JABALPUR SMART CITY LIMITED
MADHYA PRADESH

Office of the Executive Director, JABALPUR SMART CITY LIMITED, Jabalpur (M.P.)

TENDER DOCUMENT

NIT Number and Date : **JSCL/2018/20/ADM/76, DATE:-05/01/2018**

Agreement Number and Date : _____

Name of Work : **Conservation Work of Raja Gokuldas Dharamshala.**

Name of the Contractor : _____

Probable Amount of Contract
(Rs. In Figure) : **4,12,24,091.50**

(Rs. In Words) : **Four Crore Twelve Lakhs Twenty four Thousand Ninety One Rupees and Fifty Paise**

Contract Amount
(Rs. In Figure) :_____
(Rs. In Words) :_____

Stipulated Period of Completion: ***18 months i/c rainy season.***

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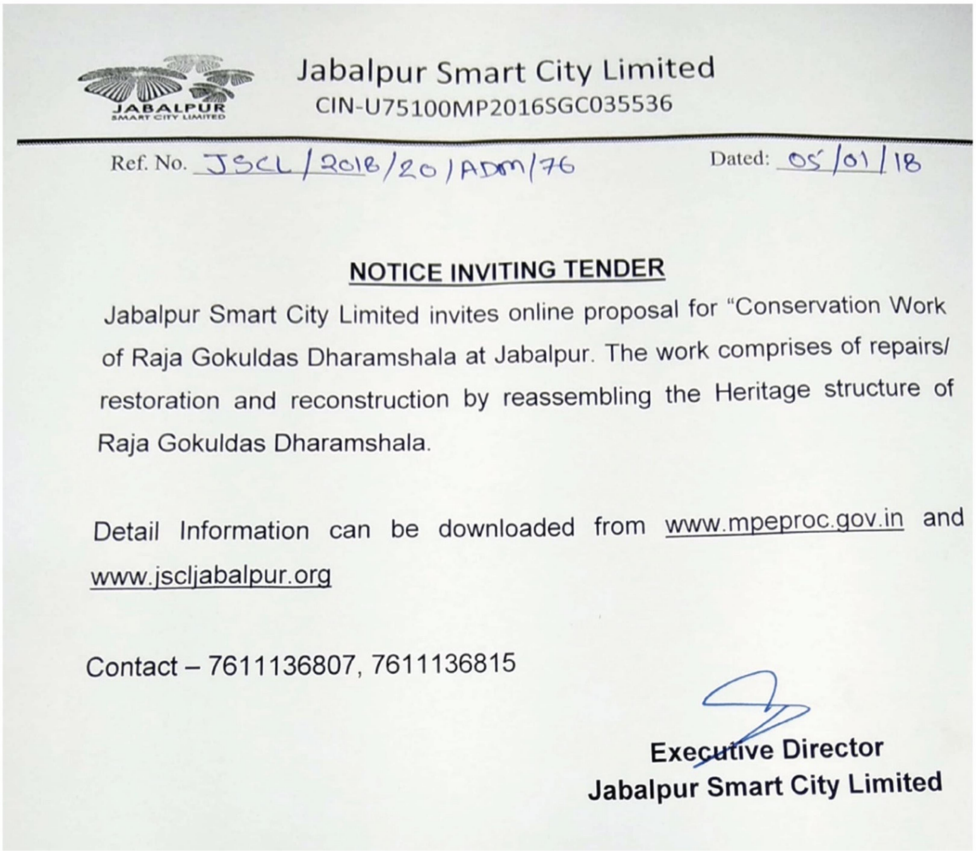

Jabalpur Smart City Limited
CIN-U75100MP2016SGC035536

Ref. No. JSCL/2018/20/ADM/76 Dated: 05/01/18

NOTICE INVITING TENDER

Jabalpur Smart City Limited invites online proposal for "Conservation Work of Raja Gokuldas Dharamshala at Jabalpur. The work comprises of repairs/ restoration and reconstruction by reassembling the Heritage structure of Raja Gokuldas Dharamshala.

Detail Information can be downloaded from www.mpeproc.gov.in and www.jscljabalpur.org

Contact – 7611136807, 7611136815

Executive Director
Jabalpur Smart City Limited

Tenders reference number	
Date of Pre Bid Meeting	06/02/2018 Time **1500 Hrs**
Last date for purchase the Tender	20/02/2018 Till **1730 Hrs**
Last date of online submission	23/02/2018 Till **1730 Hrs**
Date of opening of online technical bid	24/02/2018
Last date of physical submission	27/02/2018 Till **1730 Hrs**
Date of opening of Financial bid	03/03/2018
Tender document Cost	₹ 15000.00
Earnest Money Deposit	₹ 4,12,000.00

JABALPUR SMART CITY LIMITED

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Sd/-
Executive Director
Jabalpur Smart City Limited

JABALPUR SMART CITY LIMITED

CIN-U75100MP2016SGC035536

Ref. No. JSCL//2018/20/ADM/76 **Date : 05.01.2018**

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Contact- 0761-7611136807, 7611136815

Chief Executive Officer
Jabalpur Smart City Limited

SECTION 1

Notice Inviting e-Tenders

JABALPUR SMART CITY LIMITED

N.I.T. NO- JSCL/2018/20/ADM/76/e-tendering Dated:-05thJan 2018

Online percentage rate bids for the following works are invited from registered contractors and firms of repute fulfilling registration criteria:

S.No./Pkg /Code	Work	District(s)	Probable Amount (In Rs.)	Completion Period (months)
1.	Conservation Work of Raja Gokuldas Dharamshala.	JABALPUR	**4,12,24,091.50**	18 months

1. Interested bidders can view the NIT on website http://www.mpeproc.gov.in
2. The Bid Document can be purchased only online till 1730 hrs., 20/02/2018
3. Amendments to NIT, if any, would be published on website only, and not in newspaper.

Signature and Designation

Notice Inviting e-Tenders

JABALPUR SMART CITY LIMITED

Office of The Executive Director, JABALPUR SMART CITY LIMITED, Jabalpur (M.P.)

N.I.T. NO -JSCL/2018/20/ADM/76//e-tendering Dated 05Jan2018

Online percentage rate bids for the following works are invited from registered contractors and firms of repute fulfilling registration criteria:

S.no./ Pkg /Code	Name of Work	District(s)	Probable Amount of Contract (in Rupees)	Earnest Money Deposit (EMD) (in Rupees)	Cost of Bid Document (in Rupees)	Category of Contractor	Period of completion (in Months)
1.	Conservation Work of Raja Gokuldas Dharamshala	Jabalpur	₹ 4,12,24,091.50	₹ 4,12,000.00	₹ 15000.00	As per required	18 months including Rainy Season

1. All details relating to the Bid Document(s) can be viewed and downloaded free of cost on the website.
2. Bid Document can be purchased after making online payment of portal fees through Credit/Debit/Cash Card/ internet banking.
3. At the time of submission of the bid the eligible bidder shall be required to:
   I. Pay the cost of bid document.
   II. Deposit the Earnest Money
   III. Submit a check list and
   IV. Submit an affidavit.

Details can be seen in the Bid Data Sheet

4. **Eligibility for bidders:**
   At the time of submission of the bid the bidder should have valid registration with the Government of Madhya Pradesh, PWD in appropriate class; however, such bidders who are not registered with the Government of Madhya Pradesh and are eligible for registration can also submit their bids after having applied for registration with appropriate authority.
   a) The bidder would be required to have valid registration at the time of signing of the Contract.
   b) Failure to sign the contract by the selected bidder, for whatsoever reason, shall result in forfeiture of the earnest money deposit.
5. **Pre-qualification –** Prequalification conditions, wherever applicable, are given in the Bid Data Sheet.
6. **Special Eligibility-** Special Eligibility Conditions, if any, are given in the Bid data sheet.
7. The Bid Document can be purchased only online till **time 1730hrs, 20/02/2018.** The key dates may be seen in bid data sheet.
8. The Pre Bid meeting will be held on **6th Feb 2018 at 15:00** (03:00 pm) onwards at JSCL Office, Manas Bhawan, Wright Town, Jabalpur.
9. Amendments to NIT, if any, would be published on website only, and not in newspaper.

Signature and Designation

SECTION 2

INSTRUCTIONS TO BIDDERS (ITB)

A. GENERAL

0. BACKGROUND

Jabalpur Smart City Limited intends to preserve the Identified Heritage properties which are functional and their surroundings. The property identified is Raja Gokuldas Dharamshala. The work for which tender is invited, comprises of Renovation, Restoration & Redevelopment Of Raja Gokuldas Dharamshala by reassembling these Heritage Properties. The project involves careful repairs/reassembling, strengthening of woodwork, lime mortar work, landscape, electrical , plumbing etc. all relevant works required to restore the heritage properties to its complete glory with activities. Planning of Demolition work including sorting of usable material in coordination with Archeology Department of Madhya Pradesh, if required.

This primarily will focus on conservation of built heritage, after removal of latter in congruous additions within structure. This phase covers conservation of main dharamshala block and conservation of old block in rear court. Provision of Conduit and point wiring in the main Dharamshala Block. Provision of Centralized air conditioning system in Dharamshala Block. Landscape of front court of Dharamshala Block.

1. SCOPE OF BID

The detailed description of work, hereinafter referred as 'work' is given as below:
Conservation Work of Raja Gokuldas Dharamshala.

2. GENERAL QUALITY OF WORK:

The work shall have to be executed in accordance with the technical specifications specified in the Bid Data sheet/ Contract Data, and shall have to meet high standards of workmanship, safety and security of workmen and works.

3. PROCEDURE FOR PARTICIPATION IN E- TENDERING:

The procedure for participation in e-tendering is given in the Bid Data Sheet.

4. ONE BID PER BIDDER

4.1 The bidder can be an individual entity or a joint venture (if permitted as per Bid Data Sheet). In case the J.V. is permitted, the requirement of joint venture shall be as per the Bid Data Sheet.

4.2 No bidder shall be entitled to submit more than one bid whether jointly or severally. If he does so, all bids wherein the bidder has participated shall stand disqualified

5. COST OF BIDDING:

The bidder shall bear all costs associated with the preparation and submission of his bid, and no claim whatsoever for the same shall lie on the J.S.C.L.

6. SITE VISIT AND EXAMINATION OF WORKS:

The bidder is advised to visit and inspect the site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the work. All costs in this respect shall have to be borne by the bidder.

B. BID DOCUMENTS

7. CONTENT OF BID DOCUMENTS:

The Bid Document comprises of the following documents:

1. NIT with all amendments.
2. Instructions to Bidders, Bid Data Sheet with all Annexure
3. Conditions of Contract:
   I. Part I General Conditions of contract and the Contract Data with all Annexure, and
   II. Part II Special Condition of Contract.
4. Specifications
5. Drawings
6. Priced bill of quantities
7. Technical and Financial bid
8. Letter of Acceptance
9. Agreement, and
10. Any other document(s), as specified

8. The bidder is expected to examine carefully all instructions, conditions of contract, the Contract data, forms, terms and specifications, bill of quantities, forms and drawings in the bid document, Bidder shall be solely responsible for his failure to do so.

9. PRE-BID MEETING (WHERE APPLICABLE)

Wherever the Bid Data Sheet provides for pre-bid meeting:
9.1. Details of venue, date and time would be mentioned in the Bid Data Sheet. Any change in the schedule of pre-bid-meeting would be communicated on the website only, and intimation to bidders would not be given separately.
9.2 Any prospective bidder may raise his queries and/or seek clarifications in writing before or during the pre-bid meeting. The purpose of such meeting is to clarify issues and answer questions on any matter that may be raised at that stage. In case in the opinion of a bidder there is any inconsistency or discrepancy in provisions / specifications / requirements between any parts / sections of the tender Document, the bidder should bring the same to the attention of Employer before or during the Pre-bid meeting. The decision of Employer in this regard shall be final and binding. The Employer may, at his option, give such clarifications as are felt necessary.
9.3 Minutes of the pre-bid meeting including the gist of the questions raised and the responses given together with any response prepared after the meeting will be hosted on the website.
9.4 Pursuant to the pre-bid meeting, if the employer deems it necessary to amend the bid Documents, it shall be done by issuing amendment to the online NIT.

10. AMENDMENT OF BID DOCUMENTS:

10.1 Before the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative or in response to clarifications/suggestions requested by bidders amend or modify the bid document by issue of addendum/corrigendum/clarification etc. by publication of the same on the website. Any Addendum/Corrigendum/Clarifications etc. thus issued will be binding upon bidders.
10.2 All amendments shall form part of the Bid Document.
10.3 The Employer may, at its discretion, extend the last date for submission of bids by publication of the same on the website.

C. PREPARATION OF BID

11. The bidders have to prepare their bids online, encrypt their Bid Data in the Bid Forms and submit Bid Seals (Hashes) of all the envelopes and documents related to the bid required to be uploaded as per the time schedule mentioned in the key dates of the Notice Inviting e-tenders after signing of the same by the Digital Signature of their authorized representative.

12. DOCUMENTS COMPRISING THE BID:

The bid submitted online by the bidder shall be in the following parts:
Part1- This shall be known as online Envelop A and would apply for all bids. Online envelop A shall contain the following as per details given in the bid data sheet:
i) Registration number or proof of application for registration and organizational details in the format given in the bid data sheet.
ii) Payment of the cost of Bid Document.
iii) Earnest Money
iv) An Affidavit Duly Notarized.

Part 2 – This shall be known as Online Envelope B and required to be submitted only in work where pre-qualification conditions and / or special eligibility conditions are stipulated in the Bid Data Sheet. Online envelop B shall contain a self-certified sheet duly supported by documents to demonstrate fulfillment of pre-qualification conditions.
Part 3- This shall be known as online Envelope C and would apply to all bids. Envelop C shall contain financial offer in the prescribed format enclosed with the Bid Data Sheet.

13. LANGUAGE:

The bid as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer shall be in English or Hindi. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in English duly certified. In such case, for the purposes of interpretation of the bid, such translation shall govern.

14. TECHNICAL PROPOSAL:

14.1. Only, in case of bids with pre-qualification conditions defined in the Bid Data Sheet, the Technical Proposal shall comprise of formats and requirements given in the Bid Data Sheet.
14.2. All the documents/ information enclosed with the Technical Proposal should be self-attested and certified by the bidder. The Bidder shall be liable for forfeiture of his earnest money deposit, if any document/information are found false/fake/untrue before acceptance of bid. If it is found after acceptance of the bid, the bid sanctioning authority may at his discretion forfeit his performance security / guarantee, security deposit, enlistment deposit and take any other suitable action.

15. FINANCIAL BID:

i) The bidder shall have to quote rates in format referred in Bid Data Sheet, in overall percentage, and not item wise. If the bid is in absolute amount, overall percentage would be arrived at in relation to the probable amount

of contract given in NIT. The overall percentage rate would apply for all items of work.

ii) Percentage shall be quoted in figures as well as in words. If any difference in figures and words is found, lower of the two shall be taken as valid and correct.

iii) The bidder shall have to quote rates inclusive of all duties, royalties, levies and , taxes (except G.S.T). The amount of applicable G.S.T will be paid separately to the contractor with each bill at the time of payment. The employer shall not be liable for any duties; taxes (except G.S.T) royalties and levies

iv) The material along with the units and rates, which shall be issued, if any, by the department to the contractor, is mentioned in the Bid Data Sheet.

16. PERIOD OF VALIDITY OF BIDS:

The bids shall remain valid for a period specified in the Bid Data Sheet after the date of "close for biding" as prescribed by the Employer. The validity of the bid can be extended by mutual consent in writing.

17. EARNEST MONEY DEPOSIT (EMD)

17.1 The Bidder shall furnish, as part of the Bid, Earnest Money Deposit (EMD), in the amount specified in the Bid Data Sheet.

17.2 The EMD shall be in the form of Fixed Deposit Receipt of a scheduled commercial bank, issued in favors of the name given in the Bid Data Sheet. The Fixed Deposit Receipt shall be valid for six months or more after the last date of receipt of bids. However, form(s) of EMD may be allowed by the employer by mentioning it in the Bid Data Sheet.

17.3 Bid not accompanied by EMD shall be liable for rejection as non-responsive.

17.4 EMD of bidders whose bids are not accepted will be returned within ten working days of the decision on the bid.

17.5 EMD of the successful Bidder will be discharged when the Bidder has signed the Agreement after furnishing the required Performance security.

17.6 Failure to sign the contract by the selected bidder, within the specified period, for whatsoever reason, shall result in forfeiture of the earnest money.

D. SUBMISSION OF BID

18. The bidder is required to submit online bid duly signed digitally, and envelop "A" in physical form also at the place prescribed in the Bid Data Sheet.

E. OPENING AND EVALUATION OF BID

19. PROCEDURE:

19.1 Envelop "A" shall be opened first online at the time and date notified and its contents shall be checked. In cases where Envelop "A" does not contain all requisite documents, such bid shall be treated as non-responsive, and envelop B and / or C of such bid shall not be opened.
19.2 Wherever Envelop 'B' (Technical Bid) is required to be submitted, the same shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the envelop 'B' envelop 'C' (financial bid) of bidders who are not qualified in Technical Bid (Envelop 'B') shall not be opened.
19.3 Envelop 'C' (Financial Bid) shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the Envelop 'c'
19.4 After opening Envelop 'C' all responsive bids shall be compared to determine the lowest evaluated bid.
19.5 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all the bids at any time prior to contract award, without incurring any liability. In all such cases reasons shall be recorded.
19.6 The employer reserves the right of accepting the bid for the whole work or for a Distinct part of it.

20. CONFIDENTIALITY:

20.1 Information relating to examination, evaluation, comparison and recommendation of contract award shall not be disclosed to bidders or any other person not officially concerned with such process until final decision on the bid.
20.2 Any Attempt by a bidder to influence the employer in the evaluation of the bids or contract award decisions may result in the rejection of his bid.

F. AWARD OF CONTRACT

21. AWARD OF CONTRACT:

The Employer shall notify the successful bidder by issuing a 'Letter of Acceptance' (LOA) that his bid has been accepted.

22. PERFORMANCE SECURITY

22.1 Prior to singing of the contract the bidder to whom LOA has been issued shall have to furnish performance security of the amount in the form and for the duration, etc. as specified in the Bid Data Sheet.
22.2 Additional performance security, if applicable, is mentioned in the Bid data sheet and shall be in the form and for the duration, etc. similar to Performance Security.

23. SIGNING OF CONTRACT AGREEMENT:

23.1 The successful bidder shall have to furnish Performance Security and Additional Performance Security, if any, and sign the contract agreement within 15 days of issue of LOA
23.2 The signing of contract agreement shall be reckoned as intimation to commencement of work. No separate work order shall be issued by the employer to the contractor for commencement of work.
23.3 In the event of failure of the successful bidder to submit Performance Security and Additional Performance Security, if any or sign the Contract Agreement, his EMD shall stand forfeited without prejudice to the right of the employer for taking any other action against the bidder.

24. CORRUPT PRACTICES:

The Employer requires that bidders observe the highest standard of ethics during the procurement and execution of contracts. In pursuance of this policy, the employer.

i. May reject the bid for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract; and
ii. May debar the bidder declaring ineligible, either indefinitely or for a stated period of time, to participate in bids, if it at any time determines that the bidder has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for, or in executing, a contract.

For the purposes of this provision, the terms set forth above are defined as follows:

a) 'corrupt practice' means the offering, giving, receiving or soliciting directly or in directly, anything of value to influence improperly the actions of another party;
b) 'fraudulent practice' means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a fanatical or other benefit or to avoid an obligation:
c) 'coercive practice' means impairing of harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party,
d) 'Collusive practice' means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.

(END OF ITB)

BID DATA SHEET

GENERAL

SR.NO.	PARTICULARS	DATA
1	OFFICE INVITING TENDER	OFFICE OF THE EXECUTIVE DIRECTOR, JABALPUR SMART CITY LIMITED, JABALPUR.
2	NIT NO.	**JSCL/2018/20/ADM/76**
3	BID DOCUMENT DOWNLOAD AVAILABLE FOR DATE & TIME	THE BID DOCUMENT CAN BE PURCHASED ONLY ONLINE **TILL TIME 1730 Hrs. 20/02/2018**
4	WEBSITE LINK	http://www.mpeproc.gov.in
CLAUSE REFERENCE	**PARTICULARS**	**DATA**
1	NAME OF 'WORK'	**Conservation Work of Raja Gokuldas Dharamshala.**
2	SPECIFICATIONS	AS PER ANNEXURE –E
3	PROCEDURE FOR PARTICIPATION IN E-TENDERING	ANNEXURE-F
4	WHETHER JOINT VENTURE IS ALLOWED	NO
5	PRE BID MEETING TO BE HELD	YES
	DATE, TIME & PLACE	**DATE: 06 Feb 2018** **TIME AT 15:00** ONWARDS (03:00 PM ONWARDS) PLACE: J.S.C.L OFFICE, MANAS BHAWAN, WRIGHT TOWN, JABALPUR.
6	ENVELOPMENT A CONTAINING: **i.** REGISTRATIONNUMBER OR PROOF OF APPLICATION FOR REGISTRATION AND ORGANIZATIONAL DETAILS AS PER ANNEXURE H **ii.**COST OF BID DOCUMENT **iii.**EMD **iv.**AN AFFIDAVIT DULY NOTARIZEDAS PER ANNEXURE – B SHOULD REACH IN PHYSICALFORM	**OFFICE OF THE EXECUTIVE DIRECTOR, JABALPUR SMART CITY LIMITED, JABALPUR (M.P.)** **RS 15,000/-** **RS 4,12,000/-** **Till time 1730 Hrs. 27/02/2018**
	ENVELOPE-B TECHNICAL	ANNEXURE – I AND

7	PROPOSAL	ANNEXURE –I (FORMAT I-1 TO I-5)
8	ENVELOPE-C FINANCIAL BID	ANNEXURE – J
9	MATERIALS TO BE ISSUED BY THE DEPARTMENT	ANNEXURE-K
10	PERIOD OF VALIDITY OF BID	120 DAYS
11	EARNEST MONEY DEPOSIT	RS 4,12,000/-
	FORMS OF EARNEST MONEY DEPOSIT	FDR/E-FDR
	EMD VALID FOR A PERIOD OF	180 DAYS
	FDR MUST BE DRAWN IN FAVOUR OF	EXECUTIVE DIRECTOR, JABALPUR SMART CITY LIMITED
12	LETTER OF ACCEPTANCE (LOA)	ANNEXURE L
13	AMOUNT OF PERFORMANCE SECURITY	5% OF CONTRACT AMOUNT
	ADDITIONAL PERFORMANCE SECURITY, IF ANY	as per rules
	PERFORMANCE SECURITY IN THE FORMAT	ANNEXURE M
	PERFORMANCE SECURITY IN FAVOR OF	EXECUTIVE DIRECTOR, JABALPUR SMART CITY LIMITED
	PERFORMANCE SECURITY VALID UP TO	VALID CONTRACT PERIOD PLUS 3 MONTHS

Annexure – A
(See clause 1,7 of Section 1-NIT)

KEY DATES

S.NO	WORKS STAGE	BIDDERS STAGE	START		EXPIRY		ENVELOPES
			DATE	TIME	DATE	TIME	
1	TENDER PURCHASE	PURCHASE OF TENDER-ONLINE	-	-	20/02/2018	1730 Hrs.	
2	TENDER FILING	BID SUBMISSION-ONLINE	-	-	23/02/2018	1730 Hrs	
3	MANDATORY SUBMISSION OPEN (ENVELOP-A)		24/02/2018	1500 Hrs.	-	-	ENVELOPE A ONLINE OPENING
4	TECHNICAL PROPOSAL OPEN (PQ ENVELOPE-B)		24/02/2018	1500 Hrs.	-	-	ENVELOPE B ONLINE OPENING
5	PHYSICAL SUBMISSION REACHING J.S.C.L		-	-	27/02/2018	1730 Hrs	
6	FINANCIAL BID OPEN (ENVELOPE-C)		03/03/2018	1500 Hrs.	-	-	ENVELOPE C

Original term deposit receipt of earnest money deposit, demand draft for the cost of bid document and affidavit shall be submitted by the bidder so as to reach the office as prescribed in bid data sheet, at least one calendar day before specified start time and date in key dates for opening of technical proposal as per key dates in Bid Data Sheet.

Annexure – B
(See clause 3 of Section 1-NIT)

|| AFFIDAVIT ||

(To be contained in Envelope A)

(On Non Judicial stamp of Rs. 100)

I/We _____ who is / are _____ (status in the firm / company) and competent for submission of the affidavit on behalf of M/S _____ (contractor) do solemnly affirm an oath and state that:

I/We am / are fully satisfied for the correctness of the certificates/ records submitted in support of the following information in bid documents which are being submitted in response to notice inviting e-tender No._____ for _____ (name of work) dated _____ issued by the _____ (name of the Department).

I/We am/ are fully responsible for the correctness of following self- certified information / documents and certificates.

1. That the self – certified information given in the bid document is fully true and authentic.
2. That:

a. Term deposit receipt deposited as earnest money, demand draft for cost of bid document and other relevant documents provided by the Bank are authentic.

b. Information regarding financial qualification and annual turnover is correct.

c. Information regarding various technical qualifications is correct.

3. No. close relative of the undersigned and our firm/company is working in the department.

Or

Following close relatives are working in the department:

Name _____- Post _____ present Posting _____

Signature with seal of the Deponent (bidder)

I/We, _____ above deponent do hereby certify that the facts mentioned in above paras 1 to 4 are correct to the best of my knowledge and belief.

Verified today _____ (dated) at _____ (place).

Signature with seal of the Deponent (bidder)

Note: Affidavit duly notarized in original shall reach at least one calendar day before opening of the bid.

Annexure—C
(Sec clause 5 of Section 1-NIT)

PRE- QUALIFICATIONS CRITERIA

The bidder should have:

A. Financial

I. Experience of having successfully executed(Completed): -

a) ***Three similar works,*** each costing not less than the ***amount equal to 20%*** of the probable amount of contract during the ***last 3 financial years;*** or
b) ***Two similar works,*** each costing not less than the ***amount equal to 30%*** of the probable amount of contract during the ***last 3 financial years;*** or
c) ***One similar work*** of aggregate cost not less than the amount ***equal to 50%*** of the probable amount of contract in any one financial year during the **last 3 financial years**;

II. Average annual construction turnover on the construction works not less than 50% of the probable amount of contract, during the last 3 financial years.
III. Executed similar items of work in any one financial year during the last 3 financial years, which should not be less than the minimum, physical requirement, if any, fixed for the work.
IV. Bid Capacity — Bidder shall be allotted work up to his available Bid Capacity, which shall be worked out as given in format 1-2 of Annexure I.

B. Physical

Refer Annexure-D "SPECIAL ELIGIBILITY CRITERIA"

Note:

i) The bidder will have to provide certificates for above prequalifying conditions from competent authority.
ii) The bidder should attach a PowerPoint presentation of not more than 20 slides exhibiting exemplary work.

Annexure —D
(See clause 6 of Section 1-NIT)

SPECIAL ELIGIBILITY CRITERIA

Qualification and Award Criteria for Contractor:-

1. **Prequalification Criteria of the Bidder(s)**

- The Tenderer shall meet the Qualification Criteria specified Annexure-C as a Single firm entirely on its own without forming JV/Consortium for civil works.
- Contractor should have the team of art Restorer and electrical engineers.
- The Employer or its representatives, advisors etc. reserves the right to visit previously executed sites (submitted by Contractor as part of Experience) that conform to the above criteria and assess the quality and finish of the same in the process of prequalification of the contractor
- The Employer or its representatives, advisors etc. reserve the right to conduct reference checks on the documents/ work detail submitted by the contractor in 'Technical Bid' to ensure that they have the ability to deliver on quality, timeliness and site management and co-ordination.
- The Employer may disqualify the contractor if any discrepancy is found during the assessment.

2. **Technical Pre-Qualification for Heritage Experience**

2.1. Before evaluation of the Technical Proposals, Bidder(s) are expected to meet the pre-qualification criteria, which would be a part of the Technical Consistence. Proposal ***Annexure - I (Format: I-1)*.** Bidder(s) failing to meet these criteria or not submitting requisite proof for supporting pre-qualification criteria are liable to be rejected at the Technical Proposal level. The Bidder(s) should have the requisite ability to follow the designs and drawings to execute the work, ability to manage complex situations and to effectively coordinate the work with the concerned offices/ officers of the Employer, government authorities.

2.2. The Contracting Firm should be mainly engaged in restoration works of heritage buildings, and should have completed restoration/ renovation/ redevelopment of at least 3 projects of heritage building in the last 5 years. Bidder(s)s failing to meet these criteria or not submitting requisite proof for supporting pre-qualification criteria are liable to be rejected at the Technical Proposal level. The interested parties should have technical and financial capabilities on the lines, mentioned below:

2.3. Experience:-

The Bidder(s) should have required experience in executing architectural conservation works similar in nature to the Project applied for. Minimum experience of completion of conservation work of at **least 3 projects of heritage buildings in the last 5 years *(Organization) And Should have experience of the following work under taken on heritage buildings Declared by state or central Government :-***

Also Refer Annexure - I (Format: I-1)
B. Physical Requirement

S.no	***Description***	***In any 1 project within last 5 years***
1	Structural Conservation, Dome, Roof, Vaults and Arches Repairs	Rs. 10 lakhs
2	Lime Plaster Works and render	Rs. 10 lakhs
3	Structural wood work, Purlin and beams	Rs. 25 lakhs
4	Wood Work Door And Window Restoration	Rs. 10 lakhs
5	Lakhori / traditional brick masonry works in lime motar.	Rs. 10 lakhs
6	Roofing including water proofing work	Rs. 10 lakhs
7	Decorative work such as kara (Lime punning), stucco work, stone/lime jail work, Marble work	Rs. 10 lakhs
8	Internal Electrification in heritage building	Rs. 10 lakhs

The Bidder shall provide details of the Execution of similar items of work with quantity as per format.
Refer Annexure - I (Format: I -1),
B. Physical Requirement

2.4. Domain Expertise:-

- Contractors should have skilled team of craftsmen with past experience in lime plasters, structural and architectural and interior conservation and should have worked on conservation of listed heritage buildings/protected monuments. The Contractor should have on his payroll a Site-supervisor with the requisite ability to follow the designs and drawings to execute the work, ability to manage complex situations and to effectively coordinate the work with the concerned offices/ officers of the department.

- The Bidder shall provide details of the Domain / technical experts as per format. **Refer Annexure - I (Format: I -3) List of Technical Personnel for the Key Positions.** Engagement of the proposed personnel shall be subject to approval from the JSCL. In case such approval is not granted for a certain domain expert, the

Bidder shall be required to provide a replacement with equivalent or better qualifications, abilities and relevant experience.

2.5. Domain/ Technical Expert (s) in the panel of the agency(s) & quality of work undertaken by the contractor in previous projects.

2.6. Detail of major items of construction support equipment's / machinery etc. including like Steel scaffolding, available with contractor, and will be made available in requisite quantity on site during implementation of work. [As per format] **Refer Annexure - I (Format: I -5) List of Key equipment / Machines for Construction Work**.

