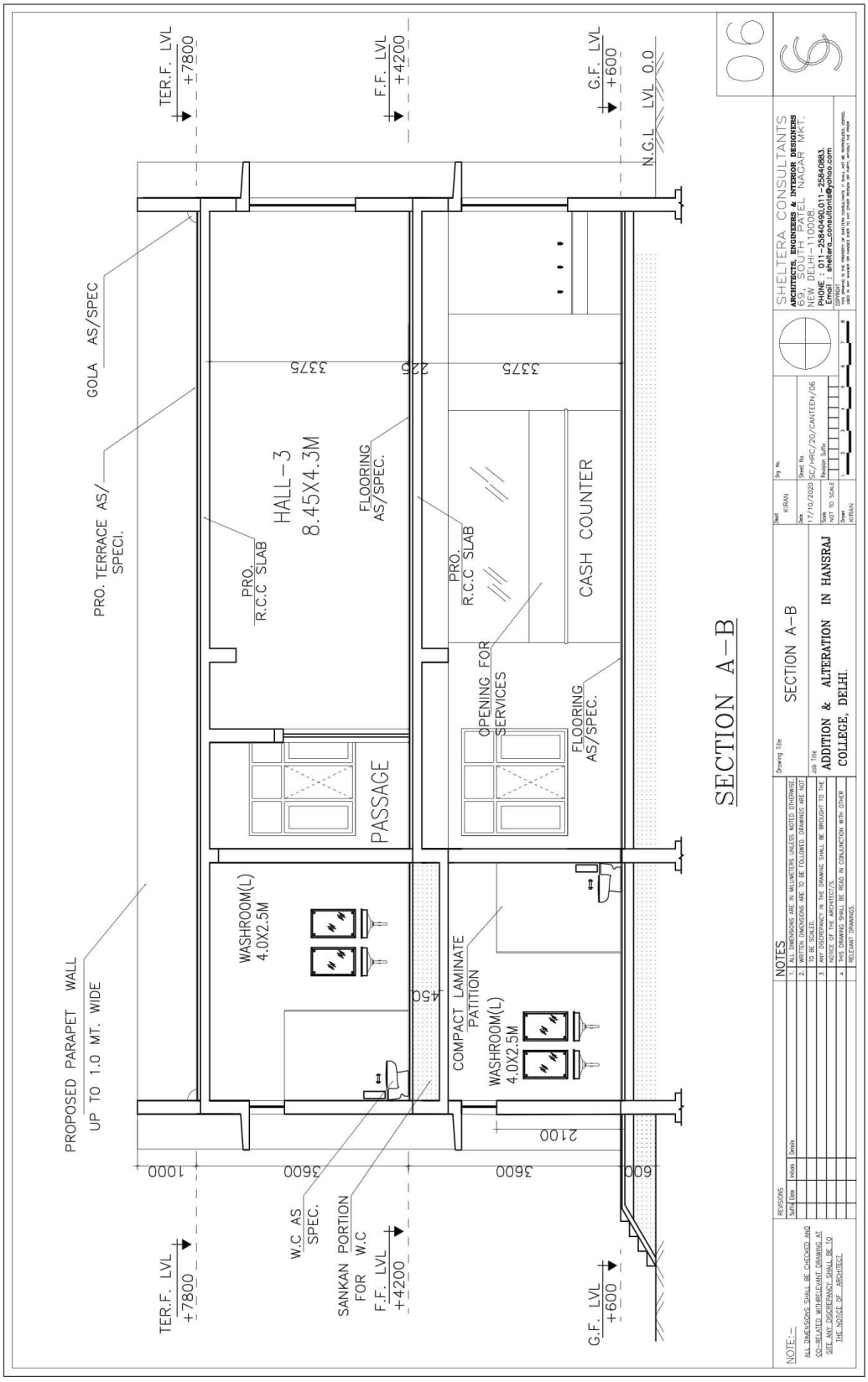
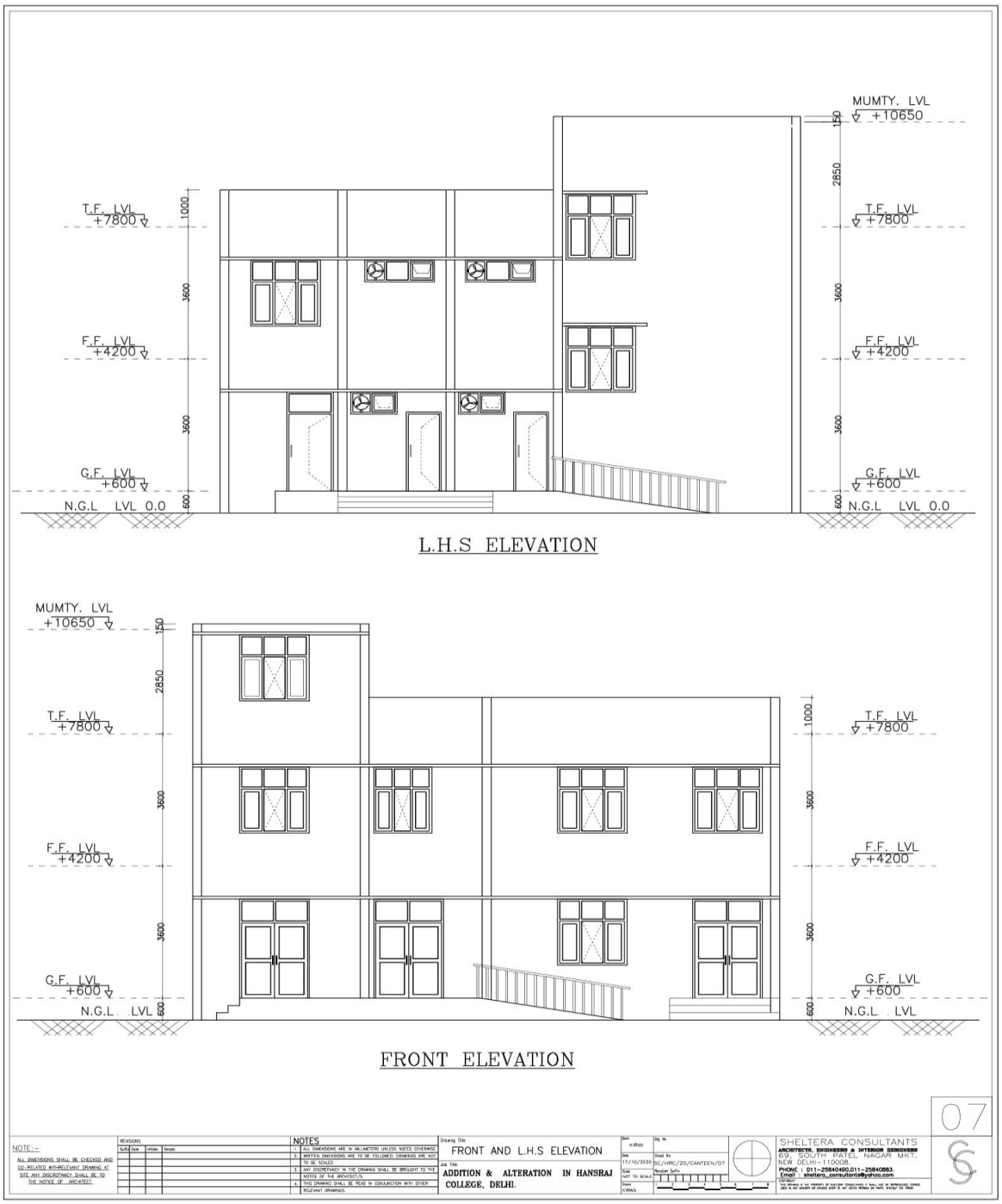
Email : shelters_consultants@yahoo.com


SECTION A–B
TER.F. LVL +7800
F.F. LVL +4200
G.F. LVL +600
N.G.L LVL 0.0
GOLA AS/SPEC
PRO. TERRACE AS/ SPECI.
PROPOSED PARAPET WALL UP TO 1.0 MT. WIDE
HALL–3 8.45X4.3M
FLOORING AS/SPEC.
PRO. R.C.C SLAB
CASH COUNTER
OPENING FOR SERVICES
PASSAGE
WASHROOM(L) 4.0X2.5M
COMPACT LAMINATE PATITION
W.C AS SPEC.
SANKAN PORTION FOR W.C
3375
225
1000
3600
2100
600
NOTES
ADDITION & ALTERATION IN HANSRAJ COLLEGE, DELHI.
SECTION A–B
SHELTERA CONSULTANTS
ARCHITECTS, ENGINEERS & INTERIOR DESIGNERS
69, SOUTH PATEL NAGAR MKT.
NEW DELHI–110008
PHONE : 011–25840980,011–25840883.
17/10/2020
SC/HRC/20/CANTEEN/06
NOT TO SCALE
KIRAN


MUMTY. LVL +10650
T.F. LVL +7800
F.F. LVL +4200
G.F. LVL +600
N.G.L LVL 0.0
1000
3600
3600
600
150
2850
3600
3600
600
L.H.S ELEVATION
MUMTY. LVL +10650
T.F. LVL +7800
F.F. LVL +4200
G.F. LVL +600
N.G.L LVL
150
2850
3600
3600
600
1000
3600
3600
600
FRONT ELEVATION
NOTE:-
ALL DIMENSIONS SHALL BE CHECKED AND CO-RELATED WITH RELEVANT DRAWING AT SITE.ANY DISCREPANCY SHALL BE TO THE NOTICE OF ARCHITECT
REVISIONS
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE
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3. ANY DISCREPANCY IN THE DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECTS.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH OTHER RELEVANT DRAWINGS.
Drawing Title
FRONT AND L.H.S ELEVATION
Job Title
ADDITION & ALTERATION IN HANSRAJ COLLEGE, DELHI.
Drawn KIRAN
Dwg. No.
Sheet No.
17/10/2020 SC/HRC/20/CANTEEN/07
Revision Suffix
Scale NOT TO SCALE
Drawn KIRAN
SHELTERA CONSULTANTS
ARCHITECTS, ENGINEERS & INTERIOR DESIGNERS
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Email : shelters_consultants@yahoo.com
07
6