Annexure —E
(See clause 2 of Section 2 —ITB & clause 10 of GCC)

GENERAL RULES AND REGULATIONS FOR CONSERVATION INTERVENTION IN HERITAGE BUILDING(S) & SITE(S)

The following Rules and regulations are mandatory to be followed along with specification by the implementing organization for preservation and reuse of the historic buildings:

a) The conservation work to be undertaken at **'Raja Gokuldas Dharamshala'** is to be as per parameters of nationally and internationally accepted conservation principles.

b) Traditional building techniques are recommended to be followed in execution of the works.

c) Structural system: Recognizing the decay inherent in the structural system of the historic building, especially where there are visible signs of cracking, deflection or failure, Undertaking stabilization and repair of weakened structural members and systems and Replacing structural members only when necessary.

d) **Building exterior feature**: Retaining original masonry and mortar without application of any surface treatment.

e) Re-pointing only those mortar joints where there is evidence of moisture problem, decay and inappropriate intervention.

f) Duplicating the original mortar in composition, color and texture.

g) Duplicating old mortar in joint size, method of application and joint profile.

h) Cleaning masonry only when necessary to halt deterioration or remove graffiti and stains and always the gentlest method possible, such as low pressure water and soft natural bristle brushes.

i) Repairing or replacing, where necessary, deteriorated material with new material that duplicates the old as closely as possible.

j) Removal of molds, lichens and algae carefully by manual means through the use of nylon brushes only.

k) Replacing missing significant architectural features such as cornices, brackets, railings Retaining the original or early color and texture of masonry surface, including early signage, wherever possible.

l) Retaining and repairing window and door opening, frames, sash, glass, hardware, shutters where they contribute to the character of the building.

m) Repairing and replacing where necessary, deteriorated architectural features of wood, iron, cast iron, terracotta, tiles etc.

n) Discovering the historic paint colors and finishes of the structure and repainting with those colors to illustrate the distinctive character of the property.

o) **Building interior features**: Retaining original material, architectural features, hardware, whenever possible, such as stairs, cornices, doors paneling floorings, finishes etc.

p) Repairing or replacing, wherever necessary deteriorated material with new material that duplicates the old as closely as possible in color, texture and composition.

q) Retaining the original plaster, whenever possible.

r) Consolidating original plaster where it is found that the original plaster is weak and separating from the base. The grout to be of the original composition.

s) Discovering and retaining original paint colors and other decorative motifs or, where necessary, replacing them with color and decorative motifs based on the original.

t) Retaining the basic plan of the building, the relationship and size of rooms, corridors and other spaces.

u) Keeping new additions and adjacent new construction to a minimum, making them compatible in scale, building materials and texture.

v) Designing new work to be compatible in materials, size, color and texture with the earlier building and the area.

w) Protecting architectural details and features that contribute to the character of the building.

1. STANDARDS

Wherever specification for any work is not provided in the documents it shall be derived /enforced from the following:

a) The latest specifications, as prepared and published by Public Works Department, Govt. of Madhya Pradesh, shall be construed to be a part of the tender. These shall be followed in respect of all materials, workmanship and various tests to be performed and the acceptance criteria.

b) In respect of certain items, where Public Works Department, Govt. of Madhya Pradesh specifications are either not available or do not serve the intent of design, the Central Public Works Department, Govt. of India, Specifications shall govern.

c) Where Specifications are still found wanting, the latest provisions of **National Building Code of India / I.S / Guidelines of INTACH for conservation work** would hold good.

d) The requirement of these specifications shall be fulfilled by the Contractor within his tendered rates. The items quoted shall be deemed to have taken these specifications into account.

e) Where the relevant standard provides for the furnishing of a certificate to the Employer, at his request, stating that the materials supplied comply in all respects with the standard, the contractor shall obtain the certificate and forward it to the JSCL`s Project Manager.

f) If no standard is indicated, the relevant Indian Standard, if any, shall apply.

g) In case of discrepancy between the 'Specification of Works' and the Standards referred to herein, the 'Specification of Works' shall govern.

2. MATERIALS AND WORKMANSHIP

a) The term "Materials" shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the contractor for incorporation in the works.

b) All materials shall be new and of the quality and should match the original in color, texture and strength. New material should be of acceptable conservation grade.

c) Materials shall be transported, handled (stacked where necessary) and stored in such a manner as to prevent deterioration, damage or contamination failing which such damaged materials will be rejected and shall not be used on any part of the works under this contract.

d) Work shall be performed only by mason skilled and competent in the particular class of work. Skilled craftsperson must be engaged and traditional methods employed in reconstruction processes. All work should match the standard and quality of the original workmanship of the building.

e) The building and Art Conservation works should be carried out in a manner complying with the principles of conservation and good conservation practices as accepted internationally.

f) The contractor should provide H-frame scaffolding and other special scaffolding that may be required for accessing and working on certain parts of the building without causing any harm to the structures. Special care must be taken while working on the ground floor so that the sandstone/marble flooring is not damaged. Scaffolding may be propped against the face of the building with suitably padded buffer.

g) Recycling of the historic material: The historic material should be reused as far as possible. This essentially includes the historic timber members and traditional/ special bricks. The partially decayed timber members should also be reused after consultation with the client and the principal consultant.

h) The scaffolding should be metal cup lock system and not take support by burrowing into the historic masonry (no put log holes).

i) All vehicular movement within the site to move material or man power should move at a minimum distance of 2 meters from the buildings. These paths should be demarcated on the site. Non-availability of access or approach to site, for the use of the contractor shall in no case condone any delay in the execution of work nor be the cause for any claim for compensation whatsoever.

j) The vehicles carrying material into the site (fort precinct) should be such as to not to exceed the load carrying capacity of the bridges and the size of the gateways or as restricted by Project Manager.

3. SAMPLING AND TESTING OF MATERIALS

a) The contractor shall submit samples of such materials as may be required by the JSCL`s Project Manager for Quality Assurance and shall carry out the specified tests directed by the JSCL`s Project Manager at the site or at the supplier's premises or at a laboratory approved by the Project Manager..

b) Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Project Manager for Quality Assurance.

c) Final specifications of the building materials, to be used for conservation work, should be based on laboratory tests to ensure that they comply with the original materials. Laboratory investigations of the art work materials should be carried out to better inform proposed conservation interventions.

d) The contractor shall give the Project Manager seven days notice in writing of the date on which any of the materials will be ready for testing or inspection. The Project Manager shall attend the test at the appointed place within seven days of the said date on which the materials are expected to be ready for testing or inspection according to the contractor, failing which the test may proceed in his absence unless instructed by the Project Manager to carry out such a test on a mutually agreed upon date.

e) The contractor shall in any case submit to the Project Manager within seven days of every test such number of certified copies (not exceeding six) of the test readings as the Project Manager may require.

f) The provisions of this clause shall also apply to materials supplied under any nominated sub-contract.

4. SITE CLEARANCE

a) Jungle clearance including uprooting of rank vegetation, grass, brushwood, shrubs, stumps, trees and saplings of girth up to 30 cm measured at a height of one meter above the ground level. The roots of trees and saplings shall be removed to a depth of 60 cm below ground level or 30 cm below formation level or 15 cm below sub-grade level, whichever is lower. All holes or hollows formed due to removal of roots shall be filled up with earth rammed and levelled. Trees, shrubs, poles, fences, signs, monuments, pipe lines, cable etc., within or adjacent to the area which are not required to be disturbed during jungle clearance shall be properly protected by the contractor as directed by Project Manager.

b) Stacking and Disposal: All useful materials obtained from clearing and grubbing operation shall be stacked in the manner as directed by the Project Manager. Trunks and branches of trees shall be cleared of limbs and tops and stacked neatly at places indicated by the Project Manager. The materials shall be the property of the Government.

c) All unserviceable materials which in the opinion of the Project Manager cannot be used or auctioned shall be removed up to a distance of 50 m outside the periphery of the area under clearance. It shall be ensured by the contractor that unserviceable materials are disposed off in such a manner that there is no likelihood of getting mixed up with the materials meant for construction.

d) **FELLING TREES**: Felling - While clearing jungle, growth trees above 30 cm girth (measured at a height of one meter above ground level) to be cut, shall be approved by the Project Manager and then marked at site. Felling trees shall include taking out roots up to 60 cm below ground level or 30 cm below formation level or 15 cm below sub-grade level, whichever is lower.

e) All excavation below general ground level arising out of the removal of trees, stumps etc. shall be filled with suitable material in 20 cm layers and compacted thoroughly so that the surfaces at these points conform to the surrounding area. The trunks and branches of trees shall be cleared of limbs and tops and cut into suitable pieces as directed by the Project Manager.

f) Stacking and Disposal Wood, branches, twigs of trees and other useful material shall be the property of the Government. The serviceable materials shall be stacked in the manner as directed by the Project Manager. All unserviceable material, which in the opinion of Project Manager cannot be used or auctioned shall be removed from the area and disposed off as per the directions of the Project Manager.

g) Utmost Care shall be taken to see that unsuitable waste materials are disposed off in such a manner that there is no likelihood of these getting mixed up with the materials meant for construction.

h) The rate includes the cost involved in all the operations described above. The contract unit rate for cutting trees above 30 cm in girth shall include removal of stumps as well.

i) **DEVEGETATION**: The growth of vegetation in the joints of historic brick buildings is the principle factor in causing their ruin. Therefore the plants and trees growing on and close to the structure need to be completely eradicated.

j) In removing weeds, trees or shrubs, etc. from walls, it is essential that the roots should be completely destroyed, and during the process of raking out, any tendrils found in the joints should be followed up and removed. The stumps can be injected with chemical called Round up or tree killer, arsenic or hot lime slurry shall be poured around the roots.

k) Joints which have to be raked out in order to destroy the vegetation should, after the earth etc. has been removed, be immediately re-pointed.

l) The cutting of trees from historic masonry is an operation that demands special care. As a rule large trees should be removed in sections in order to prevent injury being done to the masonry. When jungle has to be cleared from around an ancient monument, it should be cut for at least 30 yards on all sides, unless special reasons to the contrary exists, and its roots should be completely eradicated so as to prevent them from sprouting again.

m) Refilling shall be done by using earth in layers of 200mm. thickness with compaction in pits. Another method which can be employed for the de vegetation of small saplings is drilling by mechanical or manual means and then extracting the remnants by vacuum suction

5. DISMANTLING AND DEMOLISHING

a) Dismantling: The term 'Dismantling' implies carefully separating the parts without damage and removing. This may consist of dismantling one or more parts of the building as specified or shown on the drawings.

b) Precautions: All materials obtained from dismantling or demolition shall be the property of the Government unless otherwise specified and shall be kept in safe custody until they are handed over to the Project Manager/ authorized representative.

c) **Findings on site:** The findings should be brought in to notice of the conservation architect. The constructions details will be reviewed on the basis of the new findings. The contractor should photo document the various findings on site during the course of conservation works. It is important that the contractor formulates a time plan which keeps the conservation architect informed about the various explorations in the building so that the documentation of the findings and relevant changes in the details can be carried.

d) **Marking and keeping material**: All materials removed in accordance with the items of work shall be marked as they are removed, so as to clearly show where they have been removed from, and shall be kept on the site and protected from damage until they are inspected by the Conservation Architect. Marking of the historic material is essentially important when the roofs of the rooms are opened for conservation works. Each member should be carefully removed, numbered and stacked carefully. A system should be adopted to number the members. The members will be numbered in the following manner: level no/ room no/ member no (to be numbered from north to south or east to west depending upon the spanning system) For example if the roof is opened in room no. 5 on the ground floor then the members will be numbered as- 01/05/01

e) The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Project Manager before starting the work.

f) Due care shall be taken to maintain the safety measures prescribed in IS 4130.

g) Care in removal: All demolition shall be undertaken in a careful manner with minimum disturbance to prevent any damage to other parts or to the rest of the building.

h) While removing the incompatible later additions (lime washes, cement plaster, etc.) the contractor shall take all precautions to protect the existing original details (art work, original plaster and original elements). All work on decorative surfaces shall be carried out by Art Conservators only or under their direct supervision. Precautions to safeguard the decorative surfaces/art works shall be carried out prior to commencement of civil dismantling or demolition works on the building. Suitable measures for their protection shall be adopted by the civil works contractor and firm carrying out the art conservation work in consultation with each other.

i) Protection of historic features and materials: Utmost care must be taken to ensure that the historic fabric of the building is not damaged in the course of demolition works as well as during conservation works. Special care must be taken to protect floor surfaces (nanakshahi brick floors, marble floors, tiles etc.), decorative features (khatambandi ceilings, doors and windows, wall paintings etc.).

j) Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Project Manager.

k) Necessary precautions shall be taken to keep noise and dust nuisance to the minimum.

l) All work needs to be done under the direction of Project Manager. Helmets, goggle, safety belts etc. should be used whenever required and as directed by the Project Manager.

m) The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public.

n) Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or otherwise, lowered to the ground (and not thrown) and then properly stacked as directed by the Project Manager.

o) Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.

p) Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Project Manager within a lead of 50 meters. All unserviceable materials, rubbish etc. shall be disposed off as directed by the Project Manager.

q) The contractor shall maintain/disconnect existing services, whether temporary or permanent, where required by the Project Manager.

r) No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.

s) Screens shall be placed where necessary to prevent injuries due to falling pieces. Water may be used to reduce dust while tearing down plaster from brick work.

t) Safety belts shall be used by laborers while working at higher level to prevent falling from the structure. First-aid equipment shall be got available at all demolition works of any magnitude.

DEMOLITION OF SPECIAL ELEMENTS OF STRUCTURES

u) Asbestos or any hazardous material shall be disposed at hazardous landfill site or as directed by Project Manager.

v) **Roof Trusses**: If a building has a pitched roof, the roof structure should be removed to wall plate level by hand method. Sufficient purlins and bracing should be retained to ensure stability of the remaining roof trusses while each individual truss is removed progressively. Temporary bracing should be added, where necessary, to maintain stability. The end frame opposite to the end where dismantling is commenced, or a convenient intermediate frame should be independently and securely guyed in both directions before work starts. On no account should the bottom tie of roof trusses be cut until the principal rafters are prevented from making outward movement.

w) **Heavy Floor Beams:** Heavy bulks of timber and steel beams should be supported before cutting at the extremities and should then be lowered to a safe working place.

x) **Jack Arches**: Where tie rods are present between main supporting beams, these should not be cut until after the arch or series of arches in the floor have been removed. Particular care should be exercised and full examination of this type of structure undertaken before demolition is commenced The floor should be demolished in strips parallel to the span of the arch. rings (at right angles to the main floor beams).

y) **Brick Arches:** Expert advice should be obtained and at all stages of the demolition, the closest supervision should be given by persons fully experienced and conversant in the type of work to ensure that the structure is stable at all times.

z) As much dead load as possible may be removed provided it does not interfere with the stability of the main arch rings but it should be noted that the load-carrying capacity of many old arches relies on the filling between the spandrels. On no account should the restraining influence of the abutments be removed before the dead load of the spandrel fill and the arch rings are removed.

i. The normal sequence of demolition is as namely:

(a) Remove spandrel in filling down to the springing line,

(b) Remove the arch. rings and

(c) Remove the abutment.

ii. A single span arch. can be demolished by hand by cutting narrow segments progressively from each springing parallel to the span of the arch until the width of the arch has been reduced to a minimum which can then be collapsed.

iii. Where it is impossible to allow debris to fall to the ground below, centering designed to carry the load should be erected and the arch demolished progressively. The design of the centering should make appropriate allowance for impact.

iv. In multi-span arches before individual spans are removed, lateral restraint should be provided at the springing level. Demolition may then proceed as for a single span; care being taken to demolish the spandrels down to the springing line as the work proceeds.

v. **In-situ Reinforced Concrete**: Before commencing demolition, the nature and condition of the concrete, the condition and position of reinforcement, and the possibility of lack of continuity of reinforcement should be ascertained. Attention should be paid to the principles of the structural design to determine which parts of the structure depend on each other to maintain overall stability. Demolition should be commenced by removing partitions and external non-load bearing cladding. It should be noted that in some buildings the frame may rely on the panel walls for stability. Where

hard demolition methods are to be used, the following procedures should be used.

vi. (a) Reinforced Concrete Beams: For beams, a supporting rope should be attached to the beam. Then the concrete should be removed from both ends by pneumatic drill and the reinforcement exposed. The reinforcement should then be cut in such a way as to allow the beam to be lowered under control to the floor.

vii. (b) Reinforced Concrete Columns: For columns, the reinforcement should be exposed at the base after restraining wire guy ropes have been placed round the member at the top. The reinforcement should then be cut in such away as to allow the column to be pulled down to the floor under control.

viii. (c) Reinforced Concrete Walls: Reinforced concrete walls should be cut into strips and demolished as for columns.

ix. Measurements of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed.

x. Material from demolition: No original building material elements should be removed unless specified by the Conservation Architect.

xi. Shoring: Provide all necessary temporary shoring, props, etc. Cycle of demolition shall ensure minimum disturbance and maximum stability and security to the building.

SPECIFICATION

GENERAL NOTES

- SOR of UADD / MPPWD/ CPWD Department for all works is used for Items and specifications for this project and form a part of this document.
- Electrical items to be used shall be taken from the list of makes as approved by UADD/MPPWD/CPWD.
- Detailed specifications for Non-scheduled items are also included in the document however, in case if any specification is incomplete or missing or not clear or needs further clarifications, the decision of Employer shall be binding in this regard.
- The provisions of general / special conditions of contract, those specified elsewhere in the bid document, as well as execution drawings and notes, or other specifications issued in writing by the Employer shall form part of the technical specifications of this work.

1. DEMOLITION, DISMANTLING AND REMOVAL WORK

a) All special tools & equipment required for careful demolition and dismantling shall be arranged so that no harm is caused to any part of the Heritage structure.

b) The work shall be carried out under the supervision of a traditional craftsmen, so that the method of carrying out the work can be decided by him, knowing what the under layers may be and at what strength the demolition of dismantling should be carried out so as not to harm the structural integrity of the heritage structure.

c) Proper sheeting arrangement of the monument shall be done such that the work and the debris falling while carrying out the works does not harm or injure anybody and the dust doesn't spread in the adjoining areas.

d) Traditional crafts person shall inspect all the works while it is being carried out and shall inform the Engineer if any structural or other damage or cracks are seen to the monument when the outer layers/elements/flooring are removed.

2. SPECIFICATION FOR GRASS REMOVAL

2.1 REMOVAL OF WILD VEGETATION

The wild growth like grass, bushy plants, thorny plants, etc., that have grown shall be cut with spades, sickles or any other suitable manual / automated tools etc., and the ground shall be scraped of all smaller vegetation, dressed, etc., and all the materials that are obtained from cutting, scraping, dressing operations shall be disposed outside the premises as per instructions of Engineer in Charge.

2.2 MODE OF MEASUREMENT

The "Removal of Wild Vegetation" is measured in square meters. The rates to be quoted is per square meter and shall include all the above operations like removal of wild vegetation, dressing, scrapping, loading, transporting, dumping at places outside the premises as directed by Engineer in charge by making own transport arrangements at those locations under constant supervision and care and making the area neat and clean, etc.,

2.3 MISCELLANEOUS

a) The contractor is not permitted to sow wild grasses
b) The contractor is not permitted to allow any kind of animals to graze in the field.
c) The contractor shall not construct any type of hutment / shelter in the said premises.
d) The contractor should not allow the grass to grow above a height as specified by Engineer in charge.
e) The contractor shall take necessary steps to ensure that all the electrical installations and other service like water connections, pipelines, sewer pipelines, open drains, telephone cables, etc. are not damaged by him or his workers in any way.
f) The contractor shall be responsible for all such damages and shall have to repair failing to which he has to pay entire cost of damages.
g) The contractor shall not dig any pond or construct any tank for storage of water without written permission of concerned Engineer in charge.

3. SPECIFICATION FOR DE-VEGETATION

3.1 SCOPE:

The work covered under this specification includes opening up of all layers in plan and elevation, excavation /removal of the earth, cutting and removal of the trees with its roots and applying & pouring in the plinth, for stopping the growth of trees in earth or structure.

3.2 GENERAL:

The treatment shall be provided under the supervision of experienced traditional craftsmen and only the traditional materials should be used.

3.3 MATERIALS:

Lime: - Lime A, B and C Class shall be used and shall be in confirmation with the lime specifications and as suggested by traditional craftsmen.

3.4 TREATMENT:

Opening up of all layers in plan, elevation and excavation shall be done around the trees up to the depth till roots are found. Excavation shall be done in plan areas up to the roots wherever the growth is seen. Cutting and removal of all roots from earth and ensure that no roots remain in the earth. Engineer shall inspect this. Hot Tar shall be applied to the cut ends of the roots, which are not removable, and Hot lime slurry shall be poured around the roots. This work has to be executed under strict supervision of traditional craftsmen.

Refilling shall be done by using earth in layers of 200mm. thickness with compaction in pits. After refilling hot lime slurry shall be poured on the top surface.

3.5 MEASUREMENT& PAYMENT:

Measurement shall be done in Sq.M. for the plan area in case of growth on wall elevation in case of building surface area as applicable and excavated or opened for the treatment only. The excavation shall be paid separately. The depth should not be considered for payment purpose thus the payment cannot be made in cubic meters.

3.6 MISCELLANEOUS

h) Removal of grass/bush is not consider in de-vegetation.
i) Any wall/roof which is dismantle for other purpose de-vegetation item is not to be claimed/allowed.

4. SPECIFICATION FOR LIME MORTAR

4.1 SCOPE: -

This Specification covers materials, proportions, preparation and storage of lime mortars.

4.2 MATERIALS: -

Lime: - Lime A, B and C class shall be used in the preparation of mortar and shall conform **to lime specification no. 3.3** and relevant IS codes.
Aggregates: - Any of the following or their mixture in the given proportion shall be used.
Sand: --Sand should be angular to sub angular moderately sorted aggregate of nominal size of 150um to 1.18mm. River sand shall not be used.
Water: --For all mortars water used shall be free from mud, clay, acidic, basic or organic impurities and shall be drinkable.

4.3 PROPORTIONS: -

Different types of ratio shall be used for works as per different trades mentioned in BOQ in which the quantity of lime is based on standard lime.

The volume of lime for purpose of the table in lime specifications shall be on dry hydrated lime basis. Where Quick lime is used the ratio shall be worked out accordingly, so as to provide the necessary quantity of dry hydrated lime.

4.4 PREPARATION OF MORTAR:-

Slaking of lime: - Quick Lime shall be properly slaked and then used. The hydrated lime can be used as such for making mortar or may be run into putty and then used for making mortar (In contrast to Quick lime.)

4.5 TANK SLAKING: -

Two or preferably three tanks lined with stone or brick large enough to permit, stirring and hoeing shall be prepared (generally tanks suitable for 5 quintals or 10 quintals of quick lime are used in practice).

One of these shall be at the higher level and about 0.5 m deep and the remaining about 0.7 to 0.8 m, deep at lower level such that the contents of higher tank shall flow into the lower tanks by gravity.

The upper tank shall be filled to half its depth with water. Quick lime shall be gradually added till it fills the entire bottom to about half the depth of water. (Never add water to lime). While quick lime is being added it shall be

constantly stirred and hoed so as to break up the lumps. No part of the lime shall be allowed to expose above water level. As the lime slakes with evolution of heat temperature begins to rise and more lime or water may be added till the required temperature is reached and that temperature should be maintained by the addition of more lime or water till all the lime apparently has slaked, the stirring and hoeing shall be continued during the above process and for some period even after the slaking is apparently over.

4.6 MATURING:

After the lime has cooled it shall be transferred to the lower tank allowing it to flow through I.S. sieve size 1.18mm, more water shall be added if required and it shall be left undisturbed as under Class B lime for minimum of 12 hours and be used in seven (7) days. The putty shall be allowed to mature but not allowed to dry out till it is used.

4.7 MAKING PUTTY FROM HYDRATED LIME:

The putty shall be obtained by adding hydrated lime to water in a tank and stirring to the consistency of cream and allowing to stand as under:

Class A lime = Not more than 12 hours.
Class B lime = Minimum for 2 days.
Class C lime = Minimum for 2 days for mortar used for finishing coat of plaster and minimum of 16 hours for mortar used for other purposes.

The putty shall be allowed to mature but not allowed to dry out till it is used.

4.8 MAKING OF COARSE STUFF:

Manual mixing: -- After the lime has matured as specified above, more water shall be added and the putty stirred, till milk of lime is obtained. The fine aggregate shall be added with a whirling motion of hand so that the aggregate falls evenly in the tank. The milk of lime shall be stirred and hoed continuously till the required quantity of fine aggregate is added.

4.9 MORTAR MILL (GHARAT) MIXING:

Quick lime shall not be used directly while dry hydrated lime can be used directly for making mortar. Putty or dry hydrated lime and fine aggregates in required proportions shall be put along with water in the Gharat spreading uniformly all along its circumference and ground till a mortar of uniform color and desired consistency is obtained. As grinding is done the mixture shall be continuously raked and turned over and over specially from corners and sides. Mortar shall be ground not less 180 revolutions or for 1/2 hours minimum, considering a Gharat to have 15 rpm.

4.10 MORTAR FOR FINAL COAT OF PLASTER:

It shall be ground for a second time after an interval of 2 days for class C limes.

4.11 STORAGE OF MORTAR:

Lime mortars prepared from Class A and Class B limes shall be used up as soon as possible after mixing but not later than 12 hours for Class A limes from the time of first grinding and 2 days for Class B limes from the time of making Putty or first grinding as the case may be. Mortars from class C limes can be used for periods longer than 3 days after the making of mortar provided they are protected from drying out.

4.12 REJECTION OF MORTAR:

Dried out lime will not be used under any circumstances. Mortar not found in accordance with the Specifications above and unsuitable according to field and laboratory tests of lime mortar shall be rejected. The Contractor at his own cost shall remove rejected mortar from the site of work within 24 hours.

5. LIME SAND/SURKHI PLASTER (FOR UNDERCOATES AND EXCLUDING ITS USE ON FLOOR)

5.1 SCOPE:

The work covered by this specification shall be in furnishing and installation of lime plaster finish over walls, ceiling etc. For all plaster works, double scaffolding having two sets of vertical supports shall be provided, so that scaffolding is independent of walls. For ceiling scaffolding, in stages where required shall be done. Preferably, steel tubular scaffolding confirming to I.S. 2750 and carried out in accordance with I.S. 4014, shall be used.

5.2 SURFACE PREPARATION:

Surfaces to be plastered shall be thoroughly cleaned of all dust, grease, oil and loose mortar. Efflorescence if any shall be removed by brushing and scraping and then applying few drops of hydrochloric acid added to water for 2 to 3 days. The entire surface shall then be thoroughly washed with brush and clean water.

Joints shall be raked out to depth of 20mm. minimum with a hook tool made for the purpose. Care should be taken not to damage masonry edges while raking. All surfaces of concrete, old plaster and stone shall be roughened sufficiently for bond. Soft or crumbling stonework and other surfaces shall be dismantled and remade if required. All surfaces to be plastered shall be thoroughly wetted for 24 hours before commencing plaster and shall be kept damp during the progress of work. At the same time the wall should not be too wet, as plaster is then likely to fall out and will not be satisfactory. It is essential to maintain uniform suction of water by receiving surfaces, which shall be ensured by damping evenly all dry patches before applying plaster. The Engineer will inspect all preparatory work and plastering shall not be commenced, until the Engineer approves all preparatory works.

5.3 MATERIALS:

LIME:- Lime B class shall be used in the preparation of mortar and shall, conform to lime specification.

AGGREGATES:- Any of the following or their mixture in the given proportion shall be used.

SURKHI:- Surkhi is the powdered burnt bricks, brickbats and is used as an admixture to lime both for making lime mortar and lime plaster. surkhi shall always be obtained from fully burnt or slightly under burnt, but never from over brunt bricks. surkhi obtained from burnt loam shall not contain any un-

burnt soil. surkhi shall be perfectly clean, free from an admixture or any foreign. Surkhi shall not contain soluble sulphate more than 0.5% for exposed work and work in damp situations and not more than 1.0% when used for works in dry and internal situations.

GUR/ SUGARCANE MOLASSES:- 'Lapti' gur, without impurities, is to be added in the specified proportion.

GUGAL/BEL :- 'Bhainsa' googal / Bel without impurities, is to be added in the specified proportion.

METHI: - Methi water to be prepared over a period of 3 days by keeping the methi soaked in water and hand-abraded on every day basis. The resultant liquid concoction should be filtered to make it ready for use.

WATER:- For all mortars water used shall be free from mud, clay, acidic, basic or organic impurities and shall be drinkable.

5.4 APPLICATION & CURING:

The first coat shall be done for saresi. Saresi is a lime plaster as specified in specification should be in ratio 1:1 (lime: Sand). The saresi shall be applied to the wall with trowel in thickness 5 to 8mm. The saresi surface shall be raked out, immediately after applying saresi when it is wet, by trowel at distances 30mm. to 45mm. in jig jag pattern. The saresi shall be done for complete area under execution and should be left for 2-3 days.

Now the surface shall be thoroughly wetted for 24 hours before applying Surkhi plaster. Ceiling plaster shall be completed before commencement of wall plaster. The Lime Surkhi plaster in ratio 1:1 (lime: sand) for wall shall be done from the top to bottom and if possible each wall should be done on the same day if to avoid defects or unevenness at the joints. To ensure even thickness and a true surface, about 150mm. x 150mm. of Lime Surkhi plaster shall first be applied horizontally and vertically at 2m. centers approximately, over the entire surfaces, to serve as gauges.

The lime surkhi mortar shall be filled between two gauges with a straight edge wooden piece (plainer or butkada). The plastered surface shall be firmly pressed to uniform plumb and plane. The surface shall be left for 24 hours. The surface shall develop cracks after 24 hours.

The surface shall be hammered at the cracks with the help of wet wooden sticks (jaal / bent wood) made for the purpose. The process should continue till the cracks are removed. The surface shall be left for 7 days and shall be cured.

All corners, angles, junctions, etc. shall be truly vertical, horizontal or carved as the case may be and shall be carefully finished. Rounding or chamfering of corners or junctions wherever required shall be done without any extra payment. No portion shall be left out initially to be patched up later on. Before applying Lime Sand, loi the entire surface of the Lime Sand plaster

should be rechecked with a true straight edge (wooden or aluminum plainer 2.5m long), plumb, string, level, etc.

If any crack appears on surfaces or if any portion found soft or if sound defective due to less lime, improper curing or any other reason, the relevant portion shall be removed and redone as per the instruction of the Engineer.

The surface is thoroughly wetted before applying loi. Now the Lime Sand loi shall be apply in thickness 2mm. (ratio 1:2) is applied with the plainer. The surface shall be smoothened by rubbing and pressing.

The total thickness of the lime Lime Sand plaster, inclusive of all three coats could be from 15MM to 40 mm as required at site.

5.5 MEASUREMENT & PAYMENT:

The measurement shall be in Sq.M. as per drawings and BOQ. Opening shall be deducted in full and jambs or soffits shall be considered. The rate shall include jambs, curves at the junctions of walls, ceilings, arches etc. and at all corner. The above procedure shall apply to the both faces of the wall. No extra charge shall be paid for drip moulds, tapkas or grooves areas. If the average thickness of the plaster done by the Contractor is more than the specified one then no extra payment shall be made.

6. SPECIFICATION FOR LIME

6.1 SCOPE:

This specification lays down requirements for the physical and chemical properties and supply and storage of the different classes of lime.

6.2 TERMINOLOGY:

- **Fat Lime:** The lime, which has high calcium oxide content and is dependent for setting and hardening solely on the absorption of carbon dioxide from the atmosphere.
- **Hydraulic Lime:** Lime containing small quantities of silica and alumina and/or iron oxide which are in chemical combination with some of the calcium oxide content, giving a putty or mortar which has the property of setting and hardening under water.
- **Semi-Hydraulic Lime:** It is defined by having less than 12% clay which will make a set under water after about 20 days. It is usually an off-white colour, and makes a fatty (fairly sticky) mix which is easy to use.
- **Lump Lime:** Quicklime as it comes from kilns.

6.3 CLASSIFICATION:

Building limes shall be classified as below: -

Class A - Eminently hydraulic limes used for structural purposes.

Class B - Semi-hydraulic limes used for mortar for masonry work and plaster excluding finishing layers.

Class C - Fat limes used mainly for finishing coat in plastering, white washing and with suitable admixture, such as surkhi or any other pozzolanic material to produce artificial hydraulic mortar.

6.4 PHYSICAL AND CHEMICAL REQUIREMENTS:

Physical requirements: -The physical requirements of building lime are as given in the Table below.

TABLE I.
Physical Requirements of Building Limes.

S.No	Characteristics	Class A	Class B		Class C		Method of test. Refer to
		Hydrated Lime	Quick Lime	Hydrated Lime	Quick Lime	Hydrated Lime	
(i)	Fineness						IS:6932 (Part 4) –1973*
	a) Residue on 2.36 mm IS Sieve, percent, *Max*	Nil	--	Nil	--	Nil	
	b) Residue on 300 micron IS sieve, percent, *Max*	5	--	5	--	Nil	
	c) Residue on 212 micron IS Sieve, percent, *Max*	--	--	--	--	10	
(ii)	Residue on slaking:						IS: 6932 (Part 3) –1973**

S.No	Characteristics	Class A	Class B		Class C		Method of test. Refer to
	a) Residue on 850 micron IS Sieve, percent, Max	--	10	--	5	--	
	b) Residue on 300 micron IS Sieve, percent, Max	--	--	--	5	--	
(iii)	Compressive strength, Min, N/mm2						IS : 6932 (Part 7) –1973#
	a) at 14 days	1.75	1.25	1.25	--	--	
	b) at 28 days	2.8	1.75	1.75	--	--	
(iv)	Transverse strength, at 28 days, Min, N/mm2	1.0	0.7	0.7	--	--	IS : 6932 (Part 4) –1973#
(v)	Workability bumps, Max	--	--	--	12	10	IS : 6932 (Part 8) –1973^
(vi)	Volume yield ml/g, Min	--	--	--	1.7	--	IS : 6932 (Part 6) – 1973%
(vii)	Soundness, Le Chaterlier expansion , mm, Max	5	--	5	--	--	IS : 6932 (Part 9) –1973***
(viii)	Popping and pitting	Free from pop and pit	--	Free from pop and pit	--	Free from pop and pit	IS : 6932 (Part 10) –1973%%

* Method of tests for building limes: Part 4 Determination of fitness of hydrated lime.

** Method of tests for building limes: Part 3 Determination of residue of slaking of lime.

@ Method of tests for building limes: Part 11 Determination of setting time of hydrated lime.

Method of tests for building limes: Part 7 Determination of compressive and transverse strengths.

^ Method of tests for building limes: Part 8 Determination of workability.

% Method of tests for building limes: Part 6 Determination of volume yield of quick lime.

*** Method of tests for building limes: Part 9 Determination of soundness.

%% Method of tests for building limes: Part 10 popping and pitting of hydrated lime.

Chemical requirements: -The chemical requirements of building limes shall be as given in Table

TABLE II
CHEMICAL COMPOSITION OF LIMES

S.No	Characteristics	Class A	Class B		Class C		Method of test, ref.to
		Hydrated	Quick	Hydrated	Quick	Hydrated	
(i)	Calcium and magnesium oxides, percent, Min (on ignited basis.)	60	70	70	85	85	IS:6932 (PART 1) -1973*
(ii)	Magnesium oxides, percent (on ignited basis), Max	6	6	6	6	6	IS:6932 (PART 1) -1973*
(iii)	Silica, alumina and ferric oxide, percent, Min (on ignited basis)	20	10	10	--	--	IS:6932 (PART 1) -1973*
(Iv)	Insoluble residue in dilute acid and alkalie, percent, Max (on ignited basis)	15	10	10	2	2	IS:6932 (PART 5) -1973*
(v)	Carbon dioxide, max (on oven dry basis).	5	5	5	5	5	IS:6932 (PART 2) -1973@
(vi)	Free moisture content, percent, Max	2	--	2	--	2	IS:151411 959#

(vii)	Available lime as CaO, percent, Min (dry basis)	--	--	--	75	75	IS:151411 959#

* Method of tests for building limes : Part 1 Determination of insoluble residue, loss on ignition, insoluble matter, silicon dioxide, ferric and aluminium oxide, calcium oxide and magnesium oxide.

@ Method of tests for building limes : Part 2 Determination of carbon dioxide content.

Method of sampling and test for quick lime and hydrated lime.

6.5 SUPPLY AND STORAGE:

- **Class A-** Lime shall be supplied as hydrated lime only.
- **Class B -** Limes shall be supplied both as quick lime and hydrated lime.
- **Class C Hydrated lime-** Or bag lime, a non hydraulic lime available is produced by slaking with a precise amount of water which is driven off during the reaction, resulting in dry powder.

The material shall be supplied at the site and stacked as given below in a store or any other place to be dry and under cover well protected from rain.

Quick lime deteriorates quickly as it attracts moisture and carbon dioxide from atmosphere as such should be run to putty as quickly as possible. For storing it should be piled up and covered with a blanket of lime dust to exclude moist air.

When hydrated lime is to be stored for a long time it should be filled in bags and kept in a dry place.

6.6 REJECTION OF LIME:

The Contractor at his own expense shall remove lime, which has been rejected by the Engineer, from the site of work within 3 days.

7. SPECIFICATION OF SURKHI

7.1 SCOPE:

This specification lays down requirements regarding fineness and strength of Surkhi as used in mortars.

7.2 GENERAL:

Surkhi is the name given to powdered burnt bricks, brickbats or burnt clay loams (Calcined clay Pozzolana) and is used as an ingredient to form a mixture with lime for making structural mortar or plastering mortar.

7.3 MANUFACTURE:

Surkhi shall not contain any impurities and un-burnt soil.

7.4 GENERAL PROPERTIES:

Surkhi shall be perfectly clean, free from any foreign matter and shall conform to I.S. 1344. Surkhi shall not contain soluble sulphate more than 0.5% for exposed work and work in damp situations and not more than 1.0% when used for works in dry and internal situations. Surkhi shall not be used in situations where there is much salt in the soil. On sieving through I.S. Sieve 3.35 mm no residue should be left on the sieve and on 1.70mm shall not be more than 10% by weight of the sample.

- **Lime Reactivity:** When tested in accordance to Appendix B of I.S.1344 the lime reactivity of surkhi shall be such that the average compressive strength of test cubes (of side 7.06 cm.) on twenty eight days of curing shall not be less than 40 Kg./sq. cm. Cubes shall be prepared from one part of lime Surkhi mortar (1:2) mixed with three parts standard sand.
- **Drying Shrinkage:** Drying shrinkage should be maximum 0.15 as per I.S. Code 1344, 1981.

7.5 STACKING

Surkhi shall be stacked on masonry or wooden platform in regular stacks as of size 2.0m x 2.0m x 0.6m at the places as directed by the engineer and shall be protected from dust, rains and dampness and shall be kept under adequate coverings provided by the contra

8. LIME PLASTER (FINISHING COATES)

8.1 SCOPE:

This specification covers lime-sand and lime surkhi plasters and lays down requirements for mortar for plaster and specified method of application of the different coats and mode of measurement & payment for lime plaster.

8.2 MATERIALS:

Mortar For Plaster: Unless otherwise specified in the Bill of Quantities, lime mortar mixes shall be as per specification and shall be prepared as per specification of lime mortar. The mortar, which has set or hardened before being used shall be rejected and immediately, removed from site.

8.3 TWO/THREE COAT PLASTER:

APPLICATION OF RENDERING COAT:

In this case the rendering coat shall be a combination of the rendering floating coat of the "Three coat Plaster"' and done under one continuous operation except that the scratching of the rendering coat as specified for three coat plaster work above shall not be done here and the total thickness shall be 12 mm.

APPLICATION OF FLOATING OR SECOND COAT:

The rendering coat shall be cleaned of all dirt, dust and other loose mortar droppings and lightly wetted. Patches 15 x 15 cm. Or strips 10 cm. Wide shall be applied at suitable spacing to act as gauges. Then the mortar shall be thrown with mason's trowel spread and rubbed to the required plain surface with wooden float. The surface obtained shall be dead true in all directions.

In case of lime and plasters the finishing coat shall generally be applied immediately as given below.

In case of lime-surkhi plasters the floating coat shall be allowed to slightly set and then lightly beaten crises cross with float's edge at close spacing for about 4 cm. This shall be cured to set completely for a minimum period of 10 days and then allowed to dry out completely.

APPLICATION OF FINISHING COAT WITH:

Immediately after the floating coat has been applied the finishing coat consisting of the cream of lime shall be applied with steel trowels rubbed and finished smooth. The rubbing should be continued till it is quite dry.

It shall be cured for at least 7 days, curing should be started only after 24 hours.

LOI:

The surface shall be cleaned of all dirt, dust and any mortar droppings etc. It shall be fully wetted and then the finishing coat shall be applied with suitable trowels rubbed hard and finished smooth.

JHIKI – MARBLE POWDER

Water proofing Jhiki plaster 5-8 mm thick to be done instead of Loi on the two coats of lime surkhi plaster, Lime is slaked with curd and gur in proportion – (50 Kg Lime: 2 Kg Curd: ½ Kg Gur) for 15 days with changing of water everyday. After 15 days, one part of this lime putty is mixed with 2 parts of Jhiki and manually grounded on stone. The process is repeated two to three times with interval of one day between the process. The obtained mixture is now ready for use on the prepared surface. The surface is prepared by cleaning it removing all dust and then receives a coat of solution of sugar and water. The Jhiki plaster is normally done in three coats with interval of one day between coats. Before applying fresh coat, the surface is given a rub using masons wooden hand held tool locally called 'batkara'.

No curing shall be done after the finishing coat has been applied

8.4 MEASUREMENT & PAYMENT:

The measurement shall be in Sq.M. as per Standard specification.

9. STUCCO WORK -

9.1 SCOPE:

This specification covers lime surkhi stucco/decorative plasters and lays down requirements for mortar for plaster and specified method of application of the different coats and mode of measurement & payment for lime plaster.

9.2 MATERIALS:

Mortar For stucco work : Unless otherwise specified in the Bill of Quantities, lime mortar mixes shall be as per specification and shall be prepared as per specification of lime mortar. The mortar, which has set or hardened before being used shall be rejected and immediately, removed from site.

9.3 MAKING OF DESIGN /ORNAMENTATION IN PLASTER:

APPLICATION OF RENDERING COAT:

In this case the rendering coat shall be a combination of the rendering floating coat of the "Three coat Plaster"' and done under one continuous operation except that the scratching of the rendering coat as specified for three coat plaster work above shall not be done here and the total thickness shall be 12 mm.

APPLICATION OF FLOATING OR SECOND COAT:

The rendering coat shall be cleaned of all dirt, dust and other loose mortar droppings and lightly wetted. Patches 15 x 15 cm. Or strips 10 cm. Wide shall be applied at suitable spacing to act as gauges. Then the mortar shall be thrown with mason's trowel spread and rubbed to the required plain surface with wooden float. The surface obtained shall be dead true in all directions.

In case of lime and plasters the finishing coat shall generally be applied immediately as given below.

In case of lime-surkhi plasters the floating coat shall be allowed to slightly set and then lightly beaten crises cross with float's edge at close spacing for about 4 cm. This shall be cured to set completely for a minimum period of 10 days and then allowed to dry out completely.

APPLICATION OF FINISHING COAT WITH:

Immediately after the floating coat has been applied the finishing coat consisting of the cream of lime shall be applied with steel trowels rubbed and finished smooth. The rubbing should be continued till it is quite dry.

. Intermediate Coats - second through third coats depending on specified final stucco thickness.

Immediately after the floating coat has been applied the finishing coat consisting of the cream of lime shall be applied as per design with steel trowels rubbed and finished smooth. The rubbing should be continued till it is quite dry.

It shall be cured for at least 15 days, curing should be started only after 24 hours.

The surface shall be cleaned of all dirt, dust and any mortar droppings etc. It shall be fully wetted and then the finishing coat shall be applied with suitable trowels rubbed hard and finished smooth.

9.4 MEASUREMENT & PAYMENT:

The measurement shall be in Sq.M. The elevation area of wall/surface were stucco work is done to be measure as.

10. POINTING WITH LIME MORTAR

10.1 METHOD

The raked joints of the stone wall or the brick wall to be pointed shall be kept wetted for the pointing to be done.

The mortar for pointing shall consist of 1 part by lime and1 parts by surkhi . This mortar shall be applied to the wetted joints uniformly. The joints of the pointed work shall be neatly defined by pointing lines being regular and uniform in breadth. The edges of the pointing shall be cut off parallel so that well defined lines are seen at 19 mm apart. The pointing shall be kept well-wetted least for 5 days after pointing is finished.

10.2 MEASUREMENT & PAYMENT:

a) The measurement shall be in Sq.M. as per Standard specifications.

b) For jambs, soffits, sills, etc., for openings not exceeding 0.5 m. each in area; for ends of joists, beams, posts, girders, steps, etc., no: exceeding 0'5 ma each in area; and for openings exceeding 0.5 ma and not exceeding 3 ma each, **deductions and additions** shall be made in the following manner:
   - No deduction shall be made for ends of joists, beams, posts, etc. and openings not exceeding 0.5 m each, and no addition shall be made for reveals, jambs, soffits, sills, etc., of these openings nor for finish around ends of joists, beams, posts, etc.
   - Deductions for openings exceeding 0.5 Sq.M but not exceeding 3 Sq.M each shall be made as follows and no addition shall be made for reveals, jambs, slits, sills, etc., of these 'openings:
     I. When both faces of wall are pointed with the same type of pointing, deduction shall be made for one face only.
     II. When two faces of wall are pointed with different types of pointing or if one face is. plastered and the other pointed, deduction shall be made in the plaster or pointing on the side on which the width of reveals is less than that on the other side, but no deduction shall be made from plaster or pointing on the other side. Where widths of reveals on both faces of wall are equal, deduction of 50 percent of area of opening on each face shall be made from areas of plastering and/or pointing as the case may be.
     III. When width of door frame is equal to thickness of wall or is projecting beyond thickness of wall, full deduction for opening shall be made from each pointed face of the wall.
     IV. When only one face is pointed and the other face is not pointed, full deduction shall be made from pointing if width of reveal on the pointed side is less than that on unpointed side,

but if widths of the reveals on both sides are equal or width of reveal on pointed side is more, no deduction shall be made nor any addition shall be made for reveals, jambs, soffits, sills, etc.

- In case of openings of area above 3 Sq.M each, deduction shall be made for opening on each face but jambs, soffits and sills shall be measured.

11. LIME CONCRETE (DHAR) ON FLOORING/ROOFING

11.1 LIME CONCRETE:

This specification lays down requirements regarding materials, laying of sub-floor, and protection and finishing of lime concrete flooring.

11.2 MATERIALS:

Lime: Lime shall be fat lime and shall conform to lime specifications
Surkhi: Surkhi shall conform to surkhi specifications
Brick aggregate: 25 mm nominal size stone aggregate.

11.3 PREPARATION OF LIME CONCRETE

The main ingredient of this concrete is slaked lime as binding material. The slaked lime is obtained in various forms as hydrated lime powder, lime putty, slaked lime slurry that is prepared by grinding in suitable Grinding Mills. Slaked lime is first mixed with sand to prepare lime mortar which is then further mixed with coarse aggregates, in suitable proportion. For preparation of lime concrete, first hard impervious level base is prepared by stones or brick pitching.

Then quantity of sand is spread as the horizontal base. Generally lime & sand are taken in ratio of 1:1 to 1:3 by volume. Measured quantity of slaked lime is then added to sand and then mixing is done. In this mixing, water is sprinkled continuously to make the whole mass plastic.

Then the whole mass is allowed to mature for 1 to 3 days. After that coarse aggregates of desired type are used to lay on the prepared hard impervious level surface. After that lime mortar which is made with sand & lime is introduced into the base. Sufficient water is sprinkled over the base and it is cut into the layers and then is turned upside down with the help of spade or shovel until the whole assembly has become uniform

11.4 LAYING OF LIME CONCRETE

- Preparation of lime concrete laid to fall with 25 mm nominal thickness stone/brick aggregate and 50% lime mortar in 1:2 (1 lime: 1 surkhi 1 sand) laid over a sub-floor of stone/brick ballast and sand.
- Top layer finished with old lime putty. The surface thus applied with the paste is allowed to harden under normal temperature but protected from the direct sun and dusty wind.
- The surface of floor to be rammed with wooden dambusa till the surface is tight and compact with curing & Beating shall be carried for 7 days and further curing for next 7 days.
- In case of deep crack appearing in concrete top 3" of concrete layer shall be completely removed and relayed as per above mention method.

11.5 PROPERTIES OF LIME CONCRETE

Lime concrete provides good bases to bear the sufficient loads and also provide certain degree of flexibility. It adjusts very well when it is in contact with surface. Lime concrete also exhibits certain degree of water proofing property and thus prevents subsoil dampness in floors and walls. Lime concrete also exhibits volumetric stability. It can be made easily and can be available at much cheaper rates. It also resists weathering effects and is very durable.

12. TRADITIONAL BRICK ON EDGE FLOORING:

This specification lays down requirements regarding materials, laying of sub-floor, and protection and finishing of brick on edge flooring

12.1 MATERIALS

- Lime: Lime shall be fat lime and shall conform to lime specifications
- Surkhi: Surkhi shall conform to surkhi specifications
- Brick aggregate: 25 mm nominal size stone aggregate.
- Traditional nanakshahi or lakhori bricks: 180mm x 100mm x 40mm

12.2 LAYING METHOD:

Providing and laying of the traditional brick on edge flooring with lakhori or nanakshahi bricks on 20mm thick lime concrete leveling course laid over the sub- base of 50mm thick bed of local sand evenly spread and rammed brick ballast bed 150mm thick including the filling of joints of the brick courses with

lime mortar. Post construction the exposed mortar joints in floors to be neatly scraped and raked with metal brush.

12.3 MEASUREMENT & PAYMENT:

The measurement will be in square meters according to actual area of flooring/roofing.

13. LIME KARA

13.1 ITEM: LIME KARA FINISH 3 TO 5 MM THICKNESS

Providing and application of Lime Kara of 1:2 (1 slaked & sieved Lime: 2 Zikki powder) on Lime Surkhi / Lime rock sand plastered wall surfaces, with thickness between 3 to 6 MM including organic additives, as per traditional practices. Zikki powder shall be free of any impurities, lumps, etc. The preparation of mortar is to be done following traditional practice includes using chakki/garat (wet grinding of lime and Zikki powder by heavy stone mill / chakki/garat), application shall be done in 2 layers, first base layer shall be of 2 to 3 MM thick, Second layer shall be of not more than 2 mm and should be done with a gap of minimum 7 days of previous layer and not more than 12 days from previous layer. Lime shall be slaked minimum for 60 days in separate tanks, with repeated process of sieving with muslin cloth and changing water every 2 to 3 days. Only Fat Lime / non hydraulic shall be used and should be free of any impurities. Preparation of kara (mortar) shall be done in small batches. Final layer of Kara shall be cured and traditional process of rubbing & polishing shall be done by expert craftsman till desired finish is not achieved on the surface. Post application, Surface shall be free from any kind of hairline cracks, undulations, patchy finish. Finished surface shall be free from any powder / chalk on the surface. Item also includes all lead and lift, establishing work yard / chakki, scaffolding, formwork tools and implements etc.

NOTE:-

a. Before application of the Kara, base lime plaster shall be free from any cracks, bulge or undulations. Lime plaster shall be well cured and should be 60 days old.
b. Inspection of finished Kara surface shall be done after 1 month of application.
c. Item shall be measured for surface of application in Square Meters.

13.2 MEASUREMENT & PAYMENT:

The measurement will be in square meters according to plan area of wall/ceiling.

14. LIME WASH:

14.1 SCOPE:

This specification for white washing lays down the method of preparation of surface and application of white wash, over it and its mode of measurement. White wash may be applied over un-plastered brickwork, stone masonry and all plastered surfaces.

14.2 MATERIALS:

Lime: - Lime used for white washing shall be freshly burnt Class C lime of purely white color conforming to specification
Water: - Water shall be clear, drinkable, and free from all organic and suspended impurities.
Gum: - It shall be of the quality approved by the Engineer.
For standard whiteness the following is to be followed:

"In 1Kg. of Lime 25 gm. of Titanium Oxide and 20 gm. Of Zinc Oxide should be Mixed"

14.3 PREPARATION OF SURFACE:

New Surface: -The surface shall be broomed to clean all dirt, dust, mortar drops and other foreign matter, before white wash is applied.
Cement plastered surfaces to be white washed shall be left slightly rough and smooth finish by steel float shall not be obtained by rendering of pure cement.

Old Surfaces: -

(a) Surface already white washed: - The surfaces which have once been white washed the old surface shall be broomed down to remove all loose scale, dust, dirt and other foreign matter. In special cases the Engineer may order the removal of the film over the entire surface by rubbing down or scrapping.

(b) Surface already colour washed: - Where the surfaces have once been previously colour washed the old colour wash must be entirely removed before the white wash is applied. The surface shall be prepared by brooming down, steel wire brushing, scrapping or other means as may be ordered to produce an approved clean and fair surface.

(c) Old surface spoiled by smoke soot: - The surfaces shall be rubbed with over-burnt surkhi or brick bats (Kharanja) or steel wire brushes or by scraping as approved by the Engineer, brooming and washing the surface and then a priming coat of charcoal powder mixed in white wash shall be applied and allowed to dry before the coat of white wash is applied.

(d) Oil and grease spots or smooth surfaces shall be rubbed with Kharanja or any other suitable material.

(e) All unsound portions of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again, after raking the masonry joints properly. Such portions when dried shall be given one coat of white washing. All undesirable nails shall be removed and the holes and cracks filled with mortar similar in composition to the surface.

14.4 SCAFFOLDING:

No part of scaffolding shall rest against or touch the surface to be white washed. Scaffolding shall be shed with gunny bags to prevent damage or scratches to the walls and floors. For white washing the ceiling, external walls etc. proper scaffoldings duly approved by the Engineer, shall be erected.

14.5 PREPARATION OF WHITE WASH:

White wash shall be prepared by thoroughly slaking the lime at site in a drum or any other vessel. Slaking shall be carried out for at least 24 hours. Water shall be added to the slaked lime at the rate of about 5 litres per Kg. of un-slaked lime it shall then be stirred and strained through a clean coarse cloth.
Gum solution prepared by dissolving in water 10 gms. of gum of each Kilograms of un-slaked lime or about 5 litres of lime shall be added in white wash solution used for the final coat. Small quantity of ultramarine blue shall also be added to the last two coats solution and the whole stirred thoroughly before use.

14.6 APPLICATION OF WHITE WASH:

The white wash shall be applied with 'Moonj' brushes in the number of coats as per Schedule of Quantities or as specified by the Engineer.
The operation for each coat shall consist of a vertical stroke of brush given from top downwards, another from bottom upwards immediately applied over the first one and similarly one horizontal stroke applied by brushing from right left wards immediately followed by one from left right wards. Horizontal stroke shall be applied while the vertical stroke is still wet. Next coat shall be commercial only when the previous coating has dried thoroughly.
The 'Moonj' brush shall be dipped in white wash, pressed lightly against the wall of the container, and then applied by lightly pressing against the surface with full swing of hand. Each successive brush shall be carried over from the proceeding one. White wash over the ceiling shall be done before that on the walls.
Over walls white washing shall be started from the ceiling end and the final coat shall be vertical.

14.7 PROTECTION:

Doors, windows, floors and other articles of furniture shall be kept protected from splashes. Splashing and droppings, if any, shall be washed with water, or removed

by any other means as desired by the Engineer and the surface cleaned.

14.8 FINISH:

The surface when dry, shall present a smooth and uniform finish, free from brush marks and any sign of cracking.

14.9 MEASUREMENT & PAYMENT:

White washing shall include preparation of surface other than removal of film over the entire surface by scrubbing, scraping, providing of proper scaffolding and application of white wash as specified above.
Work on old and new surfaces shall be measured separately in square meters, number of coats applied being specified. Preparation of surface by removal of the film over the entire surface by rubbing or scraping shall be measured as extra over item of white washing.
Unless specified otherwise specified repair works viz. removing of nails and making good holes, cracks, patches etc. not exceeding 0.1 Sq.M. each and not more than ½% of the surface in total shall be incidental to be work of white washing and those exceeding 0.1Sq.M. each shall be measured in Sq.M. in accordance to chapter No.4 for plaster.
No deduction shall be made for ends of joints, beams, post for openings not exceeding 0.5 Sq.M. and not exceeding 3 Sq.M. each in area, deduction shall be made for one face only, when both the faces of wall are treated with the same finish.
In case the faces are treated with different finishes the deduction for opening shall be made from the finish on the side of frames of doors, windows etc. on which the width of reveal is less than that on the other side; no deduction shall be made for the opening from other side.
For openings exceeding 3 Sq.M. each in area, deductions shall be made for both the faces of the opening, and jambs, soffits, sills etc. shall be measured.
Corrugated surfaces shall be measured flat as fixed and not girthed the quality shall GI sheet 16%, A.C. sheet 20% and semi corrugated 10%.
Cornices and other Mouldings: These shall be girthed and white washing the cornices and mouldings included with general white washing.

15. COLOUR WASH:

15.1 SCOPE:

The specification for colour washing lays down the method of preparation and application of the colour wash. Colour wash may be applied over un-plastered brickwork, stone masonry and all types of plastered surfaces.

15.2 MATERIALS:

Colouring Pigments:
Blue Vitriol (Neela-Thotha), Yellow and Red Ochre (Ramraj and Hirmich) conforming to relevant Indian Standards shall be used for preparing colour wash of

Blue, Yellow, Red and Pink shades, different other shades can also be obtained by their mixtures in proper ratio. Lime colours in varying shades are also available in market under sealed packets and approved make of these shall be used, if specified by the Engineer.

15.3 GENERAL:

The specification for white washing shall apply to this work also the difference being that the specified colour wash solution shall be obtained by adding the necessary pigment to white wash and that the preparation of surface already colour washed shall be same as surface already white washed.

15.4 PREPARATION OF COLOUR WASH:

Sufficient quantities of colour wash enough for the complete job shall be prepared in one operation to avoid any difference in shade. A piece of 0.1 Sq.M. of the prepared surface shall be colour washed with prepared solution in full number of coats, and the shade so obtained shall be got approved by the Engineer. It shall be noted that shall sample of colour appears lighter in shade than when the same shades are applied precisely to large surfaces. Any change in that desired by the Engineer shall be carried out. Preparation of the colour wash with some of the most commonly used pigments shall be as follows: -

WITH YELLOW AND RED OCHRE: Solid lump, if any, in the powder, shall be crushed to powder and solution in water prepared and then added to white wash sieving it through a coarse cloth mixed evenly and thoroughly to white wash in small quantities, till the required shade is obtained.

WITH BLUE VITRIOL: Fresh crystals of hydrous copper sulphate (i.e. Blue Vitriol) shall be ground to fine powder and dissolved in small quantity of water. Sufficient quantity of solution enough to produce the colour wash of required shade shall be strained through a clean coarse cloth. The filtrate being mixed evenly and thoroughly to the white wash.
Colour wash from other colouring pigments shall be prepared in accordance with the instructions of the manufacturer.

15.5 PRIMING COATS:

On new surfaces and old surfaces requiring a change of colour, two coats of white wash shall be applied before the application of colour wash.
No priming coat shall be needed for old surface bearing the colour of the same shade or a good white wash.

15.6 MEASUREMENT& PAYMENT:

The work of colour washing shall be measured in accordance with the rules for white washing.
The colour washing on new surfaces shall include the two coats of white wash (priming coats).

The colour washing on old surfaces shall be exclusive of any coats of white wash; the white washing done on surfaces requiring a change of colour shall be measured separately.

16. YELLOW COLOUR WASH AND JAIPUR PINK WITH KHAMEERA:

16.1 SCOPE:

It is an age-old technique, which was used to finish exterior walls and give a coloured wash to the building. The finish of Khameera is very attractive and durable in harsh climatic conditions of the region. Buildings treated with Khameera wash 200 years back are still in good condition. Some of the examples of such buildings where Khameera was applied are Nahargarh fort, Jalmahal at Jaipur.

16.2 PREPARATION OF MATERIALS:

PURIFIED LIME: Primary requirement is good quality limestone, which is baked and then slaked with sufficient water to obtain quick lime.

16.3 KHAMEERA:

While the lime is slaked gur is added once the heat is given off. Approximate proportions arrived at are for every 40 kg of lime stone 500 gms of gur is appropriate.
After 24hrs, the above mixture is sieved through cotton cloth. Thus the impurities and un-slaked lime is removed. Fresh water devoid of suspended impurities is added to the mixture and for next 7 days the water, which comes on the surface is removed and fresh water added. Thus the slaking continues to take place. Care is taken to ensure that the lime solution remains submerged in water at all times.
At the end of 7 days, fermented butter milk (roughly 10kgs for 40kg of lime stone) is added and the mix is stirred well to ensure proper mixing.
Again the obtained mix is sieved through a cotton cloth. Thus completing the process of obtaining the khameera.

16.4 JAIPUR PINK KHAMEERA:

Two iron oxides that are popularly used for preparing coloured lime finish are Geru which is called light red in English and Hirmich which is called the Indian red.
Jaipur pink is derived using Hirmich, the Indian red as the pigmenting agent.
Hirmich (M.P.) (90 kgs) are used to arrive at Jaipur pink. Also Ramraj (8 kgs) and sindoor (8 kgs) are used.
All these are added to the khameera in a drum and mixed thoroughly. These quantities are used to match the sample tiles can vary for different samples.
The mix is sieved again and then transferred into earthen pots of 15 litres capacity (approx.). These pots are place 3/4th embedded in the ground. To each pot of mix, 200 gms of babool gum is added. The mix is then stirred continuously in a steady rhythm for 3 to 4 days using bamboo sticks.
The obtained solution is now ready for application on the prepared surfaces.
As the colour of the iron oxide (hirmich) may vary, sample tiles will be made

available to the contractor for executing the work to which the prepared pink khameera will be matched with before application.
The work shall be executed to the satisfaction of the Engineer.

16.5 PROCESS OF APPLYING KHAMEERA:

Primarily the kesula flowers are used to give the yellow colour to the khameera wash.
For every 1 kg of limestone, 100 gms of flowers are found to be appropriate.
The flowers are soaked in sufficient water. Approximately, 100 gms of flowers are soaked in 2 litres of water. After 24 hours the obtained yellow coloured water is added to the khameera paste to which Ramraj (1.250 kgs for every 1 kg of lime stone) is also added. All are mixed together to obtain a homogenous solution, which is then sieved through a cotton fabric.
The mix is then transferred into earthen pots of 15 litres capacity (approx.). These pots are place 3/4th embedded in the ground. To each pot of mix, 200 gms of babool gum is added. The mix is then stirred continuously in a steady rhythm for 3 to 4 days using bamboo sticks.
The obtained solution is now ready for application on the prepared surfaces.
As the colour of the ingredients may vary, sample tiles will be made available to the contractor for executing the work to which the prepared yellow khameera will be matched with before application.
The work shall be executed to the satisfaction of the Engineer.

16.6 PROCESS OF APPLYING KHAMEERA:

This paste applied to wall surface with the help of kunchi/brush. It is required to provide minimum three coats of Khameera for good finish. Coats will be applied over a duration of time thus not to compromise the quality of applications and work.
When Khameera paste is prepared it should be prepared for whole building in one turn so that all the surfaces will have one shade.
If Khameera has to be applied on such a wall where earlier also it was having Khameera wash, then first of all we have to remove old Khameera with the help of sand paper. In no case, new Khameera shall be applied directly on old Khameera.

16.7 MEASUREMENT & PAYMENT:

The work of colour washing shall be measured in Sq.M. or as specified in Bill of Quantities.

17. BRICK WORK FOR WALL/PARAPET/COLUMN

17.1 SCOPE:

The work covered shall consist in furnishing and installing brick masonry as shown on the drawings and in accordance with this specification.

17.2 GENERAL:

Unless otherwise specified all work and materials shall conform to the latest applicable Bureau of Indian Standard Specification. Construction of brick masonry shall in general be in accordance with I.S. 2212. Mortar shall in general be in accordance with I.S.2250. The whole work shall be executed in a good and workmanlike manner and the walls shall be in plumb, true line and level.

17.3 CONSTRUCTION:

Brick masonry shall be constructed in lime mortar 1:2 (1 lime, 2 Surkhi), Substructure and for super structure, except where specified differently.
Every brick shall be thoroughly soaked in clean water at least one hour before using till the bubbles cease to come up. The soaked bricks shall be kept on wooden platform or brick platform or on wet gunny bags to avoid earth being smeared on them. If earth sticks to it, they should be washed again. Bricks with broken edges shall not be used for Brick Masonry. No broken or half bricks shall be used except as closers. The course shall be truly horizontal and the work strictly in plumb. The courses should be well raked; vertical joints in alternate course should come directly one over the other. Vertical and horizontal joints shall not exceed 10mm. in thickness. The thickness of brick courses shall be kept uniform. The bricks shall be laid with the frogs upwards. The brickwork shall not be raised by more than 10 single courses per day. The brickwork shall be laid in English bond. The joints shall be raked 12mm. deep at the end of the day to provide for key to plaster or pointing, and the face of the brickwork shall be cleaned daily to remove any mortar sticking to it. Seven courses together should not exceed 600 mm. in height. All brickwork, which is uneven, irregular or bad, shall be demolished, if deemed necessary by the Engineer, and rebuilt at the Contractor's cost. Material obtained from the demolished masonry shall not be allowed to be roused. Unfinished work shall be stepped back by 600 mm at every course for jointing with new work. Toothing may be resorted to only if specifically approved by the Construction Manager. Before new work is started, all loose mortar shall be removed and the exposed joint thoroughly cleaned before the laying of new work. Scaffolding shall in general be as specified under clause 5.09 of Random Rubble Masonry Construction.
All brickwork shall be maintained wet for 15 days. All fixtures, pipes, outlet for water, door and window frames with hold fasts, etc. shall be in their correct positions as the work proceeds. Rates quoted by the Contractor shall be all inclusive, and no separate payments shall be made for fixing of inserts (sleeves, wall ties, anchors, structural steel lintels etc.) leaving opening, cutting chases etc.

17.4 MEASUREMENT:

I. Brick work shall be measured in cubic meters unless otherwise specified. Any extra work over the specified dimensions shall be ignored. Dimensions shall be measured correct to the nearest 0.01 m i.e. 1 cm. Areas shall be calculated to the nearest 0.01 sq mtrs and the cubic contents shall be worked out to the nearest 0.01 cubic meters.

- Brick work shall be measured separately in the following stages:
  a. From foundation to floor one level (Plinth level)
  b. Plinth (floor one) level to floor two level
  c. Between two specified floor levels above floor two level

Note :

- Brick work in parapet walls, mumty, lift machine room and water tanks constructed on the roof up to 1.2 m height above roof shall be measured together with the corresponding work of the floor next below.

II. No deductions or additions shall be done and no extra payment made for the following :

Where minimum area is defined for deduction of an opening, void or both, such areas shall refer only to opening or void within the space measured.

a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc.); up to 0.1 m2 in section;
b) Opening up to 0.1 m2 in area (see Note);
c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;
d) Cement concrete blocks as for hold fasts and holding down bolts;
e) Iron fixtures, such as wall ties, pipes up to 300 mm diameter and hold fasts for doors and windows; and
f) Chases of section not exceeding 50 cm in girth.

Note :

- In calculating area of an opening, any separate lintel or sills shall be included with the size of the opening but end portions of lintel shall be excluded. Extra width of rebated reveals, if any, shall also be excluded.

III. Walls half brick thick and less shall each be measured separately in square meters stating thickness.

IV. Walls beyond half brick thickness shall be measured in multiples of half brick which shall be deemed to be inclusive of mortar joints. For the sizes of bricks specified in 6.1.1, half brick thickness shall mean 100 mm for modular and 115 mm for non-modular bricks.

V. Where fractions of half brick occur due to architectural or other reasons, measurement shall be as follows :

a) up to 1/4th brick-actual measurements and
b) exceeding 1/4 brick-full half bricks.

VI. String courses, projecting pilasters, aprons, sills and other projections shall be fully described and measured separately in running meters stating dimensions of each projection.

VII. Square or rectangular pillars shall be measured separately in cubic meters in multiple of half brick.

VIII. Circular pillars shall be measured separately in cubic meters as per actual dimensions.

IX. Brick work curved on plan shall be measured like the brick work in straight walls and shall include all cutting and wastage of bricks, tapered vertical joints and use of extra mortar, if any. Brick work curved on plan to a mean radius not exceeding six meters shall be measured separately and extra shall be payable over the rates for brick work in straight walls. Nothing extra shall be payable if the mean radius of the brick work curved in plan exceeds six meters.

X. Tapered walls shall be measured net as walls and extra payment shall be allowed for making tapered surface for brick work in walls.

XI. Brick work with brick tiles shall be measured and paid for separately.

17.5 Rate

The rate shall include the cost of materials and labour required for all the operations described above
except the vertical reinforcement and its encasement in cement mortar or cement concrete. The rate
shall also include the following :

a) Raking out joints or finishing joints flush as the work proceeds;
b) Preparing tops of existing walls and the like for raising further new brick work.
c) Rough cutting and waste for forming gables, splays at eaves and the like.
d) Leaving holes for pipes up to 150 mm dia. and encasing hold fasts etc.
e) Rough cutting and waste for brick work curved in plan and for backing to stone or other types of facing.
f) Embedding in ends of beams, joists, slabs, lintels, sills, trusses etc.
g) Bedding wall plates, lintels, sills, roof tiles, corrugated sheets, etc. in or on walls if not covered in respective items and
h) Leaving chases of section not exceeding 50 cm in girth or 350 sq cm in cross-section.
i) Brick on edge courses, cut brick corners, splays reveals, cavity walls, brick works curved on plan to a mean radius exceeding six meters.

18. MOULDING AND CORNICES

I. The specifications described under 6.2 shall apply in so far these are applicable. Moldings and cornices shall be made with bricks as specified for brick work. The bricks shall be cut and dressed to the required shape as shown in the architectural drawings.

II. Cornices shall not ordinarily project by more than 15 cm to 20 cm and this projection shall be obtained by projecting each brick course by more than one fourth of the length. For cornices projecting more than 20 cm and

requiring more than quarter bricks projection, metal cramps shall be used and paid for separately.

III. Corbelling shall be brought roughly to shape by plastering with the specified mortar. When the mortar is still green, the moldings shall be finished straight and true with the help of metal templates.

IV. Curing and Protection

The moldings and cornices shall be cured for at least seven days. These shall be protected from the effects of sun and rain by suitable covering and also from damage during the execution of the work.

V. Measurements

For the purpose of measurements, Bearing portion of drip course, bearing of molding and cornice.

VI. Rate

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

19. RANDOM RUBBLE MASONRY

19.1 SCOPE:

The work covered includes all Random Rubble Masonry walls at all levels, including dressing, mortar, laying, curing, fixing inserts etc. as hereinafter specified and required as per the drawings and mode of measurement and payment of Random Rubble Masonry.

19.2 CONSTRUCTION:

Shall generally be in accordance with I. S. 1597 (Part-1).

19.3 STONE:

The stone used for masonry shall confirm to RUIDP specification

19.4 DRESSING:

Stones shall be hammer dressed on the face, the sides, and the beds to enable these to come in close proximity with the neighbouring stones.

19.5 MORTAR:

Random Rubble (R. R.) Masonry shall be in lime mortar (1 Lime: 2 Surkhi)

for sub structure and for super structure.

19.6 LAYING:

Stones shall be sufficiently wetted before laying to prevent absorption of water from mortar.
The wetted stones shall be kept on a clean wooden platform to avoid earth being smeared on them.
Every stone shall be carefully fitted to the adjacent stones so as to form neat and close joints.
The bushing in the face shall not project more than 4 cm. on an exposed face and 1 cm. on a face to be plastered.
Face stones shall extend and bond well into the backing. The hearting or interior filling of the wall shall consist of rubble stones, which may be of any shape, but shall not pass through a ring of 15 cm. inner diameter.
Thickness of stone in any direction shall not be less than 10 cm.
The joints shall be staggered to avoid cracking.
Chips of stones may be used wherever necessary to avoid thick mortar beds or joints and hollow spaces.
The chips shall not be used below hearting stone to bring these to the level of face stones.
The use of chips shall be restricted to the filling of interstices between adjacent stones in a hearting and these shall not exceed 20% of the quantity of stone. The course shall be truly horizontal and the work strictly in plumb.
The mortar shall be removed from the stone faces after the work is completed.
The joints should be raked 20 mm. deep at the end of each day to provide for key to plaster.
Stones may be brought to level at plinth, window sill and roof level with concrete comprising of one part of the mortar as used for the masonry and two parts of graded stone aggregate of 20 mm. Nominal size or as specified. The cost of this shall be included in the rate of masonry and nothing extra shall be payable.
All masonry, which is uneven, irregular or bad, shall be demolished, if deemed necessary by the Engineer and rebuilt at the Contractor's expense.

19.7 BOND STONES:

Bond stones of at least 400 Sq. cm. In cross sectional area at any point or through stones running at right angles through the thickness of the walls shall be provided in walls up to 60 cm thick and in case of walls above 60 cm. in thickness a set of two or more bond stones overlapping each other by at least 15 cm. shall be provided in a line from face to face. A bond stone or a set of bond stones shall be provided for every 0.5 Sq.M. of the wall surface.

19.8 JOINTS:

The joints shall be staggered to avoid cracking. Face joints shall not be more than 30mm. thick.

19.9 SCAFFOLDING:

Double scaffolding shall be provided for the construction of random rubble masonry. Piercing of walls for scaffolding supports shall not be permitted. Preferably steel tubular scaffolding conforming to I.S. 2750 and carried out in accordance with I.S. 4014 shall be used.

19.10 OPENINGS & INSERTS:

All fixtures, pipes, out let for water, door and window frames, cusped brackets with hold fasts, etc. shall be in their correct positions as the work proceeds. Fixing of inserts, sleeves, wall ties, anchors, structural steel/stone/ RCC lintels etc., leaving openings, cutting chases, etc. shall be included in Contractor's scope. Holes, if any, kept in masonry shall be filled up before the plastering or painting commences.

19.11 CURING:

All stonework shall be maintained wet for a minimum period of 10 days. In case fat lime mortar is used, curing shall commence only after 2 days.

19.12 MEASUREMENT:

The measurement for work done shall be the product of the length, the height and thickness as specified in relevant drawings. Any increase in thickness of wall other than specified in drawings due to thicker joints or due to use of over size stones shall not be paid for. Quantities for walls 300 mm. thick and more shall be in cubic meters. The quantities shall be net after making necessary deductions due to openings, drainage holes, concrete/stone lintels, landing slab bearings, beam bearings, iron fixtures, and pipes, beyond 300 mm. in size. No extra payments shall be made for leaving any groove, recess or opening. Rubble masonry work for steps and such other mass works shall be paid for on the basis of the rate quoted per cubic meter or part thereof.

19.13 PAYMENT:

Buttresses, stone pillars for compound walls and at other places shall be paid for as regular stonework, without any extras.
Gables, Kangooras, City wall, Burj and
tapered (slanting) walls, shall be paid for the actual shape as built, without any extra for trimmings. Rate shall include necessary double scaffolding, centring, soaking, watering, cutting of stones, bond stones etc. curing, raking of joints, etc. Holes, if any, kept in the masonry shall be filled up before the plastering or painting commences.

20. BRICK WORK IN ARCHES

Arch work shall include masonry for both gauged as well as plain arches. In gauged arches, cut or moulded bricks shall be used. In plain arches, uncut bricks shall be used.

Brick forming skew-backs shall be dressed or cut so as to give proper radial bearing to the end voussiors. Defects in dressing of bricks shall not be covered by extravagant use of mortar, nor shall the use of chips or bats etc. be permitted.

The bricks of the spandrel wall at their junctions with the extrudes of the arch shall be cut to fit the curvature of the arch.

20.1 Circular Arches

These shall be either

- Plain arches, and shall be built in half brick concentric rings with break joints, or

- Gauged arches built with bricks cut or moulded to proper shape.

The arch work shall be carried up from both ends simultaneously and keyed in the centre. The bricks shall be flush with mortar and well pressed into their positions so as to squeeze out a part of their mortar and leave the joints thin and compact. All joints shall be full of mortar and thickness of joints shall not be less than 5 mm nor more than 15 mm.

After the arch is completed, the haunches shall be loaded by filling up the spandrels up to the crown level of the arch. Care shall be taken to load the haunches on two sides of the spandrels.

When the arch face is to be pointed (and not plastered), the face bricks shall be cut to proper shape or moulded, so as to have the joints not more than 5 mm thick. These shall be laid with radial joints to the full depth of the arch. The voussoirs shall break joints to the full depth of the arch.

20.2 Flat Arches

These shall be gauged arches of brick cut or moulded to proper shape. The extrados shall be kept horizontal and the intrados shall be given slight camber of 1 in 100 of the span. The centre of the arch from which joints shall radiate, shall be determined by the point of the inter-section of the two lines drawn from the ends of the arch at the springing level and at 60° to horizontal.

In flat arches, bricks shall be laid with radial joints to the full depth of arch and voussoirs breaking joints with each other. The arch work shall be carried up from both ends simultaneously and keyed in the centre. The thickness of the joints shall not exceed 5 mm. Flat arches may be used for the sake of appearance but for purpose of carrying loads of the wall above, these shall be used in conjunction with relieving arches, lintels placed below.

20.3 Centring and Shuttering

The centering and shuttering for the arch shall be got approved by the Engineer-in-Charge before the arch work is started. It shall be strong enough to bear the dead load of the arch and the live loads that are likely to come upon it during construction, without any appreciable deflections.

The shuttering shall be tightened with hard wood wedged or sand boxes, so that the same could be eased without jerks being transmitted to the arch. The sequence of easing the shuttering shall be got approved from the Engineer-in-Charge. The shuttering shall be struck within 48 hours of the completion of the arch but not before 24 hours. This shall be done after the spandrel has been filled in and the arch loaded.

20.4 Measurements

The length of the arch shall be measured as the mean of the extrados and intrados of the arch correct to a cm. The thickness of the arch shall be measured in multiples of the half brick.

21. SPECIFICATION FOR STONE JALI WORK

21.1 Stone shall be as specified in stone specification.

21.2 Dressing and Fixing

The stone shall be cut into slabs of required thickness so as to make jali of the specified thickness. The jali shall be cut as per pattern shown on the drawings. All exposed faces shall be fine tooled to a uniform and smooth finish. Fixing shall be done with the adjoining work in grooves, rebates etc., as shown in the drawing or as directed by the Engineer-in-Charge. A tolerance of + 2 mm shall be allowed in the specified thickness of the jali.

21.3 Stone jalis shall be fixed in grooves/rebates etc. to adjoining Stone work/Brick work/RCC as shown in the drawing or as directed by Engineer-in-Charge. Necessary sample for the same shall be got approved from the Engineer-in-charge before execution. The breakage of stone jail during fixing shall be the responsibilities of the contractor and replacement shall be provided at his risk and cost.

21.4 Measurements

The length and breadth of the stone forming the jali including its borders shall be measured correct to a cm and the area shall be calculated in square meters nearest to two places of decimal.

21.5 Rate

It includes the cost of labour and materials required for all the operations described above. It also includes the cost of making grooves or rebates in the adjoining work for fixing jali.

22. Roof and water proofing work

Traditional roofing work:

22.1 Materials:

Following are the list of material used for the roofing in traditional style:

- Timber structural beams) in 1st class Teak, sheesham or sal wood or as specified in item .
- Timber purlins (spanned across the shortest distance) in 1st class sheesham, Teak or sal wood or as specified in item.
- Wooden plank bed plate runner (laid in running length underneath the purlins and structural sections) in sheesham, Teak or sal wood or as specified in item.
- Wooden planks (laid over the purlins in opposite direction of the bearing directions of purlins) in deodar wood or as specified .
- Lime mortar 1:2 (laid over the wooden planks) as a leveling course
- FPS Brick tiles class designation 100 in lime mortar
- Flooring material

a) Dressing and Treatment of wood: The timber members used for structural purpose can be roughly dressed by random Randha (where the upper incrustation of the timber is chiseled roughly. The wooden planks and wooden bed plate runners should be smoothened to the **surface.**

b) All wooden members used for the roofing shall be weathered, treated with anti termite compound and polished as per specification before hoisting to its location in the roofing system.

c) Process of hoisting and laying the traditional roofing: While laying the roof it should be kept in mind that the total sectional depth of the roof should not exceed the size in practice and the spacing of all the structural members and purlins should be determined by the structural engineer specializing in wooden roofing system.

d) Following is the process for hoisting and laying of roofing:

- Dismantling the masonry above the proposed lowermost section (lower end of the wooden structural beam) to the uppermost brick tile layer (to be determined by the proposed section) and then placing the structural wooden beams.
- Filling the remaining section with masonry to the uppermost level of the structural bearing in traditional material
- Fixing of wooden bed plate runner on the bearing sides of the purlins
- C/C placement of wooden purlins, fixed and strapped and screwed to the bed plate

- C/C placement of wooden planks, fixed and screwed to the purlins
- Laying of 25mm thick lime mortar bed on the wooden planks as leveling course and also check leaking or dripping of the mortar from the gaps of the plank
- Laying of two layers of brick tiles in lime mortar and leaving the same for drying

e) EPDM rubber gard shall be laid over the prepared surface (clean, smooth), providing and laying specially formulated elastomeric single-ply 1.14mm thick EPDM non-reinforced (Ethylene, Propylene, Diene Terpolymer) membrane (of approved brands like Dermabit, Firestone or equivalent) with minimum Roll width 6 meters. Membrane shall be laid loose. Overlap joint shall be made using double side adhesive Tape technology. Membrane shall have minimum of 75mm side and end laps which shall be sealed with highly formulated double sided TAPE. Membrane shall be able to resist 40mtr. head pressure, with tensile strength of > 11.3 mpa, elongation > 500% and water vapour diffusion of < 24'000 microns, Tear resistance to ASTM D624, Die C dimensional change < -0.7%. 100% UV resistance, Ozone resistance according to ASTM D1149. The membrane shall be taken to a height of 300mm of the parapet wall or adjoing wall & fixed with HP fastener and sealed with Sealant and Water cutoff mastic or sealed using chase cutting.

22.2 THE FINAL FLOOR FINISH

f) Laying Roof Finish: While finishing for the exposed roof surface or terracing, 60mm lime concrete is laid to slope (the slope shall not be less than 1 in 50 and as per approved drawing) over the brick tile layer and then Hessian based hot bitumen waterproofing felt laid over the lime concrete and left exposed for one season. After the bituminous felt settles the surface to be neatly cleaned and brick tiles should be laid to slope in lime mortar. After the completion of roof finish, the props shall be removed.

g) Curing: The finished surface shall be covered with damp sand or jute bags kept moist, or the surface may be sprinkled with water several times so as to keep it constantly wet for at least a fortnight.

Tests: The work-man-ship and material shall be such so as to provide a leak proof roof and nothing stated above shall absolve the Contractor of responsibility from providing a water tight, leak proof roof. In case any leakage occurs, this shall be made good by Contractor at his expense and labour

h) Process of hoisting and laying the traditional roofing: While laying the roof it should be kept in mind that the total sectional depth of the roof should not exceed the size in practice and the spacing of all the structural members and purlins should be determined by the structural engineer specializing in wooden roofing system.

i) Following is the process for hoisting and laying of roofing:

- Dismantling the masonry above the proposed lowermost section (lower end of the wooden structural beam) to the uppermost brick tile layer (to be determined by the proposed section) and then placing the structural wooden beams.
- Filling the remaining section with masonry to the uppermost level of the structural bearing in traditional material

- Fixing of wooden bed plate runner on the bearing sides of the purlins
- C/C placement of wooden purlins, fixed and strapped and screwed to the bed plate
- C/C placement of wooden planks, fixed and screwed to the purlins
- Laying of 25mm thick lime mortar bed on the wooden planks as leveling course and also check leaking or dripping of the mortar from the gaps of the plank
- Laying of two layers of brick tiles in lime mortar and leaving the same for drying

j) EPDM rubber gard shall be laid over the prepared surface (clean, smooth), providing and laying specially formulated elastomeric single-ply 1.14mm thick EPDM non-reinforced (Ethylene, Propylene, Diene Terpolymer) membrane (of approved brands like Dermabit, Firestone or equivalent) with minimum Roll width 6 meters. Membrane shall be laid loose. Overlap joint shall be made using double side adhesive Tape technology. Membrane shall have minimum of 75mm side and end laps which shall be sealed with highly formulated double sided TAPE. Membrane shall be able to resist 40mtr. head pressure, with tensile strength of > 11.3 mpa, elongation > 500% and water vapour diffusion of < 24'000 microns, Tear resistance to ASTM D624, Die C dimensional change < -0.7%. 100% UV resistance, Ozone resistance according to ASTM D1149, The membrane shall be taken to a height of 300mm of the parapet wall or adjoing wall & fixed with HP fastener and sealed with Sealant and Water cutoff mastic or sealed using chase cutting.

23. SPECIFICATION FOR WOOD

23.1 TEAK WOOD FRAME:

Teak wood frame shall generally conform to standard laid in I.S. 1002 or the latest revision for requirements of materials, construction workmanship and shall be of specified thickness and of 1st class C.P. teak wood of approved design with stiles, top, bottom and lock rail generally as per drawing. Wherever shown, each panel shall be in a single width piece, but when two or more pieces have to be used and are permitted, all of them shall be of equal width and shall be jointed with a tongue and groove joint with chamfered edges glued together and reinforced with metal dowels. panel shall be in a single width piece, but when two or more pieces have to be used and are permitted, all of them shall be of equal width and shall be jointed with a tongue and groove joint with chamfered edges glued together and reinforced with metal dowel.

23.2 Hardware Fittings

All hardware fittings for doors shall be either oxidized iron, brass, anodized aluminum as specified in the schedule of quantities. These hardware fittings shall be obtained from approved manufacturers and shall bear ISI mark wherever available. The samples for the fittings shall be submitted to the Owner/ Architects for their approval. Hardware fittings for door shutters shall be paid in door shutter item or separately as given in schedule of quantities.

No separate payment shall be made for hardware fittings if not mentioned otherwise in the schedule of quantities. The rate for hardware fittings shall include for supplying, fitting and fixing the fittings with necessary cadmium plated screws, washer's bolts, nuts etc. as required. All locks shall be provided with keys in duplicate/triplicate and rate shall include for the same. Approved samples of hardware fittings shall be deposited with Owner/Architects for reference.

23.3 Workmanship:

- The workmanship shall be first class and to the approval of the Owner/ Architects. Scantlings and board shall be accurately sawn and shall be of required width and thickness. All carpenter's work shall be wrought except where otherwise described. The workmanship and joinery shall be accurately set out in strict conformity according to the drawings and shall be framed together and securely fixed in approved manner and with properly made joints. All work is to be properly tanned shouldered, wedged, pinned, braced etc. and properly glued with approved quality glue to the satisfaction of the Owner/Architect.
- **Screws:** Unless otherwise specified all screws to be used in woodwork and joinery shall be of cadmium plated and of approved quality. The size (diameter and length) should conform to those specified in hardware schedule.
- **Tolerance:** l.5 mm (l/l6") will be allowed for each wrought face of sizes specified except where described as finished in which case they shall hold to the full dimensions.
- **Protection:** All edges of timber frames etc. shall be protected from being damaged during construction by providing rough timber casing securely fixed and other adequate protective measures.
- frames/shelf shall have cut rebate. Planted rebates shall not be permitted.
- Where frames are fixed flush with plaster to wall, teak wood cover mould 40 x l2 mm as per drawings shall be provided all round and shall be painted or polish finished to match with finished shutters. This will be paid as a separate item as described in Schedule of Quantities.

23.4 RATES TO INCLUDE

Apart from other factors mentioned elsewhere in this contract the rate for item of wood work and joinery shall include for the following: -

A. Items of Scantling

- All labor, materials and equipment's for fixing frame work as per drawing including the cost of holdfasts, raw plugs, or other fasteners etc.

B. Items of display case

- All labor, materials, hardware fittings and equipment's for carrying out the work as per drawing.
- Labor for fixing display case in position (including/excluding the cost of fittings as specified in the BOQ) as per drawing.

23.5 Mode of Measurement

All measurements shall be as per relevant section of I.S. I200 of latest edition.

- Scantling shall be measured in cum. The sectional area shall be the area of the least square, or rectangles from which the scantling may be cut. The length shall be actual length of timber required for the purposes including the extra portion required for jointing.

- Shutter shall be measured in square meter for closed door shutters area i.e. rebate to rebate without extra measurement for rebates and/or splayed meeting styles of door.

- Partitions, encasing shall be measured in square meter of the finished work. For full height partition no payment shall be made for additional frame work extended up to ceiling for rigidity of the same.

- Display cases /frames /display box shall be measure in one unit including the complete finishing and fixing of individual unit

24. SPECIFICATION FOR ROOFING WITH MANGALORE /CLAY TILES

Mangalore tiles are machine made burnt & lay tiles widely used for roofing work in this country. Its design incorporates corrugation for drainage and also an efficient interlocking system between the tiles enabling them when laid to form a leak-proof layer. Depending upon the degree of protection needed from the roof, Mangalore tiles may be laid as such or with an under-layer of flat tiles or ceiling tiles, etc. A specific advantage of a tiled roof is the case of maintenance since any broken tiles can be easily replaced without much disturbance to the roofing as a whole. The design of the Mangalore tile takes into account this aspect and the tile as laid on the roof will be able to carry the weight of a man it is called upon to support during such repair. Though originally produced in areas near Mangalore, this tile is now manufactured and used in many parts of this country. For efficient performance of Mangalore tiled roof there are several design and constructional details one should take care of during laying the roof.

24.1 SCOPE

- This standard covers roofing with Mangalore pattern tiles which may include the following types of work:

24.2 PREPARATORY WORK

- **For Mangalore Tiles** - Wherever Mangalore tiles are to be embedded in a mortar layer over flat tiles, the Mangalore tiles shall first be soaked in water for at least two hours before laying.

24.3 FIXING OF REEPERS

The reepers shall be fixed over the rafters at the specified or designed spacing and nailed. The nails shall penetrate at least 2 cm into the rafters. They shall extend at least over a length of three spans between the rafters. The reepers shall be nailed to the rafters by means of plain headed nails Their length shall be extended only by means of butt joint. The joint shall occur only over the rafters. The joints of no two adjacent rows of reepers shall come over the same rafter. At the eaves a tilting fillet shall be fixed, if necessary.

24.4 LAYING OF MANGALORE TILES

The tiles shall be laid from the eaves towards the ridge properly interlocked according to the design of the tile. The tile shall be laid either directly over the reepers or over an undercover. The tiles shall be laid breaking joint, that is, the left channel of the upper tile shall lie in the right channel of that below and shall fit properly one to another, the catches resting fully against battens. The hips and ridges of the roof shall be covered with ridge tiles which shall be edge-bedded in mortar. The mortar in edge bedding may be further finished with plaster or paint to match with the colour of the tiles. If the courses of roof tiles adjacent to the hip or to the ridge do not finish exactly underneath the ridge tiles, either purpose-made tiles or tiles cut to suitable shapes may be used. While finishing joints gaps in the troughs of the roof tiles giving ridge or hip, if large enough, shall be neatly packed watertight using small pieces of chips of broken tiles and mortar. At eaves the lower most course of the tiles shall overhang the tilting fillet by a distance sufficient to ensure that the water drained off from the roof discharges clear off the eaves into the gutter.

Protective Measures Against Wind - A suitable arrangement shall be made to secure the ends of lower most course of tiles to the roof structure for preventing the tiles from being blown up by wind. At least the bottom most layer of tiles, and preferably more number of layers above it, shall be tied to the reepers or other roof elements by means of galvanized wire. The tiles at the eaves shall also be protected against lifting by means of a galvanized steel flat of size 40 x 3 mm fixed to the roof.

Mortar bands 200 to 250 mm wide 60 to 65 mm deep may also be provided over the tiled roof at a spacing of 2'5 to 3 m for additional protection against wind. The mortar bends shall run along the roof slope.

Laying Mangalore Tiles Over a Flat Tile Undercover - The Hat tiles shall first be prepared by immersing in water for two hours and dried before laying. The underside of flat tiles shall also be dipped in whitewash mixed to creamy consistency and dried. The flat tile shall then be laid over the reeper. The mortar layer shall be spread over the flat tile to a thickness of not less than 25 mm. The Mangalore tile shall also be soaked for two hours before laying in the roof. When the mortar layer is spread, the soaked Mangalore tiles shall be laid SO as to be fully embedded in the mortar over the flat tiles. Where the pitch of the roof is more than 30", additional fillets shall be fixed to the reepers at a spacing of about one metre centres, so that the flat tiles laid between them are retained in position.The Mangalore tiles may also be fixed over flat tiles without mortar bedding if the work is so specified.

Laying Mangalore Tiles Over Ceiling Tiles - Where a layer of ceiling tiles is to be laid as under cover the ceiling tiles shall be laid over the reepers, and the Mangalore tiles shall be laid over them with appropriate interlocking between the tiles in the two layers

Alignment - The finished slope of the roof shall be uniform ridge eaves. The eaves-line and the ridge-line shall, be perfectly straight, horizontal and parallel to each other.

Junction Between Ridges and Hips - The joints between hip and ridge tiles shall be grouted so as to be leak-proof. A metal saddle not less than 45 cm2 area may preferably be used underneath such junctions as additional protection against leakage.

Work at Valleys - Since valley is a particularly vulnerable part of the roof as its pitch is several degrees less than that of the general roof surface and it has to provide a channel for the water running down into it from two slopes on either side, special care shall be taken that a clear and an unobstructed channel is formed. Undercover shall be provided for the courses of tiles adjacent to the valley.

The valley gutters shall be of galvanized steel sheet of minimum 1.25 mm thickness and l.2 m wide. A 300 mm overlap shall be given at joints, if any, down the slope. The valley gutters shall be laid over the reepers and not nailed on to them from underneath. Two additional reepers of section 50 x 25 mm shall be fixed over the metal sheets, 150 mm away from the central line of the valley on either side, so as to retain the tiles and mortar against falling into the gutter of the valley. On either side of the valley, the roof shall be plastered with mortar to a thickness of 12 mm so that rain water from the gutter is prevented from percolating through the tiles or the undercover to the underside of the roof.

24.5 FINISHING EDGES AROUND CHIMNEY STACKS AND SKYLIGHTS

In the case of chimney stacks and other similar features, full tiles shall be used around them and taken into the masonry. In addition, metal or bitumen flashing shall be used to cover the intersection between the top edge of the tiling and any projection through the roof. The flashing shall be turned against the projection and dressed down over the tile. The flashing shall be well tucked into either the joints in masonry or grooves in concrete as the case may be and shall be wedged and pointed.

24.6 TREATMENT OF JUNCTIONS WITH WALL

Junctions of the roof with walls shall preferably be treated for waterproofing in accordance with the relevant Indian Standards for waterproofing. Wherever special features like roof gutters and flashings are not provided between the junctions of the roof and wall, the tiles shall be let into the wall to a depth of not less than 50 mm and a drip molding shall be provided at about 100 mm height above the roof surface, and joints between the roof and the wall shall be grouted with a waterproofing mortar or such other materials.

24.7 MEASUREMENTS:

- Length and breadth shall be measured correct to a cm and its area shall be calculated in square meters correct to two places of decimal.
- The superficial area of roof coverings shall be measured on the flat without allowance for laps and corrugations. Portions of roof covering overlapping the ridge or hips etc. shall be included in the measurements of the roof.
- Roof with curved sheets shall be measured and paid for separately. Measurements shall be taken on the flat and not girthed. The breadth of the roof shall be measured along the rest of the curved sheets.
- No deductions in measurements shall be made for opening up to 0.4 sqm and nothing extra shall be allowed for forming such opening. For any opening exceeding 0.4 sqm in area, deduction in measurements for the full opening shall be made and in such cases the labour involved in making these openings shall be paid for separately. Cutting across corrugation shall be measured on the flat and not girthed.

24.8 RATE

The rate shall include the cost of all the materials and labour involved in all the operations described above except otherwise stated. This includes the cost of tile, fixing accessories like L hook, bolts and nuts or other bituminous and galvanised iron washers.

25. TECHNICAL SPECIFICATION DOORS, WINDOWS AND VENTILATORS

25.1 General

- While unloading, shifting handling and stacking timber, metal and plastic door and window frames and shutters, care shall be taken that the material is not dragged one over the other as it may cause damage to the surface of the material particularly in the case of decorative shutters. The material should be lifted and carried preferably flat avoiding damage of corners or sides.
- Metal and plastic doors, windows and ventilators shall be stacked upright (on their sills) on level ground preferably on wooden battens and shall not come in contact with dirt and ashes. If received in crates they shall be stacked according to manufacturer's instructions and removed from the crates as and when required for the work.
- Metal and plastic frames of doors, windows and ventilators shall be stacked upside down with the kick plates at the top. These shall not be allowed to stand for long in this manner before being fixed so as to avoid the door frames getting out of shape and hinges being strained and shutters drooping.
- During the period of storage all metal doors, windows and ventilators shall be protected from loose cement and mortar by suitable covering such as tarpaulin. The tarpaulin shall be hung loosely on temporary framing to permit circulation of air to prevent condensation.
- All timber frames and shutters shall be stored in a dry and clean covered space away from any infestation and dampness. The storage shall preferably be in well ventilated dry rooms. The frames shall be stacked one over the other in vertical stacks with cross battens at regular distances to keep the stack vertical and straight. These cross battens should be of uniform thickness and placed vertically one above the other. The door shutters shall be stacked in the form of clean vertical stacks over the other and at least 80 mm above ground on pallets or suitable beams or rafters. The top of the stack shall be covered by a protecting cover and weighted down by means of scantlings or other suitable weights. The shutter stack shall rest on hard and level ground.
- If any timber frame or shutter becomes wet during transit, it shall be kept separate from the undamaged material. The wet material may be dried by stacking in shade with battens in between adjacent boards with free access of dry air generally following the guidance laid down in IS 1141.
- Separate stacks shall be built up for each size, each grade and each type of material. When materials of different sizes grades and types are to be stacked in

one stack due to shortage of space, the bigger size shall be stacked in the lower portion of the stacks. Suitable pallets or separating battens shall be kept in between the two types of material.

- **LIST OF MATERIALS OF APPROVED BRAND AND/OR MANUFACTURER FOR INTERIOR DECORATION**

Description	**Name of Manufacturer**
Glazing :	M/s. Saint Gobain M/s. Asai Glass M/s. Modi Guard M/s. Hindusthan Pilkington
Castors :	M/s. Efficient Gadgets, M/s. EPCO or equivalent
Locks & Fittings :	M/s. Godrej M/s. EPCo M/s. Hafele M/s. Hettich M/s. B & R Brass Collection
Aluminum Hardware	M/s. Allen, M/s. Metaco, M/s. Crown or equivalent with ISI mark.
Brass Hardware :	M/s. Brass Arts (India) Pvt Ltd M/s. Vijay Industrial Eng Corp.
Screws :	M/s. Nettle Fold, M/s. GKW or equivalent approved quality.

Note:

1. If the approved brands mentioned above are not available, equivalent make as may be approved by the Owner/Architects only to be used for the work.

2. The Architect/Owner shall have the final say about which material amongst the above mentioned shall be used in the project and the contractor shall have no claims on this account.

26. SPECIFICATION FOR PANELLED GLAZED OR PANELLED AND GLAZED SHUTTERS

Paneled or glazed shutters for doors, windows, ventilators and cupboards shall be constructed in the form of timber frame work of stiles and rails with panel inserts of timber, plywood, block board, veneered particle board, fiber board wire gauze or sheet glass. The shutters may be single or multi paneled, as shown in the drawings or as directed by the Engineer-in-Charge. Timber for frame work, material for panel inserts and thickness of shutters shall be as specified. All members of the shutters shall be straight without any warp or bow and shall have smooth well planed face at right angles to each other. Any warp or bow shall not exceed 1.5 mm. The right angle for the shutter shall be checked by measuring the diagonals and the difference between the two diagonals should not be more than ± 3 mm.

26.1 FRAME WORK

Timber for stiles and rails shall be of the same species and shall be sawn in the directions of grains. Sawing shall be truly straight and square. The timber shall be planed smooth and accurate to the required dimensions. The stiles and rails shall be joined to each other by plain or haunched mortise and tenon joints and the rails shall be inserted 25 mm short of the width of the stiles. The bottom rails shall have double tenon joints and for other rails single tenon joints shall be provided. The lock rails of door shutter shall have its center line at a height of 800 mm from the bottom of the shutters unless otherwise specified. The thickness of each tenon shall be approximately one-third the finished thickness of the members and the width of each tenon shall not exceed three times its thickness.

26.2 GLUING OF JOINTS:

The contact surfaces of tenon and mortise shall be treated, before putting together, with bulk type synthetic resin adhesive conforming to IS 851 suitable for construction in wood or synthetic resin adhesive (Phenolic and amino plastic) conforming to IS 848 or polyvinyl acetate dispersion based adhesive conforming to IS 4835 and pinned with10 mm dia hardwood dowels or bamboo pins or star shaped metal pins; after the frames are put together and pressed in position by means of press. Stiles and bottom rail shall be made out of one piece of timber only. Intermediate rail exceeding 200 mm in width may be out of one or more pieces of timber. The width of each piece shall be not less than 75 mm. Where more than one piece of timber is used for rails, they shall be joined with a continuous tongued and grooved joint glued together and reinforced with metal dowels at regular intervals not exceeding 200 mm.

26.3 REBATING

The shutters shall be single-leaf or double leaved as shown in the drawings or as directed by the Engineer-in-Charge. In case of double leaved shutters, the meeting of the stiles shall be rebated by one-third the thickness of the shutter.

26.4 PANELLING

The panel inserts shall be either framed into the grooves or housed in the rebate of stiles and rails. Timber, plywood, hard board and particle board panels shall be fixed only with grooves.
The depth of the groove shall be 12 mm and its width shall accommodate the panel inserts such that the faces are closely fitted to the sides of the groove. Panel inserts shall be framed into the grooves of stiles and rails to the full depth of the groove leaving on space of 1.5 mm. Width and depth of the rebate shall be equal to half the thickness of stiles and rails. Glass panels, asbestos panels wire gauze panels and panel inserts of cupboard shutters shall be housed in the rebates of stiles and rails.

26.5 FRAME WORK OF SHUTTERS:

The overall length and width of the framework of the shutters shall be measured nearest to a cm in fixed position (overlaps not to be measured in case of double leaved shutters) and the area calculated in square meters correct to two places of decimeter. No deduction shall be made to form panel openings or louvers. No extra payments shall be made for shape, joints and labour involved in all operations described above. For paneling of each type or for glazed panel length and width of opening for panels inserts or glazed panels shall be measured correct to a cm before fixing the beading and the area shall be calculated to the nearest 0.01 Sq.M. The portions of the panel inserts or glazed panel inside the grooves or rebates shall not be measured for payment.

26.6 RATE

Rate includes the cost of materials and labour involved in all the operations described above. The frame work and paneling of each type or glazed panels shall be paid separately. The rate for frame work includes the cost of butt hinges and necessary screws, However, extra shall be paid for providing moulded beading where specified.

27. RED OR WHITE FINE DRESSED SAND STONE FLOORING

27.1 STONE SLABS

The slabs shall be red or white as specified in the description of the item. The stone slabs shall be hard, sound, durable and tough, free from cracks, decay and weathering. In case of red sand stone, white patches or streaks shall not be allowed. However, scattered spots up to 10 mm diameter will be permitted. Before starting the work, the contractor shall get samples of slabs approved by the Engineer-in-Charge.

The slabs shall be hand or machine cut to the requisite thickness along planes parallel to the natural bed of stone and should be of uniform size if required.

27.2 DRESSING OF SLABS

Every slab shall be cut to the required size and shape and chisel dressed on all sides to a minimum depth of 20 mm. The top and the joints shall be fine tooled so that straight edge laid along the face is fully in contact with it. In case machine cut stoneware used, chisel dressing and fine tooling of machine cut surface need not be done provided a straight edge laid anywhere along the machine cut surface is in contact with every point on it. The thickness of the slabs after dressing shall be 40 mm or as specified in the description of item with a permissible tolerance of ± 2 mm.

27.3 LAYING

Base concrete on which the slabs are to be laid shall be cleaned, wetted and mopped. The bedding for the slabs shall be with cement mortar 1:5 (1 cement: 5 coarse sand) or as given in the description of the item.
The average thickness of the bedding mortar under the slabs shall be 20 mm and the thickness at any place under the slabs shall not be less than 12 mm.

27.4 THE SLAB SHALL BE LAID IN THE FOLLOWING MANNER:

Mortar of specified mix shall be spreaded under each slab. The slab shall be washed clean before laying. It shall then be laid on top, pressed and larried, so that all hollows underneath get filled and surplus mortar works up through the joints. The top shall be tapped with a wooden mallet and brought to level and close to the adjoining slabs, with thickness of joint not exceeding 5 mm. Subsequent slabs shall be laid in the same manner. After laying each slab surplus mortar on the surface of slabs shall be cleaned off and joints finished flush.

In case pointing with other mortar mix is specified, the joint shall be left raked out uniformly and to a depth of not less than 12 mm when the mortar is still green. The pointing shall be cured for a minimum period of 7 days. The surface of the flooring as laid shall be true to levels and slopes as instructed by the Engineer-in-Charge.

Slabs 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 skirting and floor shall be finished neatly and without waviness. The finished floor shall not sound hollow when tapped with wooden mallet.

27.5 FINISHING

In case of chisel dressed stone flooring slight unevenness, if any existing between the edges of slabs at joints shall then be removed by chiseling in a slant.

27.6 RATE

The rate shall include the cost of all materials and labour involved in all the operations described above. Where pointing is to be done, this will be paid extra unless specifically included in the description of the item.

28. MARBLE FLOORING: -

28.1 GENERAL:

Marble shall be hard, sound, dense and homogeneous in texture with crystalline texture as far as possible. It shall generally be uniform in color and free from stains, cracks, decay and weathering.

- Marbles are metamorphic rocks capable of taking polish, formed from the recrystallization of lime stones or dolomitic lime stones and are distinguished from lime stone by even visibly crystallized nature and nonflaggy stratification.

Note: Marble is a product of nature hence it is difficult to guarantee uniformity of color, veining or other characteristics that may be represented in any sample submitted. A sample will indicate only an average of color, veining and other general texture and specified finish.

28.2 CLASSIFICATION:

The marble blocks, slabs and tiles shall be classified broadly in the following two categories:

White Marble Raj Nagar (plain white) Marble/ Makrana / Makrana Dhobi Doongri
It shall be plain white marble with coarse grains predominantly showing mica particles giving reflection in light. Makrana Dhobi Doongri Marble: Greyish marble with white flowery pattern available at Dhobi Doongri.

Granite Stone
It shall be of any colour and size as directed by Engineer-in-Charge. Granite shall be plain machine cut and mirror polished. The stone shall be smooth and of even surface without holes or pits.

28.3 SIZES AND TOLERANCES

The Thickness of marble is 18 mm and size, pattern of marble tiles as per design provided by architect.

Approval of Sample
Before starting the work, the contractor shall get samples of marble approved by the Engineer-in-Charge. Approved samples shall be kept in the custody of the Engineer-in- Charge and the marble supplied and used on the work shall conform to samples with regard to soundness, color, veining and general texture.

28.4 MARBLE WORK - TABLE RUBBED AND POLISHED (PLAIN WORK)

Marble work in steps, jambs, columns and other plain work shall be as specified below:

Joints in staircase treads, kitchen platforms shall be permitted only at curvature or when width/length is more than 0.6/2 meters. respectively. Number of joints in each direction shall not be more than one number for every 2 meters. length beyond the initial 2.00 m length. Additional joints due to curvature or for providing fixture shall be provided judiciously.

28.5 DRESSING, CUTTING AND RUBBING

Every marble stone shall be gang saw/machine cut to the required size and shape, chisel dressed machine finished on all beds and joints, so as to be free from any waviness and to give truly vertical, horizontal, radial or circular joints as required. The exposed faces and sides of stones forming joints up to 6mm. from the face shall be fine tooled machine cut such that a straight edge laid along the face of the stone is in contact with every point on it.
All window sills, tread of steps, counters vanities molding edges etc. shall be machine cut & polished to give high gloss mirror finish as per direction of Engineer-in- Charge. These surfaces shall then be rubbed smooth.

28.6 Mortar

The mortar used for jointing shall be as specified.

28.7 Laying

All marble stones shall be wetted before placing in position. These shall then be floated on mortar and bedded properly in position with wooden mallets without the use of chips or under pinning of any sort.

The walls and pillars shall be carried up truly in plumb or battered as shown in the drawings. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical.

In case of work without backing of brick work or coursed rubble masonry, face stone shall be laid in headers and stretchers alternatively unless otherwise directed. The headers shall be arranged to come as nearly as possible in the middle of stretchers above and below. Stone shall be laid in regular courses of not less than 15 cm in height and all courses shall be of the same height unless otherwise specified.

28.8 Joints

The depth of joints 6 mm from the face shall be uniform and as fine as possible but shall be not more than 1.5 mm thick on the exposed face. Beyond the depth of 6 mm from face, the thickness of joints shall increase in an inverted V shape so as to give good mortar bond between two stones. The inverted portion of the joints shall be filled with bedding mortar and the face 6 mm portion with pointing mortar.

28.9 Curing

The work shall be kept constantly moist on all faces for a period of at least seven days.

28.10 Finishing

After the marble work is cured, it shall be rubbed with carborandum stone of different grades no. 60, 120 and 320 in succession or with electrical rubbing machines rubbed with carborandum items 0 to 6 nos.in succession, so as to give a plane true and highly smooth surface. It shall then be cleaned with a solution of oxalic acid, washed and finished clean.

28.11 Protection

Green work shall be protected from rain by suitable coverings. The work shall also be suitably protected from damage during construction.

28.12 Measurements

For plain work: Measurements shall be taken correct to a cm in length and breadth and correct to 0.5 cm in thickness.

29. STAMPED CONCRETE

- Providing and laying 125 to 150 mm thick M-25 RMC concrete for stamp concreting work to walkways in position ready mixed concrete as per mix design of specified grade for cement concrete work including work including pumping of concrete to site of laying , finishing laid over p.c.c sub base, including cost of color hardener to the concrete(as approved colour) , admixtures in recommended proportions as per IS : 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength , durability.

- Item also include cost of stamping/texture /imprint and cutting Contraction joints as required or as per direction of the Engineer - in - charge. M-25 grade cement concrete (Stamped concrete, often called textured or imprinted concrete, is concrete that replicates stones such as slate and flagstone, tile, brick and wood.)

- Stamped concrete, often called textured or imprinted concrete, is concrete that replicates stones such as slate and flagstone, tile, brick and even wood. Ideal for beautifying pool decks, driveways, entries, courtyards, and patios, the ability of stamped concrete to resemble other building materials makes stamped concrete a less expensive alternative to using those other authentic materials such as stone, slate or brick.

- Even in complex designs with steps and fountains, patterns can be still be pressed into the concrete. Stamped concrete can also be used in conjunction with other decorative concrete elements such as exposed aggregate or acid staining. Popular patterns include running bond brick, hexagonal tile, worn rock or stone.

- There are thre procedures used in stamped concrete which separate it from other concrete procedures; the addition of a base color, the addition of an accent color, and stamping a pattern into the concrete. These three procedures provide stamped concrete with a color and shape similar to the natural building material. It also is longer-lasting than paved stone, and still resembles the look.

29.1 ADDING BASE COLOR:

- The base color is the primary color used in stamped concrete. The base color is chosen to reflect the color of the natural building material. The base color is produced by adding a color hardener to the concrete. Color hardener is a powder pigment used to dye the concrete.

- The color hardener can be applied using one of two procedures; integral color or cast-on color. Integral color is the procedure where the entire volume of concrete is dyed the base color. The entire volume of concrete is colored by adding the color hardener to the concrete truck, and allowing all the concrete in the truck to be dyed. Cast-on color is the procedure where the surface of the concrete is dyed the base color. The surface of the concrete is colored by spreading the color hardener onto the surface of the wet concrete and floating the powder into the top layer of the wet concrete.

- Concrete can be colored in many ways; color hardener, integral liquid or powder, acid stains to name a few. The process of integrally coloring the concrete offers the advantage of the entire volume being colored; however, the surface strength is not increased as with the use of color hardener. Dry shake color hardener is another popular way to color concrete. You broadcast the hardener on the concrete as soon as it is floated for the first time. After letting the bleed water soak into the hardener you float and trowel it in. This method only covers the surface about 3/16 of an inch but it gives the concrete surface a longer wear life.

29.2 ADDING ACCENT COLOR

- The accent color is the secondary color used in stamped concrete. The secondary color is used to produce texture and show additional building materials (e.g. grout) in the stamped concrete. The accent color is produced by applying color release to the concrete. Color release has two purposes. Color release is a pigment used to color the concrete and color release is a non-adhesive used to prevent the concrete stamps from sticking to the concrete.

- The color release can be applied in one of two procedures based on the two forms it is manufactured in: powdered (cast-on color release made up of calcium-releasing powders that repel water); or liquid - which is a light aromatic-based solvent, spray-on color release. Cast-on color release is a procedure where the powder color release is applied by spreading the color release on the surface of the concrete before the concrete is stamped. Spray-on color release is a procedure where liquid color release is sprayed on the bottom of the concrete stamps before the concrete is stamped.

29.3 STAMPING PATTERNS

- The pattern is the shape of the surface of the stamped concrete. The pattern reflects the shape of the natural building material. The pattern is made by imprinting the concrete shortly after it has been poured with a "concrete stamp". Most modern concrete stamps are made of polyurethane, but older "cookie cutter" style stamps were made of various metals. The old style stamps lacked the capabilities of forming natural stone texture.

- Concrete stamping is the procedure which uses the concrete stamps to make the pattern in the stamped concrete. Concrete stamps are placed on the concrete after the color release has been applied. The concrete stamps are pushed into the concrete and then removed to leave the pattern in the stamped concrete.

- In most cases concrete stamping is made to look like ordinary building products such as flagstone, brick, natural stone, etc.

30. TECHNICAL SPECIFICATIONS FOR ELECTRICAL /PLUMBING AND HVAC WORK

NOTE: - No infra work should damage Conservation esthetics and structural strength of the building.

30.1 TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORK

NOTE: -

Specifications/ standards applicable to this work shall be Indian Standard Specifications, Indian Electricity Act. National Electrical Code, Indian Electricity Rules and Punjab. PWD specifications, unless otherwise specified in the description of item, given in the schedule of quantities or in the special conditions and/or Technical Specifications, Requirements of these specifications shall be fulfilled by the contractor within the tendered rates. Item rates quoted shall be deemed to have taken these specifications, fire insurance regulations and SEB requirements into account. Sales tax, tax return over and any other tax levies by any authority and or any other statutory requirements.

I. APPROVED MAKES FOR ELECTRICAL WORK AS APPROVED BY ENGINEER – IN – CHARGE / ELECTRICAL CONSULTANT.

1.	CONDUITS	SKYTONE, HAVELS,ALCON
2.	WIRES	HAVELS, - FINOLEX - R.R KABEL - POLYCAB (GRADE-A)
3.	MCB	HAVELLS - L&T – SIEMENS
4.	SWITCH	ANCHOR, HAVELS, BOSMA
5.	UPLIGHTER AND DOWNLIGHTERS	HAVELS, PHILIPS, IPRO
7.	LIGHTS	HAVELS, PHILIPS, IPRO
8.	TIMERS	L & T,C & G, SIEMENS
9.	MCCB/ACB	L & T, MDS, ABB SIEMENS
10.	MCB/ELMCB/ELCB & DBS	MDS (LOADKONTAKT),SIEMENS, SIEMENS,ABB.
11.	CHANGE OVER SWITCHES	C& S, HPL SOCOMEC.
12.	CONTACTORS	L & T, ABB, SIMENS
13.	EARTHING MATERIALS	G.I. (B CLASS)
14.	BOLTS & NUTS/FIXTURE	HOT DIP GALVANIZED
15.	PCC/LT PANELS/BUS DUCT/SYN.PANEL/ENERGY METER PANEL	ISPL/TRICOLITE/UNITECH POWER SYSTEMS.
16.	INSULATORS	W.S., JAYSHREE AND APPROVED BY HSEB
17.	G.I. PIPES	J.S.T., TATA, JINDAL. OR ANY EQUIVALENT ISI BRAND APPROVED BY ARCHITECT.
18.	PVC CONDUIT PIPE	BEC, AKG, PRECISION
19.	STEEL CONDUIT	BEC, AKG
20.	FIRE EXTINGUISHERS	MINIMAX, FIREX, NITINE, ZENITH.

- Brands /class/grades are as mention above or as per CPWD specified Brands/class/grade .

NOTES:

1. Owner reserves the right to have any or all random samples of materials checked / tested by an approved test house. Contractor will bear all such test fees and other liaison works.
2. Wherever switchgears, DB etc., of specific ratings are not manufactured by the manufacturer next available higher size appropriately fused shall be used within the rated quoted.
3. Materials shall be brought to site in original packing. Manufacturing test certificates and or/ invoice for all materials shall be handed over to the site engineer on demand.
4. All materials specified in these specifications and conditions of contract must conform to the above brand name, and be of First quality, ISI marked wherever available and Department (Electricity), Punjab approved. Fabricated items shall be manufactured in accordance with the ISI specification and be first quality. Samples of all materials to be used must be submitted and got approved before procurement, and the owner / Architect reserves the right to select any of the Brand named specified herein for use.

30.2 TECHNICAL SPECIFICATIONS FOR PLUMBING WORK

1. The Schedule of Quantities shall be read in conjunction with the Technical Specification and Drawings supplied by the Consultant. In case of any discrepancy between Schedule of Quantities, Technical Specification and Drawings, during execution period, the decision of the Employer / Project Manager will be final and the Contractor has to do the works as per the instruction of Project Manager without any extra cost.

2. The quantities given in the Schedule of Quantities are estimated and are given to provide a common basis for bidding. The quoted rates shall not vary if the actual quantities arrived as per working drawings differ from that of the tender quantities. The basis of payment will be the actual quantities of work carried out as per the final specifications and drawings issued for execution and as measured by the Contractor and Project Manager jointly. The method of measurement of completed work for payment shall, unless said otherwise, be in accordance with the joint measurement carried out by the Contractor and Project Manager and the decision of Project Manager will be final and the Contractor will be liable to accept the decision.

3. Unless otherwise mentioned, the Contractor shall consider all work items on supply, installation, balancing, testing and commissioning of equipment & accessories.

4. All civil works such as groove cutting in wall and floor and finishing of all grooves, making opening in wall /floor and making good etc. shall form part of item rates quoted against each particular items in the Schedule of Quantities and shall not be measured

separately. Only Sanitary & Plumbing works which have been specifically indicated in the Bill of Quantities shall be paid for at an agreed cost.

I. LIST OF APPROVED MAKES FOR PLUMBING WORKS

Under Ground uPVC pipe for Sewerage & Drainage SN4N/Sq.M.	FOAMCORE / SUPREME Stiffness Value
Paint & Primer	Berger / ICI / J&N / Shalimar
M.S flat / Clamp (Hot dip galvanized)	AS APPROVED BY CLIENT
Anchor Fastener	Hilti or equivalent
SWR Pipe	SUPREME / ASTRAL as per IS: 13592 (Type-B)
Sanitary ware	Hindware / Parryware / Eq.
C.P Fittings	JAQUAR / Equivalent
.M Ball Valve	G ITAP / KITZ
C.I Butterfly Valve, Pressure Reducing Valve	ITAP / KITZ Audco/Crawley / Ray Leader
CPVC Pipe and Fittings	ASTRAL / ASHIRBAD / AJAY
Galvanized Steel Pipe	Tata (medium class) as per IS: 1239
G.I Fittings	HB or Equivalent
Manhole cover and Grating	MUNICAST / NECO / EQ.
Submersible Pump	GRUNDFOS / WILO / EQ
Hydro-pneumatic Pump set	GRUNDFOS / WILO / EQ
uPVC SWR Pipe for Soil, Waste, Rain Water.	ASTRAL/ ASHIRBAD/SUPREME

- Brands /class/grades are as mention above or as per CPWD specified Brands/class/grade.

II. GENERAL REQUIREMENTS:

The installation shall be carried out in conformity with the requirements of relevant bye-laws of Municipal and other Authorities in whose jurisdiction; the work is being carried out and also with specification laid down by Indian Standards in this codes and National Building Code of Practice - No. SP: 7 - 1983 (Part IX) plumbing services. & SP: – 35: 1987

i) All water supply, drainage and sanitary work shall be executed by a Licensed Plumbing Contractor and shall be in accordance with the requirement of relevant bye-laws of Municipal or other Authorities in whose jurisdiction the work is being carried out.
ii) The diameter of pipes and fittings wherever mentioned shall mean the internal diameter, unless otherwise specified.
iii) The job shall include the cost of making necessary chases, holes etc. in walls, floors and in other places and also making good on completion of the work. The contractor shall make good, to the satisfaction of Project Manager/Employer in case of any damage caused to floors during sanitary and plumbing works.
iv) Careful Handling, fitting and fixing the sanitary fixtures, as per drawings/specifications and instructions of authorities concerned and complete testing of necessary pipe connections, etc.
v) Fitting and fixing including jointing of uPVC Soil, waste pipes and fittings to be completed. Prior to fixing, all pipes and fittings are to be properly checked. After fixing of pipelines, the same are to be tested by water test to ensure the system is leak proof.
vi) Fitting & fixing of CPVC Pipe as per ASTM D 2846, SDR-11 for hot & cold water supply (concealed work) with various fittings such as tee, elbow, reducer, union, valves, cocks, float valve etc. with Solvent Cement Joint as per ASTM D-2564 for cold fusion. On TECHNICAL SPECIFICATIONS 4 UECPL completion the pipelines are to be tested by Hydraulic Pressure Testing Machine to ensure that the system is absolutely leak proof.
vii) Fitting & fixing of PVC pipe (lead free) as per ASTM D-1785, schedule 40 for ring main, vertical distribution & fittings such as tee, elbow, reducer, union, coupling, male/female adapter, end cap, valves, cocks, float valve etc. with solvent cement solution as per ASTM D-2564. On completion the pipelines are to be tested by Hydraulic Pressure Testing Machine to ensure that the system is absolutely leak proof
viii) Fitting, fixing & jointing of rain water pipe shall be laid over the M.S clamp (if required) with plastic clamps of suitable designs. Provision shall be made for movement in the suspended pipe caused due to thermal differences such that it does not grip or disturb the pipe at supports between the nut-bolts. The supports shall allow the repeated movements to take place without abrasion. Jointing of uPVC pipes shall be made by means of solvent cement for horizontal lines & "O" rubber ring for vertical line
ix) Provide all tools and equipment's including testing machines required for testing and supporting & fixing devices so as to install the sanitary fittings, pipe lines etc. securely in position.

30.3 TECHNICAL SPECIFICATION FOR HVAC

I. SCOPE

The scope of this section comprises the Design, Engineering, supply, erection testing and commissioning of Variable Refrigerant Flow (VRF)/Variable Refrigerant Volume(VRV) System conforming to these specifications and in accordance with the requirements of Drawing and Schedule of Quantities.

Proper water Drain system shall be incorporated as part of SCOPE OF WORK as internal/external unit.

II. LIST OF BUREAU OF INDIAN STANDARDS CODE

- IS : 554 – 1985 (Reaffirmed 1996) Dimensions for pipe threads where pressure tight joints are required on the threads.
- IS: 659-1964 (Reaffirmed 1991) Air Conditioning (Safety Code)
- IS:660-1963 (Reaffirmed 1991) Mechanical Refrigeration (Safety Code)
- IS : 732-1989 Code of practice for electrical wiring
- IS : 822-1970 (Reaffirmed 1991) Code of procedure for inspection of welds.
- IS : 1255-1983 Code of Practice for installation and maintenance of Power Cables up to and including 33KV rating (Second Revision)
- IS : 1554 – 1988 (Part – I) PVC insulated (Heavy Duty) electric cables for working voltages up to and including 1100 volts
- IS : 2379 – 1990 Colour code for the identification of pipelines. IS : 2551 – 1982 Danger notice plate.
- IS : 3043 – 1987 Code of practice for earthing
- IS : 3103 – 1975 (Reaffirmed 1999) Code of practice for Industrial Ventilation
- IS : 3837 – 1976 (Reaffirmed 1990) Accessories for rigid steel conduit for electrical wiring
- IS : 4736-1986 (Reaffirmed 1998) Hot-dip zinc coatings on steel tubes
- IS : 5133-1969 (Part-I) (Reaffirmed 1990) Boxes for the enclosure of electrical accessories.
- IS : 5424-1989 (Reaffirmed 1994) Rubber mats for electrical purposes.
- IS : 5578 & 11353-1985 Marking and identification of conductors
- IS : 6392-1971 (Reaffirmed 1988) Steel pipe flanges.
- IS : 13947-1993 (Part – V) Control Circuit Devices

- BS: EN:779-1993
- Filters ASHRAE Hand Books American Society of Heatingm Refrigeration & Air- conditioning Application 1999
- Fundamentals 1997
- Systems & Equipment 1996
- ASHRAE Indoor air quality Standard 62-1982

- IEC Relevant Sections

III. Specifications for VRF System

The system selected is a modular system, with number of indoors connected to centrally located outdoor units, as per detail designing given in the tender. The outdoor units for all the system shall be air cooled type and mounted on terrace of the building or on respective floors. Indoor units in various areas shall be as per enclosed drawings/ Bill of Quantities.

All the VRF air conditioners shall be fully factory assembled, wired, internally piped & tested. The outdoor unit shall be recharged with first charge of R 410A refrigerant. Additional charge shall be added as per refrigerant piping at site. All the units shall be suitable for operation with 415 V & further shall have operating voltage range of 320V to 460V, 50 Hz + 3%, 3 Phase supply for outdoor units & 220 V + 10%, 50 Hz + 3%, 1 Phase supply for indoor units.

The VRF system shall provide stable, trouble free & safe operation, with flexibility of operating desired indoor units. The outdoor units must be capable of delivering exact capacity proportional to the number of indoor units switched on & the heat load in the air conditioned area. The proportional operation shall be achieved by varying speed of the compressor in the outdoor units.

The operation of the VRF system shall be through independent wired/ wireless remote controllers as specified. The entire system shall be integrated with intelligent building management system of leading vendors like Honeywell/ Johnson Controls/ Staffa etc. through BAC Net Gateway. The detailing of operation required through BMS system are detailed under specifications of BMS system.

IV. Specification of Outdoor units.

Outdoors units of the VRF system shall be compact air cooled type and working on environmental friendly refrigerant R-410A.

All the compressors of the outdoor units must be hermetically sealed Fully inverter scroll type. Each module of outdoor unit must have at least 2 inverter scroll compressor above 12 HP module & Single Compressor below the same, suitable to operate at heat load proportional to indoor requirements. Outdoor units from 14 HP to 88 HP shall have all inverter compressors redundancy and optimum system efficiency.

"Coated PE Fins (with special acryl pretreatment) "for Al fins of Condenser Coils I mandatory for increased durability to salt corrosion.

The outdoor units must be suitable for up to 180 m (straight length) refrigerant piping between outdoor unit & the farthest indoor units, total piping of 1000 m for all the indoor units. Allowable level difference between outdoor unit & indoor units shall be 90 m in case of out door unit on top & 70 m in case of out door unit at bottom. Allowable level difference between various indoor units connected to one out door unit shall be up to 40 m. Further, the combination of module(System) should allow at least a level difference of 5M within the modules.

Back up operation, in case of failure of one of the compressors of out door unit, the other compressor should be capable of working in a single module. In case of multiple modules, the other modules should be able to operate in case of failure of one of the module within them. The VRF outdoor unit shall always be supplying at least 33% of back up operation, of the full load capacity.

The ODU & IDU should be able to operate even if there is failure in one or multiple IDU's by touch of a single emergency button. Further there should be a service back up option available allowing the balance IDU's to keep functioning even if a set of 5 IDU are in service.

COP of outdoor unit should be minimum 3.2 at ambient temperature of 42 degree Celsius & there shall be no duration of capacity till 42 Deg C and the modules should be able to operate till 54 Deg Cain case of any duration, the tenders are advised to furnish the respective data to department for review.

The outdoor unit shall employ system of equal run time for all the compressors, within each out door unit – Single Module or Multi Module.

The outdoor units shall be suitable to operate within an ambient temperature range of 10 Deg C to 54 Deg C in cooling mode & -10 Deg C to 24 Deg C in heating mode.

Air cooled condenser shall have Axial Flow, upward throw fan, directly coupled to BLDC fan motors with minimum IP 55 protection. The outdoor unit condenser fan shall be able to develop external static pressure up to 8 mm of H^2O.

The entire operation of outdoor units shall be through independent remotes of indoor units. No separate Start/ Stop function shall be required.

Starter for the Outdoor Unit compressor shall "Direct on Line" type.

Refrigerant control in the outdoor unit shall be through Electronic Expansion Valve. Complete refrigerant circuit, oil balancing/ equalizing circuit shall be factory assembled& tested.

Noise level of outdoor units shall not exceed 63 dB (A) at a distance of 1.5 m from the unit.

The outdoor units shall confirm to Technological Guideline for Harmonic Suppression – JAEG 9702-1995. High Harmonic Environmental Target Level for Power Distribution system shall be 5%.

Outdoor units shall be complete with following safety devices:

- High pressure switch
- Fan driver overload protector
- Over current relay
- Inverter Overload Protector
- Fusible Plug
- Unit shall be supplied with

I. Installation manual
II. Operation Manual
III. Connection Pipes
IV. Clamps

Units shall be available in following configuration 14 HP, 16 HP, 20 HP, 22 HP, 40 HP, 80 HP

V. Specifications for Indoor Units

A. Cassette type indoor units (If required)

These units shall be installed between the bottom of finished slab & top of false ceiling. The maximum allowable height for the cassette type units shall be 300 mm.

The cassette units shall have 4 way airflow (airflow from 4 sides) which will ensure uniform distribution of air and better cooling efficiency and saving in energy, thereby maintaining comfortable living environment.

The unit must have in built drain pump, suitable for vertical lift of 500 mm. The drain pan shall have antibacterial treatment that uses silver ions preventing growth of slime, mould and bacteria that cause blockages and odors. The unit casing shall be Galvanized Steel Plate.

Unit must be insulated with sound absorbing thermal insulation material, Polyurethane foam. The noise level of unit at the highest operating level shall not exceed 42 dB(A), at a vertical distance of 1.5 m from the grille of the unit.

Unit shall have provision of connecting fresh air without any special chamber & without increasing the total height of the unit (288 mm maximum).

The unit shall be supplied with suitable decorative panel treated with a dirt-repellant coating.

The unit shall be supplied with Resin Net filter with Mold Resistance. The filter shall have antibacterial treatment that prevents the growth of mould generated from dust or moisture that may adhere to filter. It shall be easy to remove, clean & re install.

The unit will be connected in series to a suitable out door unit & it must be possible to operate the unit independently, through corded/ cordless remote specified in the "Bill of quantities". The unit will be further connected to Intelligent Building Management System (To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

The unit shall be supplied with following from the factory

- Operation Manual
- Installation Manual

- Paper pattern for installation
- Drain hose/ Clamp metal/ Washer fixing plate/ Sealing pads/ Clamps/ Screws/
- Washer for hanging bracket/ Insulation for fitting

The unit must be available in following class – 1 HP, 1.25 HP, 1.6 HP, 2.0 HP, 2.5 HP, 3.2 HP, 4 HP, 5 HP

B. Ceiling Mounted duct type units.

These units shall be ceiling suspended with suitable supports to take care of operating weight of the unit, without causing any excessive vibration & noise. The cold air supplied by these units will be supplied to the area to be air conditioned, through duct system specified in the tender.

Each indoor unit must have electronic expansion valve operated by microprocessor thermostat based temperature control to deliver cooling/ heating as per the heat load of the room.

The unit casing shall be Galvanized Steel Plate.

Unit must be insulated with sound absorbing thermal insulation material, Glass Fiber. The noise level of unit at the highest operating level shall not exceed 49 dB(A), at a vertical distance of 1.5 m below the units with duct connected to the unit.

The unit must be able to develop external static pressure of 25 mm, at the specified air quantities.

Unit must have Thermal Fuse for fan motor protection, in case of motor heating.

The unit will be connected in series to a suitable out door unit & it must be possible to operate the unit independently, through corded/ cordless remote specified in the bill of quantities. The unit will be further connected to Intelligent Building Management System (To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

The unit shall be supplied with following from the factory-

- Operation Manual
- Installation Manual
- Paper pattern for installation
- Drain hose/ Clamp metal/ Insulation for fitting/ Sealing pads/ Clamps/ Screws

The unit must be available in following class – 1.6 HP, 2.0 HP, 2.5 HP, 3.2 HP, 4 HP, 5 HP, 8 HP, 10 HP

C. Floor cum Ceiling Mounted Units.

Floor cum Ceiling mounted units must be compact & stylish design that does not detract from the décor of the room.

Each indoor unit must have electronic expansion valve operated by microprocessor thermostat based temperature control to deliver cooling/ heating as per the heat load of the room.

The unit must have provision of adding drain pump kit if required & specified. The drain pump must be suitable to lift drain up to 1000 mm from the bottom of the unit.

Unit must be insulated with sound absorbing thermal insulation material, Polystyrene/Polyethylene foam. The noise level of unit at the highest operating level shall not exceed 46 dB(A), at a vertical distance of 1.5 m from the grille of the unit.

The unit shall be supplied with Resin Net filter with Mold Resistance. The filter shall be easy to remove, clean & re install.

The unit grille must be washable with soap solution.

It shall be possible to set minimum 5 steps of discharge angle by remote controller. It shall be possible to fit drain pipe from either side of the unit (Left or right)

The unit will be connected in series to a suitable out door unit & it must be possible to operate the unit independently, through corded/ cordless remote specified in the bill of quantities. The unit will be further connected to Intelligent Building Management System (To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

The unit shall be supplied with following from the factory-

- Operation Manual
- Installation Manual
- Installation panel
- Paper pattern for installation
- Insulation tape/ Clamps/ Screws

The unit must be available in following class – 1.8 HP, 2.0 HP, 3.75 HP, 5.0 HP, 6.25 HP.

D. Ceiling mounted Built – In type.

These units shall be ceiling suspended with suitable supports to take care of operating weight of the unit, without causing any excessive vibration & noise. The cold air supplied by these units will be supplied to the area to be air conditioned directly through duct collar & grille or , through duct system specified in the tender.

Each indoor unit must have electronic expansion valve operated by microprocessor thermostat based temperature control to deliver cooling/ heating as per the heat load of the room.

The unit casing shall be Galvanized Steel Plate.

Unit must be insulated with sound absorbing thermal insulation material, Glass Fiber. The noise level of unit at the highest operating level shall not exceed 48 dB(A), at a vertical distance of 1.5 m below the units with duct connected to the unit.

The unit must have provision to set external static pressure in three stages from max

10 mm to min 2 mm, depending on the air supply system.

The unit must include as standard equipment, maintenance free long-life filter, resin net with mold resistant.

The unit must include as standard equipment, a drain pump kit suitable to lift drain water up to 250 mm from the drain pipe opening.

Unit must have Thermal Fuse for fan motor protection, in case of motor heating.

The unit will be connected in series to a suitable out door unit & it must be possible to operate the unit independently, through corded/ cordless remote specified in the bill of quantities. The unit will be further connected to Intelligent Building Management System (To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

The unit shall be supplied with following from the factory:

- Operation Manual
- Installation Manual
- Paper pattern for installation
- Drain hose/ Clamp metal/ Insulation for fitting/ Sealing pads/ Clamps/ Screws

The unit must be available in following class – 0.8 HP, 1 HP, 1.25 HP, 1.6 HP, 2.0 HP, 2.5 HP, 3.2 HP, 4 HP, 5 HP

VI. Specification for Controls System for VRV air conditioning system

A. Wired Remote Controller

The controller must have large crystal display screen, which displays complete operating status.

The digital display must allow setting of temperature with 1 Deg C interval.

Remote shall be able to individually program by timer the respective times for operation start and stop within a maximum of 72 hours.

Remote must be equipped with thermostat sensor in the remote controller that will make possible more comfortable room temperature control

The remote shall be able to monitor room temperature & preset temperature by microcomputer & can select cool/ heat operation mode automatically.

The remote must constantly monitor malfunctions in the system & must be equipped with a "self diagnosis function" that let know by a message immediately when a malfunction occurs.

It shall be possible to wire the remote up to 500 Mtr.

B. Wireless Remote Controller.

Wireless remote controller shall be supplied as specified in the "Bill of Quantities"

The same operation modes & settings as with wired remote controllers must be possible.

Compact light receiving unit to be mounted into wall or ceiling shall be included.

C. Central Remote Controller.

Central Remote controller shall be touch screen type supplied as specified in the "Bill of Quantities"

Following functions shall be possible-

- Control Maximum 992 indoor units
- Zone control
- Malfunction code display
- All the functions available with wired remote controller
- It should be possible to wire the remote to 1000m
- Shall have facility of dynamic display available in various colours to identify status, i.e Red-Fault, Green- Functioning well, Grey-Off, Orange-Non Critical error

VII. Building Management System (BAC Net gateway)

The VRF system supplied must be suitable for communication between VRV & intelligent building management system of other reputed vendors, like STAEFA, Honeywell, Johnson Controls, through BAC Net gateway. The BAC Net gate way shall utilize the standard communication protocol for the HVAC industry, to provide easy connection between VRV system & BMS. The joint Matching Test shall be conducted by Authorized OEM personnel with the selected BMS vendor & entire be commissioned & balance.

Complete operation & monitoring of VRV air conditioning system shall be possible through the BMS system.

Following major functions shall be possible via BAC net interface on BMS-

Monitoring	Air conditioning status monitoring
	Indoor unit error monitoring
	Indoor air inlet temperature monitoring
	Filter choke sign monitoring
Control, Operation & Setting	Start/ Stop control
	Temperature adjustment mode setting
	Indoor air inlet temperature monitoring
	Remote control setting
	Temperature setting
	Filter sign reset
Display	Air conditioner operation setting & status

Set Temperature

Indoor unit error

Indoor air inlet temperature

Filter sign

The BAC Net gate way shall be as per ASHRAE 135, Data link - IEE802.3, BAC net/IP, conformance Class 3, with RS232C port.

BAC Net gateway hard ware shall be suitable for operation between -10°C to 50°C & humidity range between 0% to 98%, without condensation.

Billing software shall be part of the BMS.

VIII. Air conditioning Management System

The VRV system supplied must be provided with PC based air conditioning management system, form the supplier of VRV equipments. The required hard ware must be selected, suitable for up to minimum 128 indoor units.

The air conditioning management system, in broad terms must undertake following functions-

- Energy efficiency functions & optimization of system
- Operation & monitoring
- Expanded network functions

Complete operation & monitoring of VRV air conditioning system shall be possible through this PC based system.

Following major functions shall be possible:

Monitoring

Air conditioning status monitoring

Indoor unit error monitoring

Indoor air inlet temperature monitoring

Filter choke sign monitoring

Control, Operation & Setting	Start/ Stop control
	Temperature adjustment mode setting
	Indoor air inlet temperature monitoring
	Remote control setting
	Temperature setting
	Filter sign reset
Display	Air conditioner operation setting & status
	Set Temperature
	Indoor unit error
	Indoor air inlet temperature
	Filter sign
Measurement	Accurate operation time
	Number of switching times
	Power consumption (Optional with KWH meter) Room Temperature
	Outdoor Temperature
Printing	History
	Statistics
	Setting Information

- The A/C management system must be able to connect to existing LANs.
- Remote monitoring of the complete HVAC system shall be possible.
- System shall be capable to take external signal like Security/ Fire for forced shut off.
- Required hardware shall be suitable for operation between -10 Deg C to 50 DgC & humidity range, of 0% to 98%, without condensation.

Handing over of the VRV system

Following reading/ data shall be generated as a part of handing over of the VRV air conditioning system, apart from the handing over data for air side & indoor design conditions.

Out door units

- Inlet temperature
- Discharge pipe temperature
- Suction pipe temperature
- Oil pressure
- Condensing Pressure
- Evaporating Pressure
- Power supply voltage
- Inverter compressor frequency
- Inverter current
- Fan operating current
- Total ODU current

Indoor units

- Indoor unit operation – On/ off from remote
- Indoor unit operation – On/ off from thermostat
- Remote control presser temperature
- Suction temperature
- Indoor liquid pipe temperature
- Indoor gas pipe temperature
- Electronic expansion valve opening
- Fan operating current

IX. FIELD TEST AND INSPECTION

I. **Inspection:** Materials, equipment and the completed installation will be inspected by Engineer. Equipment, materials or work rejected because of defects or non- conformance with Drawings and Specifications shall be replaced or corrected by as directed by Engineer.

II. Start-up air conditioning system, in accordance with manufacturer's start-up instructions, and in presence of the manufacturer's technical representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment, and retest.

III. **Tests:**

- Provide materials and equipment required to perform the tests. Defects disclosed by the test shall be corrected at no cost to Owner.

- Tests after installation and prior to acceptance shall be performed in the presence of Engineer and subject to his Approval.

- Conform to the applicable requirements specified in PART- 17.0 - TESTING, ADJUSTING AND BALANCING.

- Equipment and material certified as having complied with referenced Specifications and Standards will not require retesting before installation. Equipment and materials not tested at place of manufacture will be tested before and after installation, as applicable, where necessary to determine compliance with referenced specifications and Standards.

  i. ROOM THERMOSTATS:
  Thermostats shall be compatible in design and appearance and shall be of modern, compact design with option of key locking type conversant concealed temperature set point adjustment. No room thermostat shall operate on Voltage in excess 24 Volt unless the thermostat is controlling a 240V fan or unit heater or unless specifically noted otherwise. Thermostat shall have on/off switch, three speed fan switch and LED's.

  ii. FREEZE PROTECTION THERMOSTATS:
  Sensing element shall be fixed to the front of the coil or wrapped around the pipe to guard against freezing at any point. If the capillary is damaged the thermostat shall cut-out to the safety side.

  iii. REMOTE SETTING UNITS:
  Remote setting unit shall have tough non-flammable plastic case on back plate suitable for surface or conduit box mounting. This unit shall enable control adjustments to be from a position remote from the controller.

  iv. OUTSIDE TEMPERATURE SENSOR:
  Sensing element of sensor shall have a negative temperature coefficient thermistor and housing shall be sealed aluminum tube, alloy head, with plastic cover.

  v. ROOM HUMIDITY SENSOR:
  The sensing element shall be foil dielectric coated both sides with gold to form a capacitor, sensor shall have 0-10V dc output

X. SUBMITTALS

Product Data: Submit manufacturer's technical data for air distribution equipment, including capacity ratings, fan performance curves with operating point clearly indicated, Finishes of materials, dimensions, weights, furnished accessories, and installation and instructions.

Shop Drawings: Submit manufacturer's assembly type shop drawings indicating dimensions, required clearances, installation details and field connection details.

Wiring Diagrams: Submit the manufacturer's electrical requirements for power supply wiring to the units.

Operation and Maintenance Data: Submit maintenance and lubrication instructions, motor and drive replacement instructions, and spare parts list for each unit.

Spare Parts List: Submit the manufacturer's spare parts list for ventilation equipment for a period of 2 years for the Engineer's review and approval.

XI. TRANSPORTATION, HANDLING AND STORAGE

I. Transportation, handling and storage of materials shall be in accordance with manufacturer's recommendations regarding transportation, handling and storage of materials.

II. Deliver materials to the site in manufacturer's original factory wrappings and containers, clearly labeled for identification of manufacturer, brand name and contents. Store materials off ground in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity. Follow manufacturer's instructions regarding transportation, handling and storage of materials.

XII. WARRANTY

Materials shall be provided of standard products of specialist manufacturers who have long experience of manufacturing and installing control equipment specified in this section. The system shall be installed by competent personnel, regularly employed by the Controls manufacturer with full responsibility for proper operation of the Controls including debugging and proper calibration of each component in the entire system. Supplier shall have in-place support facility within 30 km of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment. Submit a written guarantee signed by manufacturer, contractor, and installer agreeing to replace partitions which fail in material or workmanship within a period of 1 year from the date of handing over.

XIII. QUALITY ASSURANCE

I. Motors and electrical accessories shall comply with applicable National Standards

II. Electrical components installation shall comply with National Electrical Code

III. Test adjust and balance air conditioning systems during hot seasons

IV. Training

- Train Owner's maintenance personnel on the troubleshooting procedures and testing, adjusting, and balancing procedures. Review with Owner's personnel, the information contained in the Operating and Maintenance Data specified in Division 1.

- Schedule training through the Project Manager with at least 7 days prior notice.

XIV. MODE OF MEASUREMENT

THE FOLLOWING MEASUREMENT CODE SHALL APPLY TO THIS CONTRACT:-

I. Piping with/without insulation

- Piping with insulation shall be measured in running length (meters) for each size of pipe.

- The length of piping including accessories and fittings shall be measured along the center line of piping.

- No separate measurement of flanges, bends, elbows, reducer, expanders, tees, cross pipe supports, hangers, anchors, sockets for thermometer, pressure gauge, etc. shall be made. All such fittings / accessories shall be treated as normal piping.

- All accessories and finishes connected with insulation work shall be deemed to form part of insulation, and no separate measurement shall be made for such items.

II. Equipment Insulation:

- No separate measurement for insulation of any equipment shall be made. Insulation of equipment shall be deemed to form part of the equipment. Insulation on equipment shall be done as per specifications provided

III. Sheet Metal Work

- **Ducting:** All sheet metal ducting work will be measured in terms of final sheet area installed in SQ. METERS. No measurement of vanes, splitters, duct dampers, deflectors, access doors, etc. which are required to be installed in the duct work shall form part of the duct work.

  Duct fittings such as bends, elbows, tap-offs, collars, transformation pieces etc. shall be treated as ordinary duct pieces with their length measured along their Centerline.

  No duct supports, stiffening, members, etc. shall be measured separately. All such supports/hangers shall form part of ductwork.

  Equipment connections such as canvas/asbestos/Rexene shall be deemed to be part of the ductwork and no separate measurement will be allowed.

IV. Grilles:

All grilles will be measured in terms of effective area (e.g. 600mm x 150mm grille will be measured as 0.09 Sq. metre

V. Diffusers:

Diffusers will be measured in terms of diameter of each diffuser in centimeters.

VI. Dampers

All duct dampers shall form part of ductwork, no separate measurement will be made for duct dampers. Fire dampers will be measured in terms of effective area in Sq. metre.

VII. Ducting Insulation

Ducting insulation will be measured on the basis of centerline of insulation and not the outer line of insulation.

Example: Measurement 25 mm thick insulation on 600 mm x 300 mm duct 1 metre length. [(600 + 25) + (300 + 25] 2 x 1 metre

No special measurement shall be made for insulation of bends, transformation pieces, tap offs, elbows etc. All such insulation shall be treated as standard duct insulation. Insulation item shall include all accessories and finishes as specified. No separate measurement will be made for such items.

XV. ASSOCIATED CIVIL WORKS

The rate shall include all civil works associated with HVAC installation executed in accordance with approved shop drawings under direct supervision of the Project Manger such as PCC foundation blocks for all OUT DOOR UNITS/wall openings etc.

XVI. PERFORMANCE GUARANTEE

The contractor shall carry out the work in accordance with the Drawings, Specifications, Schedule of Quantities and other documents forming part of the Contract. The Contractor shall be fully responsible for the performance of each equipment installed by him at the specified parameters and for the efficiency of the installation to deliver the required end result. The Contractor shall guarantee that the HVAC system as installed shall maintain the inside conditions in the air-conditioned spaces as described under "Basis of Design" included in the specifications. The guarantee shall be submitted in the proforma given in Appendix I.

The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing

XVII. BYE-LAWS AND REGULATIONS

The installation shall be in conformity with the Bye-laws, Regulations and Standards of the local authorities concerned, in so far as these become applicable to the installation. But if these Specifications and drawings call for a higher standard of materials and / or workmanship than those required by any of the above regulations and standards, then these specifications and drawings shall take precedence over the said regulations and standards. However, if the drawings and specifications require something which violates the Bye-laws and Regulations, then the

Bye-laws and Regulations shall govern the requirement of this installation.

XVIII. DRAWINGS.

Various systems and extent of work covered in the contract. These drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these Drawings. The architectural/interiors drawings and details shall be examined for exact location of equipment, controls, grilles and diffusers. The Contractor shall follow the tender drawings for preparing his shop drawings, and for subsequent installation work. He shall check the drawings of other trades to verify spaces in which his work will be installed. Maximum headroom and space conditions shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the Architect/Consultant/Owner's site representative before proceeding with the installation. In case installation is carried out without notifying, the work shall be rejected and contractor shall rectify the same at his own cost. The contractor shall examine all architectural, structural, plumbing, electrical and other services drawings and check the as-built works before starting the work, report to the Owner's site representative any discrepancies and obtain clarification. Any changes found essential to coordinate installation of this work with other services and trades, shall be made with prior approval of the Architect/Consultant/ Owner's site representative without additional cost to the Owner. The data given in the Drawings and Specifications is as exact as could be procured, but its accuracy is guaranteed.

XIX. TECHNICAL DATA

Each tenderer shall submit along with his tender, the technical data for all items Failure to furnish complete technical data with tenders may result in rejection of the tender. Manufacturers drawings, catalogues and other documents submitted for approval shall be in four sets. Each item in each set shall be properly labelled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

Samples of all materials like grilles, diffusers, controls, insulation, pre-moulded pipe section, control wires etc shall be submitted to the Owner's site representative prior to procurement. These will be submitted in for approval and retention by Owner's site representative and shall be kept in their site office for reference and verification till the completion of the project.

Wherever directed a mockup or sample installation shall be carried out for approval before proceeding for further installation.

Where the contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundation, piping, wiring or any other part of the mechanical, electrical or architectural layouts; all such re-design, and all new drawings and detailing required therefore, shall be prepared by the contractor at his own expense and gotten approved by the Architect/ Consultant/ Owner's site representative. Delay on such account shall be at the cost of and consequence of the Contractor.

Where the work of the contractor has to be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Owner's site representative, If the contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make all the necessary changes without extra cost to the Owner.

XX. QUIET OPERATION AND VIBRATION ISOLATION

All equipment shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Owners site representative. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own room, shall be considered objectionable. Such condition shall be corrected by the contractor at his own expense. The contractor shall guarantee that the equipment installed shall maintain the specified NC levels.

XXI. ACCESSIBILITY

The contractor shall verify the sufficiency of the size of the shaft openings, clearances in cavity walls and suspended ceilings for proper installation of his ducting and piping. His failure to communicate insufficiency of any of the above shall constitute his acceptance of sufficiency of the same. The contractor shall locate all equipments which must be service, operated or maintained in fully accessible positions. The exact location and size of all access panels, required for each concealed damper, valve or other devices requiring attendance shall be finalized and communicated in sufficient time, to be provided in the normal cause of the work. Failing this, the contractor shall make all the necessary repairs and changes at his own expense. Access panel shall be standardized for each piece of equipment / device / accessory and shall be clearly nomenclatured/ marked.

XXII. MATERIALS AND EQUIPMENT

All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be strictly in conformity with list of approved manufacturer's.

XXIII. MANUFACTURER"S INSTRUCTIONS

A Manufacturer has furnished specific instruction, relating to the material and equipment used in this project, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

XXIV. OPERATING INSTRUCTION & MAINTENANCE MANUAL

Upon completion and commissioning of HVAC system the contractor shall submit a draft copy comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Consultant and Owner's site representative and two for Owners Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment.

XXV. MAINTENANCE DURING LIABILITY PERIOD

a. **Complaints:** The contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

b. **Repairs**: All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of charge to the Owner.

c. **UPTIME GUARANTEE:** The contractor shall guarantee for the installed system an uptime of 98%. In case of shortfall in any month during the defects liability period, the Defects Liability Period shall get extended by a month for every month having shortfall. In case of shortfall beyond the defects liability period, the contract for Operation and Maintenance shall get extended by a month for every month having the shortfall and no reimbursement shall be made for the extended period.

   The Contractor shall provide log in the form of diskettes and bound printed comprehensive log book containing tables for daily record of all temperatures, pressures, humidity, power consumption, starting and stopping times for various equipment, daily services rendered for the system alarms, maintenance and record of unusual observations etc. Contractor shall also submit preventive maintenance.

d. **Schedule:** Each tenderer shall submit along with the tender, a detailed operation assistance proposal for the Owner's site representatives/ Consultant's review. This shall include the type of service planned to be offered during the Defects Liability Period and beyond. The operation assistance proposal shall give the details of the proposed monthly reports to the management.

e. **OPERATION AND MAINTENANCE:** Contractor may be required to carry out the operation of the HVAC installation for the defects liability period. The contractor will be responsible for complete operation & maintenance of Air conditioning installation for 60 months period from the date of completion & handing over the installation to the BSCDCL. The CMC charges payable will be 4% of the quoted value of installation with 10% incremental for 5 years

XXVI. GUARANTEE PERFORMA

a. GUARANTEE FOR HVAC INSTALLATION

We hereby guarantee the year round Air Conditioning System which we have installed in the Building as per details given below.

Location: **JABALPUR**

Owner: JMC

For a period of Two Years from the date of acceptance of the total installation, we agree to repair or replace to the satisfaction of the Owner, any or all such work that may prove defective in workmanship, equipment or materials within that period, ordinary wear and tear and unusual abuse or neglect excluded, together with any other work, which may be damaged or displaced in so doing. In the event of our failure to comply with the above mentioned conditions within a reasonable time, after being notified in writing, we collectively and separately, do hereby authorize the Owner to produce to have the defects repaired and made good at our expense, and we shall pay the cost and charges thereof, immediately upon demand.

WE ALSO HEREBY UNDERTAKE to test the entire installation in first SUMMER, AND MONSOON on following the completion of installation, to check and do everything necessary to ensure that the specified indoor conditions in all spaces are maintained, that all water and air systems are properly balanced, that all controls are calibrated accurately, and all units are functioning satisfactorily.

SIGNATURE OF HVAC
CONTRACTOR
For ----------
DATE SEAL

List of approved Make-

S.No.	Electrical Item	Brand Name of Make
1	Indoor and Outdoor units	BLUE STAR, TOSHIBA, DAIKIN,HITACHI
2	PVC Copper conductor Wires, ISI Marked, PVC Insulation	HAVELLS, FINOLEX. ANCHOR, RR KABEL, HPL, POLYCAB, KEI.
3	PVC Conduct Pipe, ISI Marked and accessories, PVC Casting and Capping and its accessories	PRECISION, MODI, SHRINATH CROWN, AKG/BEC
4	Steel Conduit pipe ISI Marked.	JINDAL, BEC, NIC
5	Modular Flush type switches, sockets etc.	LEGRAND, ANCHOR, FINOLEX, ANCHOR/ C&S/ HAVELLS/ HPL.
7	Phenolic laminated sheet.	HYLAM, ANCHOR
8	MCB, Isolator, RCCB, MCB-DB	HAVELLS, LEGRAND, SIEMENS, SCHNEIDER, L&T(HAGER), ABB
9	XLPE Insulated Cables	HAVELLS, FINOLEX, POLYCAB, RR KABEL, KEI.
10	G.I.Pipes (ISI Marked)	TATA, SWASTIK, JINDAL
11	copper refrigerant piping	Mexflow/Mandev/Rajco/ kajco)
12	PVC Drain pipe	Kissan/Prince/Supreme

- Brands /class/grades are as mention above or as per CPWD specified Brands/class/grade.

Annexure-F
(See clause 3 of section 2-ITB)

PROCEDURE FOR PARTICIPATION IN E-TENDERING

1. REGISTRATION OF BIDDERS ON E-TENDERING SYSTEM:

All the PWD registered bidders are already registered on the new e-procurement portal https://www.mpeproc.gov.in. The user id will be the contractor ID provided to them from MP Online. The password for the new portal has been sent to the bidders registered email ID. for more details may contact M/s. _Tata Consultancy Services Corporate Block, 5th floor, DB City BHOPAL-462011 email id: eproc_helpdesk©mpsdc.gov.in. Helpdesk phone numbers are available on website.

2. DIGITAL CERTIFICATE:

The bids submitted online should be signed electronically with a Class III Digital Certificate to establish the identity of the bidder submitting the bid online. The bidders may obtain Class III Digital Certificate issued by an approved Certifying Authority authorized by the Controller of Certifying Authorities, Government of India. A Class III Digital Certificate is issued upon receipt of mandatory identity proofs along with an application. Only upon the receipt of the required documents, a Digital Certificate can be issued. For details please visit cca.gov.in.

NOTE:

I. It may take up to 7 working days for issuance of Class III Digital Certificate; hence the bidders are advised to obtain the Certificate at the earliest. Those bidders who already have valid Class III Digital Certificate need not obtain another Digital Certificate for the same. The bidders may obtain more information and the Application From required to be submitted for the issuance of Digital Certificate from cca.gov.in

II. Bids can be submitted till bid submission end date. Bidder will require digital signature while bid submission.

The digital certificate issued to the Authorized User of a Partnership firm / Private Limited Company / Public Limited Company and used for online biding will be considered as equivalent to a no-objection certificate / power of attorney to that user.

In case of Partnership firm, majority of the partners have to authorize a specific individual through Authority Letter signed by majority of the partners of the firm
In case of Private Limited Company, Public Limited Company, the Managing Director has to authorize a specific individual through Authority Letter. Unless the certificate is revoked, it will be assumed to represent adequate authority of the specific individual to bid on behalf of the organization for online bids as per information Technology Act 2000. This Authorized User will .be required to obtain a Digital Certificate. The Digital Signature executed through the use of Digital Certificate of this Authorized User will be binding on the firm. It shall be the responsibility of Management / Partners of the concerned firm to inform the Certifying Authority, if the Authorized User changes, and apply for a fresh Digital Certificate for the new Authorized User.

3. SET UP OF BIDDER'S COMPUTER SYSTEM:

In order for a bidder to operate on the e-tendering System, the Computer System of the bidder is required to be set up for Operating System, Internet Connectivity, Utilities, Fonts, etc. The details are available at https://www.mpeproc.gov.in

4. KEY DATES:

The bidders are strictly advised to follow the time schedule (Key Dates) of the bid on their side for tasks and responsibilities to participate in the bid, as all the stages of each bid are locked before the start time and date and after the end time and date for the relevant stage of the bid as set by the Department.

5. PREPARATION AND SUBMISSION OF BIDS

The bidders have to prepare their bids online, encrypt their bid Data in the Bid forms end submit Bid of all the envelopes and documents related to the Bid required to be uploaded as per the time schedule mentioned in the key dates of the Notice inviting e-Tenders after signing of the same by the Digital Signature of their authorized representative.

6. PURCHASE OF BID DOCUMENT

For purchasing of the bid document bidders have to pay Service Charge online ONLY which is Rs. [as per Bid Date Sheet]. Cost of bid document is separately mentioned in the Detailed NIT. The Bid Document shall be available for purchase to concerned eligible bidders immediately after online release of the bids and up to scheduled time and date as set in the key dates. The payment for the cost of bid document shall be made.

Online through Debit/Credit card Net banking or NeFT Challan through the payment gateway provided on the portal.

7. WITHDRAWAL, SUBSTITUTION AND MODIFICATION OF BIDS

Bidder can withdraw and modify the bid till Bid submission end date.

Annexure — G
(See clause 4 of Section 2 -ITB)

JOINT VENTURE (J.V.)

J.V. is not allowed as per the conditions of contract.
If J.V. is allowed following conditions and requirements must be fulfilled –

1. Number of partners in a Joint Venture shall not exceed 3 (three). The partners shall comply with the following requirements:

a) one of the partners shall be nominated as being Lead Partner, and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;
b) the bid and, in case of a successful bid, the Agreement, shall be signed so as to be legally binding on all partners;
c) the partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the contract, including payment, shall be done exclusively with the partner in charge;
d) all partners of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms, and a statement to this effect shall be included in the authorization mentioned under[c] of above, as well as in the bid and in the Agreement tin case of a successful bid];
e) The joint venture agreement should indicate precisely the role of all members of IV in respect of planning, design, construction equipment key personnel, work execution, and financing of the project. All members of JV should have active participation in execution during the currency of the contract. This should not be varied/modified subsequently without prior approval of the employer;
f) The-joint venture agreement should be registered, so as to be legally valid and binding on all partners and
g) a copy of the joint Venture Agreement entered into by the partners shall be submitted with the bid.

2. The figures for each of the partners of a joint venture shall be added together to determine the Bidder's compliance with the minimum qualifying criteria required for the bid. All the partners collectively must meet the criteria specified in full. Failure to comply with this requirement will result in rejection of the joint venture's bid.

3. The performance security of a joint venture shall be in the name of the partner Lead Partner/joint venture.

4. Attach the power of attorney of the partners authorizing the Bid signatory(ies) On behalf of the joint venture

5. Attach the agreement among all partners of the joint venture [and which is legally binding on all partners], which shows the requirements as indicted in the Instructions to Bidders'.

6. Furnish details of participation proposed in the joint venture as below:

DETAILS OF PARTICIPATION IN THE IOINT VENTURE

PARTICIPATION DETAILS	FIRM 'A' (Lead Partner)	FIRM 'B'	FIRM 'C'
Financial			
Name of the Banker(s)			
Planning			
construction Equipment			
Key Personnel			
Execution of Work (Give details on contribution of each)			

7. The partners of J.V. should satisfy the qualification criteria as below,

a) The Lead Partner must meet at least 50% requirement of Technical and Financial eligibility criteria required for the bid.
b) The other partner(s) must meet at least 25% requirement of Technical and financial eligibility criteria required for the bid.
c) The lead partner and the other partners should together meet 100% of all the eligibility criteria required for the bid.

8. For the meeting the minimum qualification criteria of experience of similar nature work. Every partner can have experience of different works as defined in similar nature works and together should have the experience of all type of works described in similar nature works.

Annexure-H
(See clause 12 of Section 2 —ITB & clause 4 of GCC)

ORGANIZATIONAL DETAILS

(To be contained in Envelope- A)

S.No.	Particulars	Details
1	Registration number issued by Centralized Registration System of Govt. of M.P. or Proof of application for registration.	'(If applicable, scanned copy of proof of application for registration to be uploaded)
2	Valid Registration of bidder in appropriate class through Centralized Registration of Govt. of MP	Registration No. ____Date_____ (Scanned copy of Registration to be uploaded)
3	Name of Organization/ Individual/ Proprietary Firm/Partnership Firm	
4	Entity of Organization Individual/ Proprietary Firm/ Partnership Firm (Registered under Partnership Act)/Limited Company (Registered under the Companies Act— 1956)/ Corporation / Joint Venture	
5	Address of Communication	
6	Telephone Number with STD Code	
7	Fax Number with STD Code	
8	Mobile Number	
9	E-mail Address for all communications	
Details of Authorized Representative		
10	Name	
11	Designation	
12	Postal Address	
13	Telephone Number with STD Code	
14	Fax Number with STD Code	
15	Mobile Number	
16	E-mail Address	

Note:

- In case of partnership firm and limited company certified copy of partnership deed/ Articles of Association and Memorandum of Association along with registration certificate of the company shall have to be enclosed.
- Self-Attested photocopies/scanned copies of all the relevant proof documents should be submitted in the physical bid as well as online bid.

Signature of Bidder with Seal

Date: _____

Annexure —1
See clause 14 of Section 2 -ITB)

Envelope — B

Technical Proposal

Technical Proposal shall comprise the following documents:

S.No.	Particulars	Details to be submitted
1	Experience — Financial & Physical	Annexure - I (Format: I -1)
2	Annual Turnover	Annexure - I (Format: I -2)
3	List of technical personnel for the key positions	Annexure - I (Format: I -3)
4	List of Key equipment's/ machines for quality control labs	Annexure - I (Format: I -4)
5	List of Key equipment's/ machines for construction work	Annexure - I (Format: I -5)

Note:

1. Technical Proposal should be uploaded duly page numbered and indexed.
2. Technical Proposal uploaded otherwise will not be considered.

Annexure - I (Format: I-1)
(See clause 14 of Section 2 -ITB)

FINANCIAL & PHYSICAL EXPERIENCE DETAILS

A. Financial Requirement:

The bidder should have completed either of the below:

i. three similar works, each costing not less than the amount equal to 20% of the probable amount of contract during the last 3 financial years; or
ii. two similar works, each costing not less than the amount equal to 30% of the probable amount of contract during the last 3 financial years; or
iii. one similar work of aggregate cost not less than the amount equal to 50% of the probable amount of contract in any one financial year during the last 3 financial years;

To be filled in by the contractor:

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

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

Existing commitments— (Value of 'C' for Bid Capacity formula)

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

B. Physical Requirement:

Execution of similar items of work in any one financial year during the last 3 financial years should not be less than the minimum physical. requirement fixed for the work.

S.No.	Particulars	Actual Quantity Executed (To be filled in by the contractor)		
		Year – 1	Year - 2	Year - 3
1.	Structural Conservation, Dome, Roof, Vaults and Arches Repairs			
2.	Lime Plaster Works and render			
3.	Structural wood work, Purlin and beams			
4.	wood work Door and Window Restoration			
5.	Lakhori / traditional brick masonry works			
6.	Roofing including water proofing work			
7.	Decorative work such as kara (Lime punning), stucco work, stone/lime jail work, Marble work			
8.	Internal Electrification in heritage building			
9.	Stitching of structural cracks			
10.	De-Vegetation			
S.No.	Particulars	Details		
		Project Name	Quantity Executed	Year of Completion

Note:

1. 1Certificate duly signed by the employer shall be enclosed for the actual quantity executed in any one year during the last 3 financial years,

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

Annexure-I (Format: I-2)
(See clause 14 of Section 2 -ITB)

ANNUAL TURN OVER

Requirement:

Average annual construction turnover on the construction works not less than 50% of the probable amount of contract during the last 3 financial years;

To be filled in by the contractor:

Financial Year	Payments received for contracts in progress or completed
1. 2014-2015	
2.2015-2016	
3.2016-2017	

Note:

i. Annual turnover of construction should be certified by the Chartered Accountant.

ii. Audited, Balance sheet including all related notes, and income statements for the above financial years to be enclosed.

Bid Capacity

Applicants who meet the minimum qualifying criteria in the evaluation as stated above are to be evaluated further for bid capacity as under:
Bid Capacity = (1.5A X B) - C
Where
A. = Maximum value of civil engineering works executed in any one year during the last five year (10% weightage per year shall be given to bring the value of work executed at present price level)
B = Proposed contract period in years.
C = Amount of work in hand at present.

Annexure - I (Format: I-3)
(See clause 14 of Section 2-ITB & Clause 6 of GCC

List of Technical Personnel for the Key Positions

Minimum requirement					**Available with the bidder**						
S.No.	Key Position	Minimum requirement	Qualification	Minimum Work Experience	S.No.	Name of Personnel	Key Position	Qualification	Age	Similar work experience	Total Work Experience
1	Project Manager	01	Engineer/ Architect with 5 years of experience in working on Heritage Conservation Sites	5 yrs.							
2	Site in-charge	02	Supervisor in experience in working on Heritage Conservations sites	5 yrs.							
3	Craftsman-wood work	01	Domain Experts with experience in wood work	10 yrs.							
4	Craftsman- Stone work	01	Domain Experts with experience in stonework	10 yrs.							
5	Craftsman- Stucco work	02	Domain Experts with experience in stucco work	10 yrs.							

Annexure - I (Format: I-4)
(See clause 14 of Section 2-ITB)

List of Key Equipment's for Quality Control Labs

Minimum requirement			Available with the bidder	
S. No.	**Name of Equipment/ Machinery**	**Quantity**	**Name of Equipment/ Machinery**	**Quantity**

Annexure - I (Format: I-5)
(See clause 14 of Section 2-ITB)

List of Key Machines for Construction Work

Minimum requirement			**Available with the bidder**				
S. No.	**Name of Equipment/ Machinery**	**Quantity**	**Name of Equipment / Machinery**	**Year of manufacture**	**Quantity**	**Owned/leased**	**make**
1.	Traditional chakki with heavy stone wheel with Tractor for chakki.	1 nos.					
2.	Water storage tanks.	5000 liters					
3.	Digital camera for documentation of execution works	2 nos.					
4.	Pressure grouting machine.	1 nos.					
5.	Concrete mixer	1nos.					

Annexure — J
(See clause 14 of Section 2 -ITB)

FINANCIAL BID

(To Be Contained in Envelope-C)

NAME OF WORK : Conservation Work of Raja Gokuldas Dharamshala, Jabalpur, Madhya Pradesh.

I/We hereby bid for the execution of the above work within the time specified at the **rate (in figures)** _____ **(in words)** _____ **percent below/ above / at par** based on the Bill of Quantities and item wise rates given therein in all respects and in accordance with the specifications, designs, drawings and instructions in writing in all respects in accordance with such conditions so far as applicable. I/We have visited the site of work and am/are fully aware of all the difficulties and conditions likely to affect carrying out the work. I/We have fully acquainted myself/ourselves about the conditions in regard to accessibility of site and quarries/kilns, nature and the extent of ground, working conditions including stacking. of materials, installation of tools and plant conditions effecting accommodation and movement of labour etc. required for the satisfactory execution of contract. Should this bid be accepted, I/We hereby agree to abide by and fulfill all the terms and provisions of the said conditions of contract annexed- hereto so far as applicable, or in default thereof to forfeit and pay to the Jabalpur Smart City Limited or his successors in office the sums of money mentioned in the said conditions.

Note:

I. Only one rate of percentage above or below or at par based on the Bill of Quantities and item wise rates. given therein shall be quoted.
II. Percentage shall be quoted in figures as well as in words. If any difference in figures and words is found lower of the two shall be taken as valid and correct rate. If the bidder is not ready to accept such valid and correct rate and declines to furnish performance -security and sign the agreement his earnest money deposit shall be forfeited.
III. In case. the percentage "above" or "below" is not given by a bidder, his bid shall be treated as non-responsive.
IV. The bidder shall have to quote rates inclusive of all duties, royalties, levies and taxes except Goods and Service Tax (GST). The amount of applicable GST will be paid separately to the Contractor with each bill at the time of payment. The employer shall not be liable for any duties, taxes (except GST) royalties and levies.

Signature of Bidder

Name of Bidder

The above bid is hereby accepted by me on behalf of the Jabalpur Smart City Limited dated the _____ day of _____ 20_____

Signature of Officer
By whom accepted
Annexure — K
(See clause 15 of Section 2 -ITB)

MATERIALS TO BE ISSUED BY THE DEPARTMENT

NIL

Annexure—L
(See clause 21 of Section 2 -ITB)

LETTER OF ACCEPTANCE (LOA)

No. _____ Dated: _____
To,

M/s._____ (Name and address of the contractor)

Subject: Conservation Work of Raja Gokuldas Dharamshala, Jabalpur, Madhya Pradesh

Dear Sir(s),

Your bid for the work mentioned above has been accepted on behalf of the Jabalpur Smart City Limited at your bided percentage _____ below/ above or at par the Bill of Quantities and item wise rates given therein.

You are requested to submit within 15 (Fifteen) days from the date of issue of this letter:

a) The performance security/ performance guarantee of Rs. _____ (in-figures) (Rupees _____ in words only). The performance security shall be in the shape of term deposit receipt / bank guarantee of any nationalized / schedule commercial bank valid up to three months after the expiry of defects liability period.

b) Sign the contract agreement.

Please note that the time allowed for carrying-out the work as entered in the bid is _____ months including/ excluding rainy season, shall be reckoned from the date of signing the-contract agreement.

Signing the contract agreement shall be reckoned as intimation to commencement of work and no separate letter for commencement of work is required. Therefore, after signing of the agreement, you are directed to contact the Engineer-in-charge for taking the possession of site and necessary instructions to start the work.

Yours Faithfully

Sign & Designation

Annexure — M
(See clause 22 of Section 2 -ITB)

PERFORMANCE SECURITY

To
_____ [name of Employer]
_____ [address of Employer]

WHEREAS _____ [name and address of Contractor) (Hereinafter called 'the Contractor") has undertaken, in pursuance of letter of Acceptance No-_____ dated to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, Up to a total of _____ [amount of guarantee]* _____ _(in words), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and Without cavil or argument, an sum or sums within the limits of _____[amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the term of the Contract of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification

This guarantee shall be valid until 3 (three) months from the date of expiry of the Defect Liability Period.

Signature, Name and Seal of the guarantor _____
Name of Bank_____
Address_____

Phone No, Fax No., E-mail Address, of Signing Authority _____
Date _____

* An amount shall be inserted by the Guarantor, representing the percentage the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.

SECTION 3

Conditions of Contract

Part - I General Conditions of Contract [GCC]

Table of Clauses of GCC

A. General

1. DEFINITIONS

1.1. Bill of Quantities: means the priced and completed Bill of Quantities forming part of the Bid.

1.2. Chief Engineer: means Chief Engineer of the zone/ basin concerned:

1.3. Completion: means completion of the work as certified by the Engineer-in-Charge, in accordance with provisions of agreement.

1.4. Contract: means the Contract between the Employer and the Contractor to execute, complete and/or maintain the work. Agreement is synonym of Contract and carries the same meaning wherever used.

1.5. Contract Data: means the documents and other information, which comprise of the Contract.

1.6. Contractor: means a person or legal entity whose bid to carry out the work has been accepted by the Employer.

1.7. Contractor's bid: means the completed bid document submitted by the Contractor to the Employer.

1.8. Contract amount: means the amount of contract worked out on the basis of accepted bid.

1.9. Completion of work: means completion of the entire contracted work; Exhaustion of quantity of any particular item mentioned in the bid document shall not imply completion of work or any component thereof.

1.10. Day: means the calendar day.

1.11. Defect: means any part of the work not completed in accordance with the specifications included in the contract.

1.12. Department: means Department of the, State Government viz. Water Resources Department, Public Works Department, Public Health Engineering Department Rural Engineering Service and any other organization which adopts this document.

1.13. Drawings: means drawings including calculations and other information provided or approved by the Engineer-in-Charge.

1.14. Employer: means the party as defined in the Contract Data, who employs the Contractor to carry out the work. The Employer may delegate any or all functions to a person or body nominated by him for specified functions. The word Employer / Government / Department wherever used denote the Employer.

1.15. Engineer: means the person named in the Contract Data.

1.16. Engineer in charge: means the person named in the Contract Data.

1.17. Equipment: means the Contractor's machinery and vehicles brought temporarily to the Site far execution of work.

1.18. Government: means Government of Madhya Pradesh.

1.19. In Writing: means communicated in written form and delivered against receipt.

1.20. Material: means all supplies, including consumables, used by the Contractor for incorporation in the work.

1.21. Superintending Engineer: means Superintending Engineer-in-Charge of the Circle concerned.

1.22. Stipulated period of completion: means the period in which the Contractor is required to complete the work. The stipulated period is specified in the Contract Data.

1.23. Specification: means the specification of the work included in the Contract and any modification or addition made or approved by the Engineer-in-Charge.

1.24. Start Date: means the date of signing of agreement for the work.

1.25. Sub-Contractor: means a person or corporate body who has a Contract with the Contractor, duly authorized to carry out a part of the construction work under the Contract.

1.26. Temporary Work: means work designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the work.

1.27. Tender/Bid, Tendered/Bidder: are the synonyms and carry the same meaning where ever used. -

1.28. Variation: means any change in the work which is instructed or approved as variation under this contract.

1.29. Work: The expression "work' or "works" where used in these conditions shall unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the work by virtue of contract, contracted to be executed, whether temporary or permanent and whether original, altered, substituted or additional,

2. INTERPRETATIONS AND DOCUMENTS

2.1. Interpretations

In the contract, except where the context requires otherwise:

a) words indicating one gender include all genders;
b) Wards indicating the singular also include the plural and vice versa.
c) provisions including the word "agree", "agreed" or "agreement' require the agreement to be recorded in writing;
d) written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;

2.2. Documents Forming Part of Contract:

1. NIT with all amendments.
2. Instructions to Bidders (ITB, Bid Data Sheet with all Annexure's)
3. Conditions of Contract:

Part I General Conditions of Contract and the Contract Data; with all Annexures
Part II Special Conditions of Contract.

4. Specifications
5. Drawings
6. Bill of Quantities
7. Technical and Financial Bid
8. Agreement, and
9. Any other document(s), as specified.

3. Language and Law

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

4. Communications

All certificates, notice or instruction to be given to the Contractor by Employer/Engineer shall be sent to the address or contact details given by the Contractor in [Annexure H of ITB]. The address and contact details for communication with the Employer/Engineer shall be as per the details given in the Contract Data. Communication between parties that are referred to in the conditions shall be in writing. The notice sent by facsimile (fax) or other electronic means (email) shall also be effective on confirmation of the transmission. The notice sent by registered post or speed post shall be effective on delivery or at the expiry of the normal delivery period as undertaken by the postal service. In case of any change in address for communication, the same shall be immediately notified to Engineer-in- Charge.

5. Subcontracting

Subcontracting shall be permitted for contracts of value more than amount specified in the Contract Data with following conditions.

a. The Contractor may subcontract up to 25 percent of the contract price with the approval of the Employer in writing, but will not assign the Contract. Subcontracting shall not alter the Contractors obligations.
b. Following shall not form part of subcontracting:
iii. Hiring of labour through a labour contractor.
iv. The purchase of Materials to be incorporated in the works.
v. Hiring of plant& machinery. .
c. The sub-contractor will have to be registered in the appropriate category in the centralized registration system for contractors of the G0MP.

6. Personnel

6.1. The Contractor shall employ for the construction work and routine maintenance the technical personnel as provided in the Annexure

I-3 of Bid Data Sheet if applicable. If the Contractor fails to deploy required number of technical staff, recovery as specified in the Contract Data will be made from the Contractor.

6.2. If the Engineer asks the Contractor to remove a person who is a member of the contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within three days and has no further connection with the Works in the Contract.

7. Force Majeure

7.1. The term "Force Majeure" means an exceptional event or circumstance:
Which is beyond a Party's control,
Which such Party could not reasonably have provided against before entering into the Contract
Which, having arisen, such Party could not reasonably have avoided or overcome, and Which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

7.1.1. War, hostilities (whether war be declared or not), invasion, act of foreign enemies,
7.1.2. Rebellion, terrorism, sabotage by persons other than the contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
7.1.3. Riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
7.1.4. Munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
7.1.5. Natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

7.2. In the event of either party being rendered unable by force majeure to perform any duty or discharge any responsibility arising out of the contract, the relative obligation of the party affected by such force majeure shall upon notification to the other party be suspended for the period during which force majeure event lasts. The cost and loss sustained by either party shall be borne by respective parties.

7.3. For the period of extension granted to the Contractor due to Force Majeure the price adjustment clause shall apply but the penalty clause shall not apply. It is clarified that this sub clause shall not give eligibility

for price adjustment to contracts which are otherwise not subject to the benefit of price adjustment clause.

7.4. The time for performance of the relative obligation suspended by the force majeure shall stand extended by the period for which such cause lasts. Should the delay caused by force majeure exceed twelve months, the parties to the contract shall be at liberty to foreclose the contact after holding mutual discussions.

8. Contractor's Risks –

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

8.2. All risks and consequences arising from the inaccuracies or falseness of the documents, drawing, designs, other documents and/or information submitted by the contractor shall be the responsibility of the Contractor alone, notwithstanding the fact that the design/ drawings or other documents have been approved by the department.

9. Liability for Accidents to Person

The contractor shall be deemed to have indemnified and saved harmless the Corporation against all action, suits, claims, demands, costs etc. arising in connection with injuries suffered by any persons employed by the contractor or his subcontractor for the works whether under the General law or under workman's compensation Act or any other statute in force at the time of dealing with the question of the liability of employees for the injuries suffered by employees and to have taken steps properly to ensure against any claim there under.

10. Contractor to Construct the Works

10.1. The Contractor shall construct install and maintain the Works in accordance with the Specifications and Drawings as specified in the Contract Data.

10.2. In the case of any class of work for which there is no such specification as is mentioned in Contract Data, such work shall be carried out in accordance with the instructions and requirement of the Engineer-in-charge.

10.3. The contractor shall supply and take upon himself the entire responsibility of the sufficiency of the scaffolding, timbering, machinery, tools and implements, and generally of all means used for the fulfillment of this contract whether such means may or may not be approved or recommended by the Engineer.

11. Discoveries

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

12. Dispute Resolution System

12.1. No dispute can be raised except before the Competent Authority as defined in Contract Data in writing giving full description and grounds of dispute. It is clarified that merely recording protest while accepting measurement and/or payment shall not be taken as raising a dispute.

12.2. No dispute can be raised after 45 days of its first occurrence. Any dispute raised after expiry of 45 days of its first occurrence shall not be entertained and the Employer shall not be liable for claims arising out of such dispute.

12.3. The Competent Authority shall decide the matter within 45 days.

12.4. Appeal against the order of the Competent Authority can be preferred within 30 days to the Appellate Authority as defined in the Contract Data. The Appellate Authority shall decide the dispute within 45 days.

12.5. Appeal against the order of the Appellate Authority can be preferred before the Madhya Pradesh Arbitration Tribunal constituted under Madhya Pradesh Madhyastham Adhikaran Adhiniyam, 1983.

12.6. The Contractor shall have to continue execution of the Works with due diligence notwithstanding pendency of a dispute before any authority or forum.

B. Time Control

13. Programme

13.1. Within the time stated in the Contract Data, the Contractor shall submit to the Engineer for approval a Programme showing the general methods arrangements, order and timing for all the activities for the construction of works.

13.2. **The program shall be supported with all the details regarding key personnel, equipment and machinery proposed to be deployed on the works for its execution.** The contractor shall submit the list of equipment and machinery being brought to site, the list of key personnel being deployed, the list of machinery/equipment being placed in field laboratory and the location of field laboratory along with the Programme.

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

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

13.5. The Engineer's approval of the Programme shall not alter the Contractor's obligations.

14. Extension of Time

14.1. If the Contractor desires an extension of time for completion of the work on the ground of his having been unavoidably hindered in its execution or on any other grounds, he shall apply, in writing, to the Engineer-in-charge, on account of which he desires such extension. Engineer-in-Charge shall forward the aforesaid application to the Competent Authority as prescribed.

14.2. The competent authority shall grant such extension at each such occasion within a period of 30 days of receipt of application from contractor and shall not wait for finality of work. Such extensions shall be granted in accordance with provisions under clause 15 of this agreement.

14.3. In case the work is already in progress, the Contractor shall proceed with the execution of the works, including maintenance thereof, pending receipt of the decision of the competent authority as aforesaid with all due diligence.

15. Compensation for delay

15.1. The. time allowed for carrying out the work, as entered in the agreement, shall be strictly observed by the Contractor.

15.2. The time allowed for execution of the contract shall commence from the date of signing of the agreement. It is clarified that the need for issue of work order is dispensed with.

15.3. In the event milestones are laid down in the Contract Data for execution of the works, the contractor shall have to ensure strict adherence to the same

15.4. Failure of the Contractor to adhere to the timelines and/or milestones shall attract such liquidated damages as is laid down in the Contract Data.

15.5. In the event of delay in execution of the Works as per the time lines mentioned in the Contract Data the Engineer-in-charge shall retain from the bills of the Contractor amount equal to the liquidated damages leviable until the Contractor makes such delays good. However, the Engineer-in-charge shall accept bankable security in lieu of retaining such amount.

15.6. If the Contractor is given extension .of time after liquidated damages have been paid, the Engineer in Charge shall correct any over payment of liquidated damages by the Contractor in the next payment certificate.

15.7. In the event the Contractor fails to make good the delay until completion of the stipulated contract period (including extension of time) the sum so retained shall be adjusted against the liquidated damages levied.

16. Contractor's quoted percentage

The Contractor's quoted percentage rate referred to in the "Bid for works' will be deducted added from/to the net amount of the bill after deducting the cost of material supplied by the department.

C. Quality Control

17. Tests

17.1. The Contractor shall be responsible for:

b. Carrying out the tests prescribed in specifications, and

c. For the correctness of the test results, whether preformed in his laboratory or elsewhere.

17.2. The contractor shall have to establish field laboratory within the time specified and having such equipment's as are specified in the Contract Data.

17.3. Failure of the Contractor to establish laboratory shall attract such penalty as is specified in the Contract Data.

17.4. Ten percent of the mandatory test prescribed under the specification shall be got carried out through laboratories accredited by national Accreditation Board of laboratories (NABL) By the Engineer-in-charge and the cost of such testing shall be deducted from the payments due to contractor.

18. Correction of Defects noticed during the Defect Liability Period

18.1. The Defect Liability Period of work in the contract shall be as per the Contract Data.

18.2. The Contractor shall promptly rectify all defects pointed out by the Engineer well before the end of the Defect Liability Period. The Defect Liability Period shall automatically stand extended until the defect is rectified.

18.3. If the Contractor has not corrected a Defect pertaining to the Defect Liability Period to the satisfaction of the Engineer, within the time specified by the Engineer, the Engineer will assess the cost of having the Defect corrected, and the cost of correction of the Defect shall be recovered from the Performance Security or any amount due or that may become due to the contractor and other available securities.

D. COST CONTROL

19. Variations - Change in original Specifications, Designs, and Drawings etc.

19.1. The Engineer-in-charge shall have power to make any alterations, omissions or additions to or substitutions in the original specifications, drawings, designs and instructions, that may appear to him to be necessary during the progress of the work and the contractor shall carry out the work in accordance with any instructions which may be given to him in writing signed by the Engineer-in-charge, and such alterations, omission, additions or substitutions 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 the same conditions in all respects on which he agrees to do the main work.

19.2. The time for the completion of the work shall be adjusted in the proportion that the altered, additional or substituted work bears to the original contract work and the certificate of the Engineer-in-charge shall be conclusive as to such proportion.

20. Extra items

20.1. All such items which are not included in the priced BOQ shall be treated as extra items.

21. Payments for Variations and / or Extra Quantities

21.1. The rates for such additional (Extra quantity), altered or substituted work / extra items under this clause shall be worked out in accordance with the following provisions in the irrespective order:

a. The contractor is bound to carry out the additional (Extra quantity), work at the same rates as are specified in the contract for the work.
b. If the item is not in the priced BOQ and is. included in the SOR of the department, the rate shall be arrived at by applying the quoted tender percentage on the SOR rate.
c. If the rates for the altered or substituted work are not provided in applicable SOR - such rates will be derived from the rates for a similar class (type) of work as is provided in the contract (priced BOQ) for the work.
d. If the rates for the altered, substituted work cannot be determined in the manner specified in the sub clause (c) above - then the rates for such composite work item shall be worked out on the basis of the concerned Schedule of Rates minus/plus the percentage quoted by the contractor.
e. If the rates for a particular part or parts of the item is not in the Schedule of Rates and the rates for the altered, or substituted work item cannot be determined in the manner specified in sub clause (b) to (d) above, the rate for such part or parts will be determined by the Competent Authority, as defined in the Contract Data on the basis of the rate analysis derived out of prevailing market rates when the work was done.
f. But under no circumstances, the contractor shall suspend the work on the plea of non-acceptability of rates on items falling under sub clause (a) to (d). In case the contractor does not accept the rate approved by the Engineer in Charge for a particular item, the contractor shall continue to carry out the item at the rates determined by the Competent Authority. The decision on the final rates payable shall be arrived at through the dispute settlement procedure.

22. No compensation for alterations in or restriction of work to be carried out.

22.1. If at any time after the commencement of the work, the Engineer-in-charge for any reason whatsoever, not require the whole or any part of the work as specified in the bid to be carried out the Engineer-in-charge shall give notice in writing of the fact to the Contractor and withdraw that whole or any part of the work.

22.2. The Contractor shall have no claim to any payments or compensation whatsoever, on account of any profit or advantage

which he might have derived from the execution of work in full or on account of any loss incurred for idle men and machinery due to any alteration or restriction of work for whatsoever reason.

22.3. The Engineer-in-charge may supplement the work by engaging another agency to execute such portion of the work, without prejudice to his rights.

23. 'No Interest Payable

No interest shall be payable to the Contractor on any payment due or awarded by any authority.

24. Recovery from Contractors

Whenever any claim against the Contractor for the payment arises under the contract, the Department may be entitled to recover such sum by:

(a) Appropriating, in part or whole of the Performance Security and Additional Performance Security, if any; and/or Security Deposit and / or any sums payable under the contract to the contractor.

(b) If the amount recovered in accordance with (a) above is not sufficient, the balance sum may be recovered from any payment due to the contractor -under any other contract of the department, including the securities which become due for release.

(c) The department shall, further have an additional right to effect recoveries as arrears of land revenue under the M.P. Land-Revenue Code.

25. Tax –

25.1. The rates (in case of percentage rate bids)/ lump-sum offer (in case of lump-sum bids) quoted by the Contractor shall be deemed to be inclusive of all duties, royalties, levies and taxes except Goods and Service Tax(GST). The amount of applicable GST will be paid separately to the contractor with each bill at the time of payment.

25.2. The liability, if any, on account of quarry fees, duties, taxes (except GST), royalties and levies in respect of materials consumed or services rendered on public work, shall be borne by the Contractor.

25.3. Any changes in the taxes due to change in legislation or for any other reason shall not be payable to the contractor.

26. check Measurements

26.1. The department reserves to itself the right to prescribe a scale of check measurement of work in general or specific scale for specific works or by other special orders.

26.2. Checking of measurement by superior officer shall supersede measurements by subordinate officer(s), and the former will become the basis of the payment.

26.3. Any over/excess payments detected, as a result of such check measurement or otherwise at any stage up to the date of completion of the defect liability period specified in this contract, shall be recoverable from the Contractor, as per clause 24 above.

27. Termination by Engineer in charge

27.1. If the Contractor fails to carry out any obligation under the Contract, the Engineer in Charge may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

27.2. The Engineer in Charge, shall be entitled to terminate the Contract if the Contractor.

a) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract;
b) the Contractor is declared as bankrupt or goes into liquidation other than for approved reconstruction or amalgamation;
c) without reasonable excuse falls to comply with the notice to correct a particular defect within a reasonable period of time;
d) the Contractor does not maintain a valid instrument of financial security as prescribed;
e) the Contractor has delayed the completion of the Works by such duration for which the maximum amount of liquidated damages is recoverable;
f) If the Contractor fails to deploy machinery and equipment or personnel or set up a field laboratory as specified in the Contract Data;
g) If the contractor, in the judgment of the Engineer in chargé has engaged in corrupt or fraudulent practices in competing for or in executing the contract;
h) Any other fundamental breaches as specified in the Contract Data.

27.3. In any of these events or circumstances, the Engineer in Charge may, upon giving 14 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site, However, in the case of sub-paragraph (b) or (g) of clause 27.2, the Engineer in Charge may terminate the Contract immediately.

27.4. Notwithstanding the above, the Engineer-in-Charge may terminate the Contract for convenience by giving notice to the Contractor.

28. Payment upon Termination

28.1. If the contract is terminated under clause 27.3, the Engineer shall issue a certificate for value of the work accepted on final measurements, less Advance Payments and Penalty as indicated in the Contract Data. The amount so arrived at shall be determined by the Engineer-in-Charge and shall be final and binding on both the parties.

28.2. Payment on termination under clause 27.4 above - If the Contract is terminated under clause 27.4 above, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation, of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

28.3. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be recovered as per clause 24 above.

29. Performance Security

The Contractor shall have to submit, performance security and additional performance security, if any, as specified in the Bid Data Sheet at the time of signing of the contract. The contractor shall have to ensure that such performance security and additional performance security, if any remains valid for the period 'as specified in the Contract Data.

30. Security Deposit-

30.1. Security Deposit shall be deducted from each running bill at the rate as specified in the Contract Data. The total amount of Security Deposit so deducted shall not exceed the percentage of Contract Price specified in the Contract Data.

30.2. The security deposit may be replaced by equivalent amount of bank guarantee or fixed deposit receipt assigned to the Employer, with validity up to 3 (three) months beyond the completion of Defect Liability Period/ extended Delectability Period.

30.3. The Security Deposit shall be refunded on completion of' Defect Liability Period.

31. Price Adjustment

31.1. Applicability

1. Price adjustment shall be applicable only if provided for in the Contract Data.
2. The price adjustment clause shall apply only for the works executed from the date of signing of the agreement until the end of the initial intended completion date or extensions granted for reasons attributed to the Employer by the Engineer.
3. The Contractor shall not be entitled to any benefit arising from the price adjustment clause for extension in the contract period for reasons attributed to the Contractor.
4. In the Force Majeure event the price escalation clause shall apply.

31.2. Procedure

1. Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with following principles and procedures and as per formula given in the contract data.
2. The price adjustable shall be determined during each quarter from the formula given in the contract data.
3. Following expression and meaning are assigned to the work done during each quarter:
   R = Total value of work during the quarter. It would include the amount of secured advance granted, if any, during the quarter, less the amount of secured advance recovered, if any during the quarter, less value of material issued by the department, if any, during the quarter.
4. Weightages of various components of the work shall be as per the Contract Data.

31.3. To the extent that full compensation for any rise or fail in costs to the contractor is not covered by the provisions of this or other clauses in the contract the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

31.4. The index relevant to any quarter, for which such compensation is paid, shall be the arithmetical average of the indices relevant of the calendar month.

31.5. For the purpose of clarity it is pointed out that the price adjustment may be either positive or negative, i.e. if the price adjustment is in favour of the Employer, the same shall be recovered from the sums payable to the Contractor.

32. Mobilization and Construction Machinery Advance

32.1. Payment of advances shall be applicable if provided in the Contract Data.

32.2. If applicable, the Engineer in Charge shall make interest bearing advance payment to the contractor of the amounts stated in the Contract Data, against provision by the contractor of an unconditional Bank Guarantee in a form and by a nationalized/ scheduled banks, in the name as stated in the Contract Data in amounts equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the contractor.

32.3. The rate of interest chargeable shall be as per Contract Data.

32.4. The construction machinery advance, if applicable, shall be limited to 80% of the cost of construction machinery and admissible only for new construction machinery.

32.5. The advance payment shall be recovered as stated in the Contract Data by deducing proportionate amounts from payment otherwise due to the Contractor. No account shall be taken of the advance payment or its recovery in assessing valuations of work done, variations, price adjustments, compensation events, or liquidated damages.

33. secured Advance

33.1. Payment of Secured Advance shall be applicable if provided in the Contract Data.

33.2. If applicable, the Engineer shall make advance payment against materials intended for but not yet incorporated in the Works and against provision by the contractor of an unconditional Bank Guarantee in a form and by a nationalized/ scheduled bank, in the name as stated in the Contract Data, in amounts equal to the advance payment. The guarantee shall remain effective until the advance payment has been adjusted, but the amount of the guarantee shall be progressively reduced by the amounts adjusted by the contractor.

33.3. The amount of secured advance and conditions to be fulfilled shall be as stipulated in the Contract Data.

33.4. The Secured Advance paid shall be recovered as stated in the Contract Data.

34. Payment Certificates

The payment to the contractor will be as follows for construction work:

(a) The Contractor shall submit to the Engineer monthly statements of the value of the work executed less the cumulative amount certified

previously, supported with detailed measurement of the items of work executed.

(b) The Engineer shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.

(c) The value of work executed shall be determined, based on the measurements approved by the Engineer/ Engineer-in-charge.

(d) The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed:

(e) The value of work executed shall also include the valuation of Variations and Compensation Events.

(f) All payments shall be adjusted for deductions for advance payment, security deposit, other recoveries in terms of contract and taxes at source as applicable under the law.

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

(h) Payment of intermediate certificate shall be regarded as payments by way of advance, against the final payment and not as payments for work actually done and completed.

(i) Intermediate payment shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or be considered as an admission of the due performance of the contractor any part thereof, in any respect or the occurring of any claim.

(j) The payment of final bill shall be governed by the provisions of clause 36 of GCC.

E. Finishing the Contract

35. Completion Certificate

35.1. A Completion Certificate in the prescribed format in Contract Data shall be issued by the Engineer-in-Charge after physical completion of the Work.

35.2. After final payment to the Contractor a Final Completion Certificate in the prescribed format in the Contract Data shall be issued by the Engineer-in Charge.

36. Final Account

36.1. The Contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable for works under the Contract within 21 days of issue of certificate of physical completion of works. The Engineer shall issue a Defects Liability Certificate and certify any payment that is due to the Contractor within 45 days of receiving the Contractor's account if it is correct and complete. If the account is not correct or complete, the

Engineer shall issue within 45 days a schedule that states the scope of the corrections or additions that are necessary. If the Account is still unsatisfactory after it has been resubmitted, the matter shall be referred to the Competent Authority as defined in the Contract Data, who shall decide on the amount payable to the Contractor after hearing the Contractor and the Engineer in Charge.

36.2. In case the account is not received within 21 days of issue of Certificate of Completion as provided in clause 32.1 above, the Engineer shall proceed to finalize the account and issue a payment certificate within 28 days.

F. Other Conditions of Contract

37. Currencies

All payments will be made in Indian Rupees.

38. Labour

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

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

39. Compliance with Labour Regulations

39.1. During continuance of the Contract, the Contractor and his Sub Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the, State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that, are applicable to construction industry are given in the Contract Data. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made their under, regulations or notifications including amendments, If the Employer is caused to pay or reimburse, such amounts as may .be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/ byelaws/

Acts/Rules / regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct from any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer. The employees of the Contractor and the Sub Contractor in no case shall be treated as the employees of the Employer at any point of time.

40. Audit and Technical Examination

Government shall have the right to cause an audit and technical examination of the works and the final bill of the contract including all supporting vouchers abstract etc. to be made after payment of the final bill and if as a result of such audit and technical examination any sun is found to have been overpaid in respect of any work done by the contractor under the contract or any work claimed by him to have been done under the contract and found not to; have been executed, the Contractor shall be liable to refund the amount of overpayment and it shall be lawful for Government to recover the same from him in the manner prescribed in clause 24 above and if it is found that the Contractor was paid less than what was due to him, under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by Government to the Contractor.

41. Death or Permanent Invalidity of Contractor

If the Contractor is an individual or a proprietary concern, partnership concern, dies during the currency of the contract or becomes permanently incapacitated, where the surviving partners are only minors, the contract shall be closed without levying any damages/compensation as provided for in clause 28.2 of the contract agreement However, if the competent authority is satisfied about the competence of the survivors, then the competent authority shall enter into a fresh agreement for the remaining work strictly on the same terms and conditions under which the contract was awarded.

42. Jurisdiction

This contract has been entered into the State of Madhya Pradesh and its validity, construction, interpretation and legal effect shall be subjected to the courts at the place where this agreement is entered into. No other jurisdiction shall be applicable.

[End of GCC]

Contract Data

Clause Ref.	Particulars	Data
1.14	Employer	Jabalpur Smart City Limited
1.15	Engineer	Person as designated by the Engineer-in-Chief JSCL, Jabalpur / Municipal Council / Nagar Parishad (Jabalpur)
1.16	Engineer in Charge	Executive Engineer of the department in-charge of Project.
1.22	Stipulated period of completion	18 Months (including Rainy Season)
3	Language & Law of Contract	English & Indian Contract Act, 1872
4	Address & contact details of the Contractor	As per Annexure H
	Address & contact details of the Employer/ Engineer - phone, Fax, e-mail	Jabalpur Smart City Limited, Manas Bhawan, Wright Town, Jabalpur, Madhya Pradesh, 482002, India +91-7611136800 E-Mail: ictpmu@jscljabalpur.org, abdpmu@jscljabalpur.org,
5	Subcontracting permitted for the Contract Value	not more than 25 % of tender amount
6	Technical Personnel to be provided by the contractor – requirement	As per Annexure I (Format I-3)
	Penalty, if required Technical Personnel not employed	Rs. 20,000/- per month per Technical Personnel For 1-3 in As per Annexure–I (Format: I – 3) Rs. 15,000/- per month per Technical Personnel
10	Specifications	As per Annexure E
	Drawings	As per Annexure - N
12	Competent Authority for deciding dispute under Dispute Resolution System	CEO, JSCL, Jabalpur
	Appellate Authority for deciding dispute under Dispute Resolution System	Executive Director, JSCL, Jabalpur
13	Period of submission of work programme	15 days from the date of signing the agreement
	Period for submission of updated construction program	Three months (Quarterly)
	Amount to be withheld for not submitting construction program in prescribed period	Rs. 1,00,000/- per event

14	Competent Authority for granting Time Extension	CEO , JSCL, Jabalpur	
15	Milestones laid down for the contract	Yes	No
	If Yes, details of Milestones	As per Annexure - O	
	Liquidated damage	As per Annexure - P	
17	List of equipment for lab	As per Annexure - Q	
	Time to establish lab	Before execution of work at site	
17	Penalty for not establishing field Laboratory	Rs. 1,00,000/- per month for the delay	
18	Defect Liability Period	36 Months after issue of final completion certificate	
21	Competent Authority for determining the rate	CEO , JSCL, Jabalpur	
27	Any other condition for breach of contract		
28	Penalty	Penalty Shall include (a) Security Deposit as per clause 30 of General Conditions of Contract, and (b Liquidated Damages imposed as per clause 15 or Performance Security (Guarantee) including Additional Performance Security (Guarantee), if any, as per clause 29 of General Conditions of Contract, whichever is higher	
29	Performance guarantee (Security) shall be valid up to	Till issue of final Completion Certificate as per Clause 35.1	
30	Security Deposit to be deducted from each running bill	At the rate of 5%.	
	Maximum limit of deduction of Security Deposit	Up to 5% of Final Contract Amount.	
31	Price Adjustment formula and procedure to calculate	Deleted	
31.1 (1)	Price adjustment shall be applicable	Deleted	
32	32.1 Mobilization Advance Applicable	Yes	
	32.2 If yes, Unconditional Bank Guarantee of 110 % of Mobilization Advance	In the format prescribed in Annexure - S	
	32.3 If yes, Rate of interest chargeable on advances	Interest rate (computed quarterly) as per notified bank rate on the date of inviting tender	

32	32.4 If yes, Type & Amount of Advance payment that can be paid	1. Mobilization advance-Not more than 10% of contract amount
32	32.5 If yes, Recovery of advance payment	Recovery of Mobilization advance shall commence when 10% of the contract amount is executed and recovery of total advance shall be done on pro-rata basis and shall be completed by the time work equivalent to 80% of the contract amount is executed. In addition to the recovery of principal amount, recovery of interest shall be carried out as calculated on the outstanding amount of principal at the close of each month. The interest shall be accrue from the day of payment of advance and the recovery of interest shall commence when 10% of the contract amount is executed and shall be completed by the time work equivalent to 80% of the contract amount is executed.
33	33.1 Secured Advance Applicable	No Secured Advance payable.
	33.2 if yes, Unconditional Bank Guarantee	Not Applicable
	33.2 if yes, Amount of Secured Advance	Not Applicable
	33.3 if yes, Conditions for secured advance	Not Applicable
	33.4 if yes, Recovery of Secured advance	Not Applicable
35	Completion Certificate – after physical completion of the Work	As per Annexure - U
	Final Completion Certificate – after final payment on completion of the Work	As per Annexure- V
36	Competent Authority	CEO, JSCL, Jabalpur
37	Salient features of some of the major labour laws that are applicable	As per Annexure-W

ANNEXURE—N
(See clause 10 of Section 3— GCC)

List of Drawings

S.No.	NAME OF DRAWING
1.	SITE PLAN_PHASE PLAN
2.	GROUND FLOOR PLAN-PROPOSAL DRAWING
3.	FIRST FLOOR PLAN-PROPOSAL DRAWING
4.	TERRACE FLOOR PLAN-PROPOSAL DRAWING
5.	ELEVATION-FRONT-PROPOSAL DRAWING
6.	ELEVATION-REAR-PROPOSAL DRAWING
7.	ELEVATION-SIDE-1-PROPOSAL DRAWING
8.	ELEVATION-SIDE-2-PROPOSAL DRAWING
9.	SECTION-AA'-PROPOSAL DRAWING
10.	SECTION-BB'-PROPOSAL DRAWING
11.	SECTION-CC'-PROPOSAL DRAWING
12.	SECTION-DD'-PROPOSAL DRAWING
13.	SECTION-EE'-PROPOSAL DRAWING
14.	SECTION-FF'-PROPOSAL DRAWING
15.	SECTION-OO'-PROPOSAL DRAWING
16.	SECTION-PP'-PROPOSAL DRAWING
17.	RCP GROUND FLOOR PLAN-PROPOSAL DRAWING
18.	RCP FIRST FLOOR PLAN-PROPOSAL DRAWING
19.	PROPOSED ELECTRICAL LAYOUT-SITE REFF. FLOOR PLAN
20.	PROPOSED ELECTRICAL LAYOUT-GROUND FLOOR PLAN
21.	PROPOSED ELECTRICAL LAYOUT-FIRST FLOOR PLAN
22.	PROPOSED A.C. LAYOUT-SITE REFF. FLOOR PLAN
23.	PROPOSED AIR CONDITIONING LAYOUT- GROUND FLOOR PLAN
24.	PROPOSED AIR CONDITIONING LAYOUT- FIRST FLOOR PLAN
25.	PROPOSED_VAULTED ROOF SECTION AND DETAIL
26.	ARCHITECTURAL ELEMENTS-1
27.	ARCHITECTURAL ELEMENTS-2
28.	ARCHITECTURAL ELEMENTS-3
29.	DOOR WINDOW SCHEDULE GROUND FLOOR_NUMBERING
30.	DOOR WINDOW SCHEDULE FIRST FLOOR_NUMBERING
31.	DOOR WINDOW SCHEDULE GROUND FLOOR_TYPE
32.	DOOR WINDOW SCHEDULE FIRST FLOOR_TYPE
33.	DOOR DETAIL DRAWING-1
34.	DOOR DETAIL DRAWING-1
35.	DOOR DETAIL DRAWING-1
36.	WINDOW DETAIL DRAWING-1

ANNEXURE—O
(See clause 15 of Section 3 -GCC)

Details of Milestones

Mile Stone 1:-

1/8th of the whole work before 1/4th of the whole time allowed has elapsed,

Mile Stone 2:-

3/8th of the whole work before 1/2th of the whole time allowed has elapsed

Mile Stone 3:-

3/4th of the whole work before 3/4th of the whole time allowed has elapsed

Mile Stone 4:-

Complete work within the stipulated time.

ANNEXURE—P
(See clause 15 of Section 3-GCC

Compensation for Delay

If the contractor fails to achieve the milestones, and the delay in execution of work is attributable to the contractor, the Employer shall retain an amount from the sums payable and due to the contractor as per following scale –

i. Slippage up to 25% in financial target during the milestone under consideration 2.5% of the work remained unexecuted in the related time span.
ii. Slippage exceeding 25% but Up to 50% in financial target during the milestone under consideration - 5% of the work remained unexecuted in the related time span.
iii. Slippage exceeding 50% but Up to 75% in financial target during the milestone under consideration -7.5% of the work remained unexecuted in the related time span,
iv. Slippage exceeding 75% in financial target during the milestone under consideration-10% of the work remained unexecuted in the related time span.

Note: For arriving at the dates of completion of time span related to different milestones, delays which are not attributable to the Contractor shall be considered. The slippage on any milestone is if made good in subsequent milestones or at the time of stipulated period of completion, the amount retained as above shall be refunded. In case the work is not completed within the stipulated period of completion along with all such extensions which are granted to the Contractor for either Employer's default or Force Majeure, the compensation shall be levied on the contractor at the rate of 0.05% per day of delay limited to a maximum of 10% of contract price. The decision of Superintending Engineer shall be final and binding upon both the parties.

List of Equipment for Quality Control Lab

PRICE ADJUSTMENT

The formulas for adjustment of price are as follow:

R = Value of work as defined in Clause 31.2(3) of General Conditions of Contract

Weightages* of component in the work

S.No.	Component	Percentage of Component in the work
1.	Cement -P_c	18%
2.	Steel -P_s	13%
3.	Bitumen –P_b	0%
4.	POL P_f	5%

* Weightages of various components of the work shall be as determined by the competent Technical authority.

Adjustment for cement component

(ii) Price adjustment for increase or decrease in the cost of cement procured by the contractor shall be paid in accordance with the following formula:

$V_c = 0.85 \times Pc/100 \times R \times (C1-C0)/C0$
V_c = increase or decrease in the cost of work during the month under Consideration due to changes in rates for cement.
C0= The all India wholesale price index for Grey cement on the date of opening of Bids as published by the Ministry of Industrial Development, Government of India, New Delhi (www.eaindustry.nic.in)

C1= The all India average wholesale price Index for grey cement for the month under consideration as published by Ministry Government of India, New Delhi. (www. eaindustry.nic.in)
Pc= Percentage of cement component of the work

Bank Guarantee Form for Mobilization and Construction Machinery Advance

To
_____ [name of Employer)
_____ [address of Employer]
_____ [name of Contractor]

In accordance with the provisions of the General Conditions of Contract, clause 31 ("Mobilization and Construction Machinery Advance") of the above-mentioned Contract _____[name and address of Contractor] (hereinafter called "the Contractor")' shall deposit with _____ [name of Employer) a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____[amount of Guarantee]* _____[in words].

We, the _____ [bank of financial institution], as instructed by the Contractor., agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to _____ [name of Employer] on his first demand without whatsoever right of obligation on our part and without his first claim to the Contractor, in the amount not exceeding '[amount of guarantee]*_____ [in words].

We further agree that no change or addition to or other modification of the terms of the Contractor or Works to be performed thereunder or of any of the Contract documents which may be made between _____[name of Employer] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the contract until _____ [name of Employer] receives full repayment of the same amount from the Contractor.
Yours truly,

Signature and Seal: _____
Name of Bank/Financial Institution: _____
Address: _____
Date: _____

* An amount shall be inserted by the Bank or Financial Institution representing the amount of the Advance Payment and denominated in Indian Rupees.

Bank Guarantee Form for Secured Advance

INDENTURE FOR SECURED ADVANCES

This indenture made the _____ day of _____ 20__ BETWEEN _____ (hereinafter called the contractor which expression shall where the context so admits or implies be deemed to include his executors, administrators and assigns) or the one part and the Employer of the other part.

Whereas by an agreement dated _____ (hereinafter called the said agreement) the contractor has agreed.

AND WHEREAS the contractor has applied to the Employer that he may be allowed advanced on the security of materials absolutely belonging to him and brought by him to the site of the works the subject of the said agreement for use in the construction of such of the works as he has undertaken to executive at rates fixed for the finished work (inclusive of the cost of materials and labour and other charges)

AND WHEREAS the Employer has agreed to advance to the Contractor the sum of Rupees _____ on the security of materials the quantities and other particulars of which are detailed in Accounts of Secured Advance attached to the Running Account Bill for the said works signed by the Contractor on _____ and the Employer has reserved to himself the option of making any further advance or advances on the authority of other materials brought by the Contractor to the site of the said works.

Now THIS INDENTURE WITNESSETH that in pursuance of the said agreement and in consideration of the sum of Rupees _____ on or before the execution of these presents paid to the Contractor by the Employer (the receipt where of the Contractor doth hereby 'acknowledge) and of such further advances (if any) as may be made to him as aforesaid the Contractor doth hereby covenant and agree with the President and declare as follows:

That the said sum of Rupees _____ so advanced by the Employer to

1. The Contractor as aforesaid and all or any further sum of sums advanced as aforesaid shall be employed by the Contractor in or towards expending the execution of the said works and for no other purpose whatsoever.
2. That the materials details in the said Account of Secured Advances which have been offered to and accepted by the Employer as security are absolutely the Contractor's own propriety and free from encumbrances of any kind and the contractor will not make any application for or receive a further advance, on the security Of materials which are not absolutely his own property and free from encumbrances of any kind and the Contractor indemnified the Employer against all claims to any materials in respect of which an advance has be made to him as aforesaid.
3. That the materials detailed in the said account of Secured Advances and all other materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereafter called the said materials) shall be used by the Contractor solely in the execution of the said works in accordance with the directions of the Engineer.
4. That the Contractor shall make at his own cost all necessary and adequate arrangements for the proper watch, safe custody and protection against all

risks of the said materials and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the Contractor's custody and on his own responsibility and shall at all times be open to inspection by the Engineer or any officer authorized by him. In the event of the said materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in a greater degree than is due to reasonable use and wear thereof the Contractor will forthwith replace the same with other materials of like quality or repair and make good the same required by the Engineer.

5. That the said materials shall not be removed from the site of the said works except with the written permission of the Engineer or an officer authorized by him on that behalf.
6. That the advances shall be repayable in full when or before the Contract receives payment from the Employer of the price payable to him for the said works under the terms and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done than on the occasion of each such payment the Employer-will be at liberty to make a recovery from the Contractor's bill for such payment by deducting there from the value of the said materials than actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amounts of the advances made under these presents were calculated.
7. That if the Contractor shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing of the Employer shall immediately on the happening of such default were payable by the Contractor to be the Employer together with interest thereon at twelve percent per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the Employer in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default of the Contractor and the Contractor hereby covenants and agrees with the Employer to reply and pay the same respectively to him accordingly.
8. That the Contractor hereby charges all the said materials with the repayment to the Employer of the said sum of Rupees_____ and any further sum of sums advanced as aforesaid and all costs, charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the power contained therein if and whenever the covenant for payment and repayment here-in-before contained shall become enforceable and the money owing shall not be paid in accordance there with the Employer may at any time thereafter adopt all or any of the following courses as he may deem best:

a) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the contractor in accordance with the provision in that behalf contained in the said agreement debiting the contractor with the actual cost of effecting such completion and the amount due to the contractor with the value of work done as if he had carried it out in accordance with the said agreement and at the rates thereby provided. If the

balance is against the contractor, he is to pay same to the Employer on demand.

b) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable or repayable to the Employer under these presents and pay over the surplus (if any) to the Contractor.
c) Deduct all or any part of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.

9. That except in the event of such default on the part of the contractor as aforesaid interest on the said advance shall not be payable.
10. That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been here-in-before expressly provided for the same shall be referred to the Employer whose decision shall be final and the provision of the Indian Arbitration Act for the time being in force shall apply to any such reference.

Annexure - U
(See clause 35 of Section 3 -GCC)

Physical Completion Certificate

Name of Work:
.....
.....
.....

Agreement No .....Date .....
Amount of Contract Rs .....
Name of Agency .....
Used MB No. .....

Last measurement recorded
a. Page No. & MB No. _____
b. Date _____

Certified that the above mentioned work was physically completed on .....(date) and taken over on .....(date) and that I have satisfied myself to best of my ability that the work has been done properly.

Date of issue

Sing & Designation

Annexure-V
(See clause 35 of Section 3-GCC)

Final Completion Certificate

Name of Work:
.....
.....
.....

Agreement no ..... Date .....

Name of Agency: .....

Used MB No. .....

Last measurement recorded
a: Page No. & MB No. _____
b. Date _____

Certified that the above mentioned work was physically completed on .....(date) and taken over on .....(date).

Agreemented amount Rs .....
Final Amount paid to contractor Rs. .....
Incumbency of officers for the work

I have satisfied myself to best of my ability that the work has been done properly.

Date of issue

Sing & Designation

Salient Features of Some Major Labour Laws Applicable

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

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

c) **Employees P.F. and Miscellaneous Provision Act 1952:** The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%), The benefits payable under the Act are:

i. Pension or family pension on retirement or death as the case may be.
ii. Deposit linked insurance on the death in harness of the worker.
iii. Payment of P.F. accumulation on retirement/death etc.

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

e) **Contract Labour (Regulation & Abolition) Act 1970**: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ prescribed minimum (say 20) or more contract labour.

f) **'Minimum Wages Act 1948**; - The Employer is to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads, runways is scheduled employment.

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

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

i) **Payment of Bonus Act 1965**: - The Act is applicable to all establishments employing prescribed minimum (say, 20) or more workmen. The Act provides for payments of annual bonus within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. States may have different number of employment size.

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

k) **Industrial Employment (Standing Orders) Act 1946**: - It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and gets these certified by the designated Authority.

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

m) **Child Labour (Prohibition & Regulation) Act 1986**: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations of employment of children in all other occupations and processes. Employment of child labour is prohibited in building and construction industry.

n) **Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act 1979**: - The Act is applicable to an establishment which employs prescribed minimum (say, five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as Housing, Medical-Aid, Traveling expenses from home up to the establishment and back etc.

o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996 - All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodations for workers near the work place etc. The Employer to whom the Act applies

has to obtain a registration certificate from the Registering Officer appointed by the Government.

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

SECTION 3

Conditions of Contract

Part – II Special Conditions of Contract [SCC]

NIL

SECTION 4

Bill of Quantities

(ATTACHED WITH THIS TENDER SEPERATELY)

SECTION 5

Agreement Form

AGREEMENT

This agreement, made on the _____ day of _____ between _____ (name and address of Employer) (hereinafter called "the Employer") and_____ (name and address of contractor) hereinafter called "the Contractor" of the other part.

Whereas the Employer is desirous that the Contractor execute _____ _____ (name and identification number of Contract) (hereinafter called "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a cost of Rs. _____

NOW THIS AGREEMENT WITNESSED as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the conditions of contract hereinafter referred to and they shall be deemed to form and be read and construed as part of this Agreement.

2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be ready and construed as part of this Agreement viz.

    i. Letter of Acceptance

    ii. Contractor's Bid

    iii. Condition of Contract: General and Special

    iv. Contract Data

    v. Bid Data

    vi. Drawings

    vii. Bill of Quantities and

    viii. Any other documents listed in the Contract Data as forming part of the Contract.

In witnessed whereof the parties there to have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____ was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said _____ _____ in the presence of:

Binding Signature of Employer _____

Binding Signature of Contractor _____